NATIONAL RIVER CONSERVATION DIRECTORATE
Department of Water Resources, River Development & Ganga Rejuvenation
Ministry of Jal Shakti, Government of India

CAMP

Condition Assessment and Management Plan for Six River Basins

(Mahanadi, Narmada, Godavari, Krishna, Cauvery, & Periyar)

STAKEHOLDERS' CONCLAVE

Jointly Organized by

cCauvery

भारतीय विज्ञान संस्थान

Centre for Cauvery River Basin Management Studies, Indian Institute of Science, Bengaluru

&

cGanga

Centre for Ganga River Basin Management and Studies Indian Institute of Technology Kanpur

September 25-26, 2025, AV Rama Rao Audiotorium, IISc, Bengaluru

National River Conservation Directorate (NRCD)

The National River Conservation Directorate, functioning under the Department of Water Resources, River Development & Ganga Rejuvenation, and Ministry of Jal Shakti providing financial assistance to the State Government for conservation of rivers under the Centrally Sponsored Schemes of 'National River Conservation Plan (NRCP)'. National River Conservation Plan to the State Governments/ local bodies to set up infrastructure for pollution abatement of rivers in identified polluted river stretches based on proposals received from the State Governments/ local bodies.

www.nrcd.nic.in

Centre for Ganga River Basin Management and Studies (cGanga)

cGanga is a think tank formed under the aegis of NMCG, and one of its stated objectives is to make India a world leader in river and water science. The Centre is headquartered at IIT Kanpur and has representation from most leading science and technological institutes of the country. cGanga's mandate is to serve as think-tank in implementation and dynamic evolution of Ganga River Basin Management Plan (GRBMP) prepared by the Consortium of 7 IITs. In addition to this it is also responsible for introducing new technologies, innovations and solutions into India.

www.cganga.org

Centres for Cauvery River Basin Management Studies (cCauvery)

The Centres for Cauvery River Basin Management Studies (cCauvery) is a Brain Trust dedicated to River Science and River Basin Management. Established in 2024 by IISc Bengaluru and NIT Tiruchirappalli, under the supervision of cGanga at IIT Kanpur, the centre serves as a knowledge wing of the National River Conservation Directorate (NRCD). cCauvery is committed to restoring and conserving the Cauvery River basin and its resources through the collation of information and knowledge, research and development, planning, monitoring, education, advocacy, and stakeholder engagement.

www.ccauvery.org

Acknowledgment

This event is the collective effort of numerous experts, institutions, and organizations in particular, the PIs of cGanga and other centres engaged by NRCD, Ministry of Jal Shakti, GoI under the CAMP Project. The valuable contributions of stakeholders from various State and Central departments are also sincerely acknowledged. Contributions to the photographs and images by individuals are gratefully recognized and appreciated.

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Preface

It is with immense pleasure and a profound sense of purpose that I present the *Proceedings of the CAMP Conclave 2025*, held at the Indian Institute of Science (IISc), Bengaluru. This Conclave marks a defining milestone in India's ongoing journey towards comprehensive river basin management and sustainable water stewardship—a journey that began with the visionary proclamation of the President of India in the Joint Session of Parliament.

The **Condition Assessment and Management Plan (CAMP)** Project, initiated by the **National River Conservation Directorate (NRCD)** under the **Department of Water Resources, River Development & Ganga Rejuvenation (DoWR, RD & GR), Ministry of Jal Shakti (MoJS)**, represents a bold and systematic expansion of the integrated basin-level approach pioneered under the **Namami Gange Programme** and the **Ganga River Basin Management Plan (GRBMP)** developed by the Consortium of Seven IITs. Extending this framework to six other major river systems—the Mahanadi, Narmada, Godavari, Krishna, Cauvery, and Periyar—the CAMP Project exemplifies a collaborative national mission uniting **twelve premier institutions of India**, including IITs, NITs, IISc, and CSIR-NEERI, under the leadership and coordination of **cGanga, IIT Kanpur**.

These Proceedings present a comprehensive record of the deliberations and outcomes of the Conclave, including detailed accounts of the **Thematic Panel Discussions and Record Notes of the 2nd Scientific Advisory Committee (SAC) Meeting**, chaired by **Mr. V. L. Kantha Rao**, Secretary, DoWR, RD & GR, MoJS, Government of India, along with photographs and documentation of the sessions. Together, they capture the intellectual rigour, collaborative spirit, and shared vision that shaped this landmark event.

This Conclave was not merely a forum to showcase progress, but a vital platform for dialogue, exchange, and consensus-building among scientists, policymakers, administrators, and practitioners. The insights shared and the feedback received during these sessions will serve as guiding beacons for translating scientific understanding into actionable strategies, ensuring that our collective efforts contribute meaningfully to the preservation, rejuvenation, and sustainable management of India's rivers.

I take this opportunity to extend my **deepest gratitude** to **Mr. V. L. Kantha Rao**, Secretary, DoWR, RD & GR, MoJS, for his vision, guidance, and leadership in steering the national mission on river conservation, and to **Mr. Rajeev Kumar Mittal**, Project Director, NRCD, for his dynamic coordination, sustained support, and unwavering commitment that have been pivotal to the progress of the CAMP Project.

My sincere appreciation also goes to the **Team Members of NRCD**, the **Teams of all CAMP Institutions**, including **Team cGanga**, and the **officials of the concerned State Governments** for their dedication and contribution. I also wish to place on record my heartfelt thanks to the **panel members, participants**, and the **host institution—Indian Institute of Science (IISc), Bengaluru**—for their exemplary support and hospitality. Special recognition is due to **Professor Govindan Rangarajan**, Director, IISc, **Dr. Praveen C. Ramamurthy**, and **Professor R. Manjula**, Team Leads of cCauvery, whose leadership and tireless efforts ensured the smooth and near-flawless organisation of this two-day Conclave.

As we reflect on the discussions and outcomes captured in this volume, let us reaffirm our shared resolve to nurture, protect, and restore our river ecosystems through knowledge, collaboration, and sustained action. The CAMP Project stands as a shining example of what can be achieved when science, governance, and community come together in pursuit of a common goal—the rejuvenation of India's rivers for a sustainable and resilient future.

Dr. Vinod Tare
Lead and Coordinator, CAMP Project, cGanga, IIT Kanpur
Founder and Advisor,
Centre for Ganga River Basin Management & Studies (cGanga), IIT Kanpur

From the organizer's Desk

It gives us great pleasure to present the *Proceedings of the CAMP Conclave 2025*, held at the Indian Institute of Science (IISc), Bengaluru, on *25–26 September 2025*. The two-day event, hosted by IISc under the aegis of the National River Conservation Directorate (NRCD), *Ministry of Jal Shakti, Government of India*, brought together distinguished participants from government, academia, and research institutions across the country.

We are honoured to have had the opportunity to facilitate this important national gathering and to support cGanga, IIT Kanpur, in its role as the lead coordinator of the CAMP initiative. The event saw active engagement from multiple institutions and stakeholders, and IISc was privileged to serve as the venue for this collaborative and forward-looking dialogue.

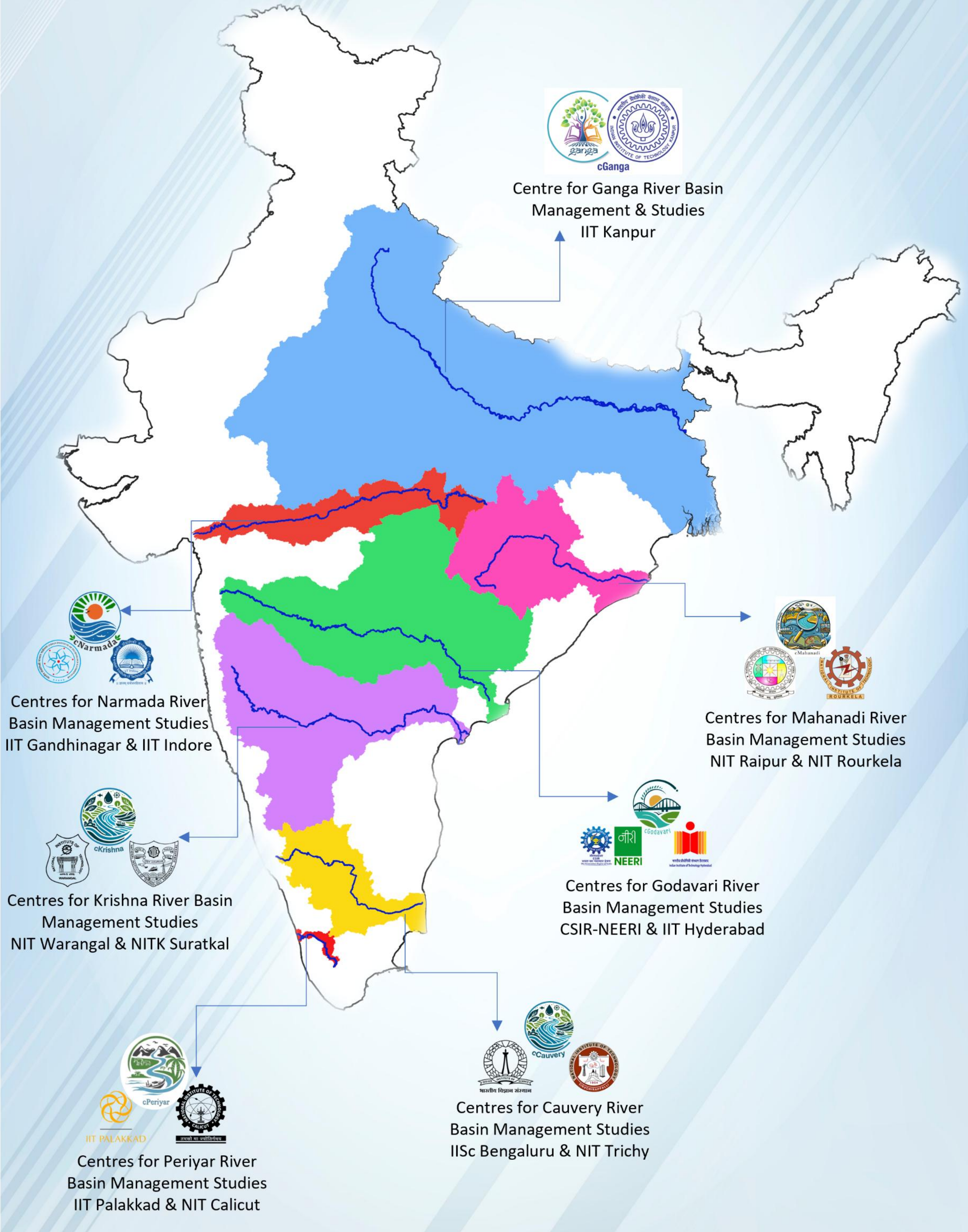
On behalf of the organising committee, I express my heartfelt appreciation to Mr. V. L. Kantha Rao, Secretary, *DoWR, RD & GR, MoJS*, and Mr. Rajeev Kumar Mittal, Project Director, *NRCD*, for their leadership and guidance. We also extend our sincere thanks to Team cGanga, all CAMP partner institutions, and the numerous officials and experts who contributed to the success of the Conclave.

A special word of gratitude goes to the cCauvery team at IISc Bengaluru & NIT Trichy, whose dedication and meticulous coordination ensured the smooth organisation of this event. We also acknowledge the efforts of the media, documentation, logistics, and technical support teams, whose professionalism and commitment were instrumental in the seamless execution of the Conclave.

It has been a privilege for IISc to host this gathering of minds and institutions united in their commitment to the sustainable management of India's rivers. We look forward to continuing this collaboration in the forthcoming phases of the CAMP initiative and future national endeavours towards holistic river basin management.

Prof. Praveen C. Ramamurthy
Chair, Organising Committee, CAMP Conclave 2025
Indian Institute of Science (IISc), Bengaluru

Content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Day 1

CAMP

Condition Assessment and Management Plan for Six River Basins'

[Mahanadi, Narmada, Godavari, Krishna, Cauvery & Periyar]

Stakeholders' Conclave

Date & Venue: 25 September 2025, A V Rama Rao Auditorium, IISc Bengaluru

Session A
District River Management Plans (DRMPs) vis-à-vis Smart Cities and Villages

Discussion Report

Executive Summary

Moderator:
Dr. Vinod Tare
Lead and Coordinator, CAMP Project, cGanga, IIT Kanpur

Panelist:
1. **Dr. Rakesh Kadaverugu** (cGodavari, CSIR-NEERI Nagpur)
2. **Dr. Sitaram Taigor** (Environment Expert/Nodal officer-Namami Gange Programme)
3. **Er. Lingaraj Gouda** (Engineer i n Chief, Planning and Design, Department of Water Resources, Odisha)
4. **Shri S Vishwanath** (BIOME, Karnataka)
5. **Prof. N V Umamahesh** (cKrishna, NIT Warangal)
6. **Prof. Pranab K Mohapatra,** (cNarmada, IIT Gandhinagar)
7. **Prof. Satish Kumar D** (cPeriyar, NIT Calicut)
8. **Dr. Jayaramu K P** (Consultant, KIUWMIP, Mangaluru, Karantaka)

Lead Discussant:
1. **Shri K Jaiprakash** (Technical Advisor to Hon'ble Deputy Chief Minister of Karnataka)
2. **Dr Rajesh Biniwale** (cGodavari, CSIR- NEERI)
3. **Shri Vikas Rajoria** (WRD, MP)

Setting the Scene

India's rivers are under mounting pressure from rapid urbanization, agricultural intensification, industrial growth, and climatic variability. The convergence of **Smart Cities**, **Smart Villages**, and **catchment-scale management** offers a unique opportunity to integrate infrastructure development with ecological restoration. Yet, the existing river management approaches remain fragmented split across sectors and institutions with minimal synchronization between hydrological boundaries and administrative jurisdictions.

The **District River Management Plan (DRMP)** concept has emerged as the pivotal operational tool to bridge this gap. It localizes the principles of **integrated river basin management (IRBM)** by positioning the *district* as the basic planning and implementation unit—where data, institutions, and community action converge. DRMPs enable coordination between urban and rural water systems, closing the water loop through local storage, reuse, and recharge, aligning with the *330–35-day operational planning horizon* for adaptive water governance.

Context

The Panel 1 discussion under the CAMP coordination framework examined the implementation of DRMPs as the practical mechanism for achieving basin-scale river rejuvenation. The panel underscored that districts are the most pragmatic units for integrating administrative and hydrological realities, ensuring effective coordination between local governance, scientific management, and community participation.

The first CAMP panel discussed District River Management Plans (DRMPs) as the practical route to basin-scale river rejuvenation. It emphasized district- level water budgeting, multi-tier governance, and the integration of technologies like AI/ML, SCADA, and Digital Twin systems. The panel also called for stronger community participation, data interoperability, and a hybrid infrastructure model—centralized for irrigation and decentralized for wastewater and stormwater management.

Key Insights

1. **Decentralization:** District-level planning is essential for actionable river management. Each district should maintain a **10-daily water budget** analogous to financial budgeting.

2. **Institutional Coordination:** A **multi-tier governance model**—from Gram Panchayats to Basin Authorities—is needed to link hydrological and administrative systems.

3. **Technology Integration:** Use of **AI/ML, SCADA**, and **Digital Twin** systems for real-time monitoring can enable adaptive water management.

4. **Community and Citizen Science:** Engagement of citizens, schools, and local institutions is indispensable for participatory monitoring and long-term stewardship.

5. **Knowledge Gaps:** There is a critical need for interoperable data systems, capacity building, and realistic regulatory norms for effluent management.

6. **Infrastructure Models:** A hybrid approach—centralized for irrigation, decentralized for wastewater and stormwater—was recommended.

Major Takeaways

Focus Area	Key Takeaway
Planning Scale	District-level integration of administrative and hydrological data is optimal.
Governance	DRMCs at district level with upward linkages to state and national bodies.
Monitoring	Ten-day water budgeting supported by real-time digital platforms.
Community Role	Empowered local scouts and citizen scientists enhance ownership.
Technology	AI/ML and digital twins for predictive water management.
Data Systems	Unified, interoperable dashboards across agencies.

Recommendations

Institutional Framework: Establish *District River Management Committees (DRMCs)* chaired by District Magistrates; coordinate through *State Steering Committees* under Divisional Commissioners and Chief Secretaries.

Technical Systems: Develop *Digital River Basin Platforms* and *District Water Dashboards* for dynamic monitoring and open-data sharing.

Capacity Building: Create *River Knowledge Cells* in universities; train district officers in hydrological modelling and GIS.

Finance: Enable *local fund pools* through CSR, PPPs, and water-reuse credits for O&M sustainability.

Policy Alignment: Integrate DRMPs with *National Water Policy (2012)*, *GRBMP*, *Jal Jeevan Mission*, and the *Samarth Ganga Framework* emphasizing *Jan Bhagidari* and *Jan Andolan*.

Panel 1 proposed a district-centric model for river rejuvenation through District River Management Committees, supported by Digital River Basin Platforms, Water Dashboards, and River Knowledge Cells. It emphasized local financing via CSR, PPPs, and water-reuse credits, aligning DRMPs with national frameworks like the Jal Jeevan Mission and Samarth Ganga. DRMPs were highlighted as the bridge between basin-scale planning and on-ground action, advancing river-centric development and SDG-6 goals.

Conclusion

Panel 1 affirmed that DRMPs are the **bridge between basin-scale vision and ground-level implementation**. They empower districts to manage water as both a local asset and shared natural system, guided by science, inclusivity, and accountability. This district-centric framework represents a vital step toward achieving **river-centric development, water security, and SDG-6 compliance**.

Full Report

1. Setting the Scene and Context

Rivers are the lifelines of India's ecological and economic systems, yet their management has remained siloed divided between urban planning, irrigation, and pollution control agencies. The **Smart Cities Mission**, **Jal Jeevan Mission**, and **Ganga Rejuvenation Program** have created unprecedented investments in the water sector, but integration at the district scale is still missing.

The **District River Management Plan (DRMP)** framework fills this critical void by enabling a convergence of **hydrological data**, **infrastructure planning**, and **community participation**. It positions districts as operational nodes connecting local actions with basin-level goals— bridging the administrative–hydrological divide.

In this context, the Panel 1 discussion was convened to define how DRMPs can become the fundamental planning instruments to actualize India's commitment to *river-centric and sustainable development*.

2. Key Themes and Discussion Summary

2.1 Decentralization and District-Level Planning

Participants agreed that effective river management must be decentralized, with **districts as the basic operational unit**. Water budgeting was equated to financial budgeting—requiring ten-daily updates on water availability, consumption, and demand.

Panelists emphasized that district plans should be **aggregated upward** into basin-level frameworks, enabling bottom-up coherence and integration. Local ownership through **District Planning Committees** ensures accountability and resource optimization.

2.2 Institutional Frameworks and Governance Coordination

Existing institutions—State Water Resources Boards, District Ganga Committees, River Basin Authorities—operate in silos. Coordination, not duplication, is required. The **District River Management Committee (DRMC)** chaired by the District Magistrate, supported by Divisional and State Steering Committees, was proposed to align administrative action with hydrological boundaries.

Multi-level governance linking **Gram Panchayat → District → State → National** levels was considered essential. Mapping existing frameworks will identify institutional overlaps and capacity gaps.

2.3 Water Budgeting and Real-Time Monitoring

Dynamic water-balance assessments and **real-time monitoring** of surface and groundwater are indispensable.

Key recommendations included:

- Developing **digital twins** for watersheds at 1–2 km resolution.
- Utilizing **AI/ML and SCADA** for continuous data-driven management.
- Maintaining **10-daily water budgets** for adaptive decision-making.
- Integrating **green water (soil moisture)** management alongside blue water.

These measures will help districts anticipate floods, droughts, and seasonal variations, ensuring resilient governance.

2.4 Integration of Traditional Knowledge and Citizen Science

The panel recognized that rejuvenation must blend **traditional wisdom** (step wells, tanks, recharge ponds) with **modern science**.

Citizen involvement was seen as indispensable:

- Training communities for **low-cost water monitoring**.
- Engaging **schools and colleges** in river-adoption programs.
- Documenting and integrating **local knowledge** into planning.

This approach enhances both data density and civic ownership.

2.5 Technological and Regulatory Challenges

Persistent challenges include:

- Fragmented data systems.
- Poor STP performance and maintenance.
- Unrealistic effluent norms.
- Over-centralized data control.

Panellists urged creation of **interoperable digital platforms** accessible to all governance tiers and **capacity building** for data interpretation and policy linkage.

2.6 Centralized vs. Decentralized Infrastructure

Centralized systems are better suited for irrigation and bulk conveyance, whereas **decentralized systems** are more effective for sewage, stormwater, and local reuse. The consensus supported **hybrid models** combining centralized oversight with decentralized execution, allowing flexibility across India's diverse hydro-ecological contexts.

3. Key Takeaways

Thematic Area	Key Insight / Consensus
Governance	Multi-tier coordination from village to basin level is essential.
Planning Unit	Districts integrate administrative and hydrological data most effectively.
Monitoring	Ten-day water budgeting enables adaptive management.
Technology	AI, ML, and digital twins enhance predictive capability.
Community Role	Empower scouts, Panchayats, and citizen scientists for participatory monitoring.
Regulation	Effluent and STP norms must be realistic and enforceable. *Making stringent norms do not improve the situation rather adoptable and affordable norms yield better results.*
Finance	Sustainable, localized financial models ensure long-term viability.
Data Governance	Unified dashboards improve transparency and integration.

4. Policy Recommendations

4.1 Institutional Strengthening

- Establish **District River Management Committees (DRMCs)** chaired by District Magistrates.
- Create **Divisional and State Steering Committees** under Chief Secretaries.
- Coordinate nationally through **NMCG and NRCD**.
- Institutionalize **bottom-up planning** linking village plans to basin objectives.

4.2 Technical and Data Systems

- Develop **Digital River Basin Platforms** integrating hydrology, infrastructure, land use, pollution data.
- Launch **District Water Dashboards** for 10-daily water budgets.
- Enforce **open-data policies** and interoperability standards.
- Encourage **AI/ML-based decision tools** for planning and forecasting.

4.3 Knowledge and Capacity Development

- Establish **River Knowledge Cells** in universities and research institutes.
- Develop **training modules** for engineers, administrators, and NGOs.
- Institutionalize **citizen-based monitoring** using low-cost kits.

4.4 Sustainable Financing

- Introduce **water-use charges, reuse credits, service fees**.
- Leverage **CSR and PPP funding** for maintenance and data systems. Create **district-level fund pools** managed by DRMCs.

1.2 Legal and Policy Alignment

- Align DRMPs with:
  - *National Water Policy (2012)*
  - *Ganga River Basin Management Plan (GRMBP)*
  - *Atal Bhujal Yojana and Jal Jeevan Mission*
  - *Samarth Ganga Framework* (*Jan Bhagidari*, *Jan Andolan*)
- Amend state laws to mandate district-level planning and budgeting.
- Incorporate **ecosystem service valuation** in project appraisal.

5. Concluding Remarks

The panel reaffirmed that **District River Management Plans** constitute the cornerstone of a *river-centric, decentralized governance model*. They serve as the operational bridge connecting policy intent with ground reality—empowering districts to take ownership of their rivers through data, design, and participation.

This paradigm shift—from fragmented programs to integrated, district-based planning—will anchor India's journey toward **sustainable water security, resilient ecosystems, and inclusive development**.

"Rivers are living entities, and districts are their custodians. Managing rivers means managing our districts wisely."

Session B

Nirmal Dhara: Pathways to Pollution-Free Rivers

Discussion Report

Executive Summary

Moderator:
Dr. Vinod Tare
Lead and Coordinator, CAMP Project, cGanga, IIT Kanpur

Panelist:

1. **Prof. Samir Bajpai** (cMahanadi, NIT Raipur)
2. **Prof. Basavaraju Manu** (cKrishna, NITK Suratkal)
3. **Dr. Amit Bansiwal** (cGodavari, CSIR-NEERI),
4. **Dr Sanjay Singh** (cPeriyar, NIT Calicut)
5. **Shri K Jaiprakash** (Technical Advisor to Hon'ble Deputy Chief Minister of Karnataka)
6. **Shri Suresh Babu** (Senior Director-Ecological Footprint , WWF-India)
7. **Dr. R. L. Narendran** (Environmental Scientist, Tamil Nadu Pollution Control Board)
8. **Smt Priyanka Jamwal** (ATREE, Karnataka)
9. **Shri Sumant** (BWSSB, Karnataka)

Lead Discussant:

1. **Prof Debraj Bhattacharyya** (cGodavari, IIT Hyderabad),
2. **Shri Sushil K Shrivastav** (Scientist F, NRCD)

The vision of *Nirmal Dhara*—pollution-free rivers—forms a cornerstone of India's river rejuvenation and sustainable water management framework. It is not merely an environmental target but a prerequisite for **public health, economic growth, and cultural well-being**. Most Indian Rivers, despite decades of investment, continue to face severe degradation due to **untreated sewage, industrial effluents, solid waste, and diffuse pollution**.

The National Mission for Clean Ganga (NMCG) and NRCD have redefined this challenge under *Nirmal Dhara* as part of an integrated framework: **Source Control and Treatment**, **Regulatory Enforcement**, and **Financial Sustainability and Innovation**.

The goal is to transition from compliance-based pollution control to **river-centric, adaptive, and participatory management**, where rivers are treated as **living entities** whose health reflects their ecological vitality, not just water quality standards for human use.

Context

Panel 2 deliberated on redefining "river health" and the means to achieve *Nirmalta* through scientific simplicity, decentralization, and community engagement. It proposed a major paradigm shift—from rigid, human-centric, chemical compliance toward **ecological integrity, decentralized treatment, and participatory monitoring**.

The second CAMP Panel discussed Nirmal Dhara envisions pollution-free rivers as the foundation of India's sustainable water future. Moving beyond compliance-based control, it emphasizes ecological integrity, community participation, and decentralized management. Under NMCG and NRCD, the approach integrates source control, enforcement, and financial innovation to restore rivers as living, self-sustaining ecosystems vital to national well-being.

Key Insights

1. **Shift from Human-Centric to River-Centric Standards:**
   River health should be measured by its ability to sustain indigenous life forms, not by drinking or bathing water norms.

2. **Simplified Monitoring Parameters:**
   Replace complex metrics like BOD and coliforms with **pH, Dissolved Oxygen (DO), and Conductivity**—robust, easily measurable indicators of ecological condition.

3. **Decentralized and Nature-Based Treatment:**
   Promote **wastewater treatment near source** using decentralized hybrid (electro-mechanical to nature based) systems rather than centralized STPs requiring huge water & sewage conveyance.

4. **Participatory Monitoring:**
   Empower **river scouts, schools, and communities** with mobile applications (e.g., *Jalprahari*) and low-cost kits for frequent DO-based monitoring.

5. **Dynamic River Health Index (RHI):**
   Integrate **chemical, physical, biological, and ecological indicators** to reflect the river's real condition.

6. **Localized Standards:**
   India's rivers differ ecologically; therefore, **region-specific norms** must replace uniform standards.

7. **Financial Sustainability and Innovation:**
   Combine **circular economy models**, PPPs, and reuse markets for biomass, sludge, and treated water.

Major Takeaways

Focus Area	Key Takeaway
Indicators	Replace BOD and coliforms with DO, pH, and Conductivity.
Philosophy	Move from human health to ecological river health.
Community Role	Train and equip citizens as river monitors.
Technology	Combine simple test kits with citizen apps like *Jalprahari*.
Institutional Reform	Update CPCB norms to reflect ecological and local realities.
Economics	Develop reuse and circular economy-based sustainability models.

Recommendations

- **Policy Revision:**
  Redefine national river water quality standards to focus on ecological and biological integrity.
- **Monitoring Framework:**
  Institutionalize community-based DO monitoring (twice daily: pre-dawn and sunset).
- **River Health Index (RHI):**
  Adopt a composite RHI integrating chemical, physical, and biological indicators.
- **Institutional Coordination:**
  Form a multi-stakeholder platform involving CPCB, SPCBs, NMCG, academia, and citizens.
- **Economic Incentives:**
  Promote PPPs and circular reuse markets for treated wastewater and sludge-based soil conditioners for carbon enrichment.
- **Research & Capacity Building:**
  Encourage research on aquatic ecology, nutrient dynamics, and bio-indicators such as phytoplankton and macroinvertebrates.

> Panel 1 proposed a redefining river quality standards around ecological integrity, establishing community-based monitoring, and adopting a comprehensive River Health Index. They emphasize multi-stakeholder coordination, public–private partnerships, and circular economy models, while advancing research and capacity building in aquatic ecology and bio-indicators to ensure resilient, sustainable, and living river systems.

Conclusion

The panel unanimously recognized that achieving *Nirmal Dhara* requires **a paradigm shift—from compliance-driven pollution control to participatory, ecological stewardship**. Simplification, decentralization, and community ownership are the future of river management.

Full Report

1. Setting the Scene and Context

The vision of *Nirmal Dhara*—pollution-free rivers—is a **foundational pillar** of India's water security and sustainability agenda. Rivers are not only ecological systems but also cultural and economic backbones. Yet, despite decades of efforts, **nearly 300 river stretches across India as could be noticed by CPCB,** in reality many more**, remain critically polluted** due to untreated municipal sewage, industrial discharges, and poorly managed solid waste.

The challenge is multi-dimensional: expanding infrastructure alone cannot achieve pollution-free rivers without rethinking the **framework of monitoring, regulation, and financing**. India's rapid urbanization demands **localized, scalable, and adaptive solutions**, integrating **decentralized treatment, participatory monitoring, and real-time data transparency**.

2. Key Themes and Expert Perspectives

2.1 Redefining River Health

The panel emphasized redefining river health as **the ability to sustain indigenous flora and fauna** rather than meeting anthropocentric standards. The current CPCB classification (Classes A–E) was deemed **outdated** and unsuitable for India's tropical, monsoonal rivers.

Panellists agreed that **river health should be represented by ecological resilience**, not compliance against arbitrary limits on BOD or coliform. This shift would reorient policy and monitoring toward ecological restoration.

2.2 Simplified Parameter Framework

Experts proposed reducing monitoring to **three key parameters**—DO, pH, and Conductivity—representing the physical and chemical status most relevant to ecology.

- **Dissolved Oxygen (DO):** Monitored twice daily (pre-dawn and sunset), reflects self-purification and organic loading.
- **pH and Conductivity:** Track ionic balance and pollution load.

This simplified system enables **high-frequency, community-led monitoring**, bridging scientific reliability with field practicality.

2.3 Decentralized Treatment and Circular Economy

Panellists agreed that **centralized STPs** are often economically and operationally unsustainable, particularly in small towns. Instead, they advocated:

- **Decentralized STPs at outfalls**, enabling **local reuse** of treated wastewater.
- **Hybrid systems** with appropriate mix of electromechanical and nature based such as constructed wetlands, oxidation ponds, bioremediation processes.
- **Reuse of biomass** from aquatic vegetation and sludge for composting and biogas production—**closing the nutrient loop**.

The *Nirmal Dhara* vision emphasizes **pollution prevention and reuse** over end-of-pipe treatment.

2.4 Participatory and Community-Based Monitoring

Citizen engagement emerged as a core pillar. Tools like **"Jalprahari"**, developed by NIT Raipur, allow local users to record DO and visual indicators with geotags, creating **dense and frequent datasets**.

This democratizes monitoring, improves accountability, and builds social ownership over river health.
Schools, colleges, and NGOs can adopt river stretches for routine monitoring—turning *Jan Bhagidari* (public participation) into a daily practice of *Jan Andolan* (people's movement).

2.5 Revisiting Nutrient and Pathogen Norms

Experts cautioned against over-stringent **nutrient removal** norms (for N and P) in flowing rivers. They argued for **context-specific standards**, considering self-purifying capacity and flow variability.

Instead of high-cost nutrient removal, **harvesting aquatic weeds** and sediment management can achieve similar ecological benefits at lower cost.

2.6 Institutional and Policy Dimensions

CPCB and SPCBs must **redefine pollution classification** to integrate ecological parameters.

A **River Health Index (RHI)** was proposed, integrating:

- **Chemical:** DO, pH, Conductivity.
- **Physical:** Sedimentation, flow continuity.
- **Biological:** Plankton, macroinvertebrates, fish species.
- **Ecological:** Riparian vegetation, connectivity.

Implementation should start with **pilot basins** in partnership with NRCD, CPCB, and academic institutions.

3. Education and Research Challenges

Panellists noted inertia in academia, where traditional BOD/COD frameworks persist. They called for **curriculum reform**, **capacity building**, and **communication strategies** that simplify science for the public.
Universities must adopt ecological monitoring and field-based learning, while regulators should upskill to interpret biological and ecological data.

4. Policy Recommendations

4.1 Institutional

- Update **CPCB guidelines** to reflect ecological river health indicators.
- Establish **State River Health Committees** for RHI implementation.
- Integrate **citizen-collected data** into the National Water Quality Network.

4.2 Technological

- Scale up **mobile apps and IoT-enabled kits** for participatory monitoring.
- Build **AI-based dashboards** for real-time decision-making and data validation.

4.3 Financial

- Introduce **PPP models** for wastewater reuse and biomass valorization.
- Promote **CSR and community-based financing** for local monitoring.

4.4 Research and Education

- Create **Centres for River Health Studies** at IITs/NITs.
- Reform university curricula to include **river-centric ecological assessment**.

5. Concluding Remarks

The *Nirmal Dhara* vision represents a **scientific, social, and institutional shift**—from viewing rivers as waste carriers to living ecosystems.

India's success will depend on **simplifying monitoring, decentralizing treatment, and empowering communities**.

Together, these actions can make *Nirmal Dhara* a lived reality, restoring rivers as vibrant, self-sustaining lifelines.

"When the dissolved oxygen returns, the river breathes again."

Session C

Navigating Uncertainties: Data Gaps and their Impact on River Basin Planning

Discussion Report

Executive Summary

Moderator:

Dr. Vinod Tare
Lead and Coordinator, CAMP Project, cGanga, IIT Kanpur

Panelist:

1. **Prof. Santosh G Thampi** (cPeriyar, NIT Calicut),
2. **Smt Veena Srinivasan** (Executive Director, WELL Labs, Karnataka),
3. **Dr. R Manjula** (cCauvery, NIT Trichy),
4. **Prof. Kishanjit K Khatua** (cMahanadi, NIT Rourkela),
5. **Dr. P. Somasekhar Rao** (Director-Tech, ACIWRM, WRD, Karnataka)

Lead Discussant:

1. **Dr Uday Roman** (Madhya Pradesh)
2. **Sanjay Kumar Das (GSI, Odisha)**

Reliable, continuous, and interoperable data is the backbone of effective river basin management. Yet, India's water sector remains constrained by fragmented datasets, inconsistent monitoring frequencies, and limited sharing between agencies. Theme 3, *"Navigating Uncertainties: Data Gaps and Their Impact on River Basin Planning,"* explores this critical issue — highlighting how data gaps, asymmetries, and inconsistencies undermine decision-making at all scales, from villages to entire river basins.

Historically, water data in India has been collected for administrative, rather than management, purposes — focusing on compliance, rather than insight. River rejuvenation efforts under the **Namami Gange Programme** and **Samarth Ganga Framework** have revealed how **data unavailability, inaccessibility, and unreliability** create institutional inertia and inefficiency.

The panel discussion emphasized that **uncertainty is not just a technical challenge but a governance one**, requiring both institutional reform and technological innovation. Robust data frameworks — integrating real-time sensors, remote sensing, community observations, and open data policies — are essential for **District River Management Plans (DRMPs)**, **River Health Assessment (RHA)**, and basin-scale modelling.

Context

Panel 3 brought together experts from hydrology, ecology, remote sensing, and digital infrastructure to discuss how India can transition from **data-poor to data-smart water governance**. The conversation focused on three central questions:

1. How do data gaps influence planning and prioritization at basin and district levels?
2. How can uncertainties be quantified and minimized?
3. What institutional and technological innovations can make data sharing efficient, secure, and actionable?

The session's central message was that **no DRMP or River Basin Plan can succeed without addressing data quality, ownership, and interoperability**.

Panel 3 discussion highlights that fragmented, inconsistent, and inaccessible data hampers effective river basin management. It calls for governance reform and technological innovation to overcome uncertainties through integrated, real-time, and open data systems. Reliable, interoperable information is vital for informed decision-making, supporting DRMPs, River Health Assessments, and sustainable basin planning.

Key Insights

1. **Data Fragmentation and Institutional Silos:**
   Multiple agencies — CWC, CGWB, CPCB, IMD, NRSC, SPCBs — collect overlapping data without integration or metadata harmonization.

2. **Temporal and Spatial Gaps:**
   Inadequate spatial coverage (few gauging stations per river stretch) and poor temporal frequency (monthly or seasonal data) make it impossible to calibrate predictive models.

3. **Data Credibility and Accessibility:**
   Much of the available data remains unverified or inaccessible due to security classifications and institutional reluctance.

4. **Technology as Enabler:**
   AI/ML, remote sensing, IoT sensors, and digital twins can bridge some gaps — but only if fed with consistent and verified ground data.

5. **Two-Way Data Flow:**
   DRMPs must integrate **community-based data collection** (e.g., river scouts) with **scientific validation frameworks**, allowing upward and downward data exchange.

6. **Institutional Architecture:**
   Establishing a **National River Data Coordination Authority (NRDCA)** under MoJS, with district-level data cells, was proposed to ensure standardization and interoperability.

7. **Uncertainty as a Management Variable:**
   Models should express uncertainty explicitly and use **scenario-based planning**, rather than assuming precision in poor data contexts.

Major Takeaways

Focus Area	Key Takeaway
Data Integration	Unify datasets from multiple agencies into a federated architecture.
Standards	Adopt uniform metadata, coordinate systems, and frequency
Community Role	Integrate participatory monitoring for dense spatio-temporal
Technology	Use AI, IoT, and remote sensing to fill observational gaps.
Governance	Establish a National River Data Coordination Authority (NRDCA).
Transparency	Move toward open data policies and public dashboards.

Recommendations

- **Institutional Reform:**
  Establish NRDCA as an apex body under MoJS to manage data collection, integration, and dissemination through a multi-tier system.

- **Standardization:**
  Develop national standards for spatial referencing, metadata tagging, and temporal frequency (e.g., daily for flow, fortnightly for quality).

- **Technological Integration:**
  Build a **Federated River Basin Information System (FRBIS)** linking central, state, and district datasets.

- **Participatory Data Collection:**
  Engage communities, academic institutions, and NGOs in data collection with standardized validation protocols.

The recommendations propose establishing the NRDCA under MoJS to unify data governance through a Federated River Basin Information System. Standardized protocols, participatory data collection, and capacity building will enhance reliability. Open-access dashboards will promote transparency, ensuring integrated, science-based, and community-driven decision-making for sustainable river basin management nationwide.

- **Capacity Building:**
  Train district engineers, scientists, and administrators in data management, GIS, and modelling.

- **Transparency & Access:**
  Implement open-access digital dashboards to support planning, research, and public accountability.

Conclusion

Panel 3 underscored that **data is the foundation of all river basin management** — but only when it is credible, consistent, and collaboratively managed.

The way forward lies in **integrating data systems, fostering trust among institutions, and empowering communities to contribute observations**.

A *federated, transparent, and adaptive data governance model* will reduce uncertainty, improve decision-making, and help India build resilient and sustainable river systems.

Full Report

1. Setting the Scene and Context

India's rivers represent complex, dynamic systems influenced by climatic, geomorphological, and anthropogenic factors. Yet, the nation's water management efforts are constrained by **data uncertainty** — spatial, temporal, and institutional.

Theme 3, *"Navigating Uncertainties: Data Gaps and Their Impact on River Basin Planning,"* explores how incomplete, inconsistent, and inaccessible data limits effective planning, forecasting, and adaptive management.

The **Samarth Ganga Framework** and **CAMP coordination study** have both emphasized that effective planning for DRMPs, River Health Assessment (RHA), or River Rejuvenation requires a **robust information architecture** — linking hydrological observations, pollution data, ecological status, and socio-economic indicators.

The setting is clear: while India has vast data assets, **they remain scattered, outdated, or locked behind institutional silos**. Bridging this gap is key to achieving credible, evidence-based decision-making for river basin management.

2. Key Themes and Expert Perspectives

2.1 Fragmented Data Landscape

Experts highlighted that India's hydrological data architecture is fragmented. CWC monitors discharge, CGWB groundwater levels, CPCB/SPCBs water quality, and IMD rainfall — yet integration between these datasets is weak. This separation prevents comprehensive **water balance analysis** and model calibration at basin and district scales.

2.2 Temporal and Spatial Gaps

Spatial coverage is sparse — **one hydrological station per 400–600 km**, and water quality monitoring at intervals too wide to reflect river dynamics Temporal gaps — monthly or seasonal observations — limit the detection of diurnal or event-based pollution spikes Panelists proposed high-frequency, multi-scale monitoring integrating satellite data, IoT- based sensors, and field validation.

2.3 Data Quality and Verification

Participants identified **credibility** as a key barrier. Inconsistent sampling, lack of QA/QC, and absence of calibration records undermine model accuracy.

Developing **standard operating procedures (SOPs)** for field collection and inter-laboratory comparison was recommended.

2.4 Technological Opportunities

Technological innovation can mitigate data gaps.

- **Remote sensing** provides synoptic coverage of land use, vegetation, and water extent.
- **IoT sensors** enable real-time updates on flow and quality.
- **AI/ML** models can interpolate missing data and predict anomalies. However, technology alone cannot replace verified field data — synergy is key.

2.5 Institutional Coordination and Data Sharing

Participants strongly advocated for **inter-agency collaboration** through structured agreements and APIs.

They recommended forming a **National River Data Coordination Authority (NRDCA)** to manage data integration and sharing between CWC, CPCB, IMD, NRSC, and state agencies.

Such a structure should operate on **federated principles**, preserving agency ownership while enabling standardized access.

2.6 Community-Based Data as a Complementary Source

Local data from **River Health Monitoring (RHM) scouts** and community observers can dramatically enhance spatial and temporal density.

Panellists recommended incorporating validated community-collected data into official repositories, especially for basic parameters like water level, DO, EC, and turbidity.

3. Challenges Identified

Category	Challenge
Institutional	Fragmented data collection; lack of coordination protocols.
Technical	Sparse network, missing metadata, poor standardization.
Operational	Low temporal frequency and limited district-level access.
Capacity	Insufficient trained personnel for GIS, modelling, and QA/QC.
Policy	Absence of legal mandate for inter-agency data sharing.

4. Recommendations

4.1 Institutional Framework

- Establish **NRDCA** under MoJS to coordinate data standardization and integration.
- Create **District Data Cells** linked to DRMP implementation units.
- Mandate data sharing through legally binding MoUs between agencies.

4.2 Technical Systems

- Develop a **Federated River Basin Information System (FRBIS)** connecting hydrology, quality, land use, and ecological data.
- Implement **metadata tagging** and **spatial harmonization** standards.
- Use **AI-driven analytics** for anomaly detection and prediction.

4.3 Participatory and Real-Time Monitoring

- Expand **community-based data networks** to supplement official datasets.
- Validate and integrate citizen data through district and academic institutions.

4.4 Capacity Building

- Establish **Centres of Excellence** for data analytics, remote sensing, and uncertainty quantification.
- Train engineers and administrators in GIS and model interpretation.

4.5 Policy and Legal Measures

- Introduce **data-sharing legislation** ensuring interoperability and transparency.
- Promote **open-data portals** while safeguarding privacy and security.

5. Concluding Remarks

Panel 3 concluded that managing rivers amidst uncertainty demands **adaptive, data-driven governance**. Bridging India's data gaps is not merely a technical necessity but a moral imperative — to ensure transparent, equitable, and science-based river rejuvenation. The recommended federated architecture will allow India to move toward **predictive river management**, where uncertainty becomes an input for resilience rather than an obstacle to progress.

"Data is the new water — when it flows freely, governance thrives."

Session D

From Monitoring to Action – Closing the loop in Basin Management

Discussion Report

Executive Summary

Moderator:
Dr. Vinod Tare
Lead and Coordinator, CAMP Project
cGanga, IIT Kanpur

Panelist:

1. **Prof. Vikrant Jain** (cNarmada, IIT Gandhinagar)
2. **Prof. L N Rao** (cCauvery, IISc, Bengaluru)
3. **John Kingsley A.R.** (Secretary, WRD)
4. **Ms Emily Praba** (Karnataka Disaster Management)
5. **Prof. Athira P.** (cPeriyar, IIT Palakkad)
6. **Dr Akshara Kaginalkar** (Atria University)
7. **Prof. K. Venkata Reddy** (cKrishna, NIT Warangal).
8. **Ms Khushbu K Birawat,** (Consultant, Water & Environment, Bengaluru)

Lead Discussant:

1. **Dr Kaushika GS** (Hydrologist, CWD, Bengaluru)
2. **Dr Shubhankar Biswas**
3. (WRD, Madhya Pradesh)
4. **Mr Vikas Rajoria** (WRD, Madhya Pradesh)

River basin management is not a linear process but a **cyclic continuum** — encompassing planning, implementation, monitoring, evaluation, and adaptive adjustment. However, as the Theme 4 deliberations underlined, this cycle is **often broken at its most crucial link**: transforming monitoring insights into corrective action and planning feedback.

Titled *"From Monitoring to Action: Making Sure Our River Plans Actually Work,"* this theme focused on closing that "broken loop" — ensuring that monitoring outcomes genuinely inform decisions, foster accountability, and improve future program design.

The **core challenge** lies in the disconnection between **data collection and data use**. While thousands of projects under river rejuvenation missions are monitored, the information rarely guides adaptive management or influences subsequent planning cycles. The result is **ineffective interventions, poor feedback loops, and limited public trust**

The panel emphasized the need for a **responsive, evidence-based governance system** where monitoring is continuous, participatory, and capable of triggering timely action. In this model, monitoring data evolves from passive statistics into actionable intelligence — helping India achieve true circularity in its river management framework.

Context

Panel 4 brought together experts from academia, government, and research organizations to deliberate on mechanisms that could transform **monitoring into management intelligence**. Professor Vinod Tare set the stage by observing that while project statistics — budgets spent, infrastructure built, and capacities created — are often showcased, **evidence of actual impact remains scarce**.

The panel reflected on India's extensive investments in river and sanitation programs — from Ganga Action Plan to Namami Gange — and acknowledged that **baseline-to-outcome comparisons remain inconsistent**. They highlighted the need for **independent, third-party evaluation**, supported by participatory monitoring and cross-agency data integration.

Panel 4 stresses that river basin management must be a continuous feedback cycle linking monitoring to action. It highlights the gap between data collection and its practical use, urging a shift to evidence-based, participatory governance where monitoring drives adaptive planning, accountability, and real-time decision-making for effective river rejuvenation.

The discussion reinforced that river basin planning must be **cyclic, not episodic**, where each implementation cycle informs the next. The shift from *"monitoring as an obligation"* to *"monitoring as an enabler"* was identified as central to future reforms.

Key Insights

1. The "Broken Loop" Problem:

Plans are made and projects executed, but the feedback loop to verify if objectives are met is weak. Monitoring data remains underutilized or delayed, impeding corrective action.

2. **Evidence-Based Planning:**
   Impact assessments must be quantitative and verifiable. The absence of documented baselines makes it impossible to assess real improvement or degradation in river health.

3. **Institutional Accountability:**
   Monitoring and implementation must be separated; agencies cannot evaluate their own outcomes objectively. Independent oversight ensures credibility.

4. **Participatory and Citizen Science:**
   Programs like *River Scouts* along the Ganga demonstrate how local communities can collect high-frequency data, bridging spatial and temporal monitoring gaps.

5. **Integrated Data Systems:**
   Siloed data collection must give way to interoperable, centralized platforms — combining IoT sensors, remote sensing, laboratory testing, and citizen observations.

6. **Strengthening Existing Institutions:**
   Rather than creating new agencies, empower Pollution Control Boards, CWC, and academic partners to deliver joint, multi-tier monitoring.

7. **Technological Reliability:**
   IoT-based and sensor-driven monitoring should be complemented by regular calibration, data verification, and cross-validation mechanisms.

8. **Inclusion of Major Water Users:**
   Agriculture, which consumes up to 89% of India's water, must be part of the monitoring framework. Feedback loops must connect irrigation practices to basin-scale sustainability outcomes.

Major Takeaways

Focus Area	Key Takeaway
Closing the Loop	Integrate feedback from monitoring into planning and decision-making cycles.
Independence & Accountability	Separate implementers from evaluators for objective impact assessment.
Community Engagement	Scale up "River Scouts" for participatory and real-time data collection.
Technology Integration	Use hybrid monitoring (IoT, remote sensing, and field data).
Institutional Strengthening	Reinforce existing agencies instead of creating parallel structures.
Holistic Scope	Include agriculture, ecology, and socio-economic dimensions in river monitoring.

Recommendations

- **Institutional:**
  - Establish **independent monitoring frameworks** anchored in academic or neutral bodies like cGanga and CAMP institutes.
  - Define clear roles for central, state, and community levels in data collection and feedback loops.

- **Technical:**
  - Develop a **multi-parameter monitoring matrix** covering water quality, flows, sediments, ecology, and socio-economic indicators.
  - Create a **nationally integrated digital platform** linking real-time sensors, laboratory data, and public dashboards. However, state-of-the-art of sensors must ensure that sensors used yield data that is credible and acceptable for regulation, fulfilment of contractual agreements and public use.

- **Policy:**
  - Mandate that all river rejuvenation programs include baseline, mid-term, and post- project impact assessments.
  - Encourage **FAIR (Findable, Accessible, Interoperable, Reusable) and Responsible Data** principles for all government data.

- **Community & Participation:**
  - Institutionalize citizen-led monitoring models, such as River Scouts, to ensure ownership and local relevance.
  - Utilize community networks (e.g., Gram Panchayats, Abhaya Mitra volunteers) for observation and reporting of river health.

- **Capacity Building:**
  - Train monitoring personnel and communities in calibration, sampling, and digital reporting.
  - Establish **Regional Monitoring Hubs** for data validation and technical support.

The recommendations call for independent, multi-level monitoring frameworks, robust digital integration, and adherence to FAIR data principles. They emphasize citizen participation through River Scouts and local networks, credible sensor-based systems, and periodic impact assessments. Strengthened capacity building and regional hubs will ensure reliable data, accountability, and adaptive river management.

Conclusion

Panel 4 underscored that **monitoring is meaningful only when it leads to action**. Data must not remain a passive archive but serve as a living input for adaptive management. India's river rejuvenation journey must therefore focus on **closing the monitoring–action loop** through transparency, participation, and institutional integrity.

The convergence of **science, technology, and community intelligence** offers the pathway for this transition.

"What gets measured gets managed — but only if we act on what we measure."

Full Report

1. Setting the Scene and Context

The "broken feedback loop" in India's river basin management has long hindered effective outcomes. Plans are meticulously designed, projects implemented, and reports generated — yet the **critical step of translating monitoring data into adaptive planning remains weak**.

Theme 4 placed this issue at the forefront, examining how to build mechanisms where monitoring insights directly influence project design, resource allocation, and regulatory responses.

This theme is the natural culmination of the earlier discussions on DRMPs (Theme 1), Nirmal Dhara (Theme 2), and Data Systems (Theme 3). It reaffirms that **without a functioning feedback system**, no plan — however well crafted — can remain effective or sustainable.

2. Key Themes and Expert Perspectives

2.1 Evidence-Based Governance

Prof. Vinod Tare highlighted that India's reporting culture remains focused on outputs, not outcomes. Project evaluations rarely compare conditions before and after interventions. He called for **quantitative, independent impact assessments** for all major river initiatives.

2.2 Independent and Participatory Monitoring

Experts argued that monitoring and implementation must be structurally separated to avoid conflicts of interest. Prof. Venkat Reddy proposed **empowering existing Pollution Control Boards** rather than creating new institutions.The **River Scouts pilot** on the Ganga — involving trained local monitors measuring DO, EC, and pH daily — was cited as a successful example of **citizen science integrated with formal data systems**.

2.3 Data Integration and Technology

Dr. Akshara K. emphasized that valuable research data often disappears post-projects, urging creation of a **"Water Data Heritage" system**. She recommended FAIR + Responsible data practices and interoperable data sharing to avoid duplication and loss of institutional memory.

Ms. Emily from Karnataka State Natural Disaster Monitoring Centre showcased a **statewide real-time monitoring network** with over 6,000 rain gauges and 950 weather stations, illustrating how integrated data systems can drive real-time decision-making.

2.4 Hybrid Monitoring Models

The panel favoured a **hybrid model** — blending real-time IoT data, satellite imagery, laboratory testing, and citizen-based observation. Prof. Athira from IIT Palakkad proposed developing an **impact quantification framework** combining environmental and social indicators.

2.5 Role of Agriculture and Resource Efficiency

Mr. John Kingsley, Secretary (WRD, Madhya Pradesh), underscored that **agriculture consumes nearly 89% of India's water**, yet remains peripheral in river monitoring frameworks. He advocated **advanced irrigation technologies** and **soil-based water budgeting** as critical elements for closing the feedback loop.

2.6 Private Sector and Global Engagement

Dr. Kaushik proposed inclusion of private and global players in monitoring to bring **two-way accountability and innovation**, enabling benchmarking and quality assurance across institutions.

3. Challenges Identified

Category	Challenge
Institutional	Fragmented data collection; lack of coordination protocols.
Technical	Sparse network, missing metadata, poor standardization.
Operational	Low temporal frequency and limited district-level access.
Capacity	Insufficient trained personnel for GIS, modelling, and QA/QC.
Policy	Absence of legal mandate for inter-agency data sharing.

4. Recommendations

4.1 Institutional Reforms

- Create a **National Monitoring & Evaluation Framework** under MoJS with regional nodes anchored in academic institutions.
- Mandate **third-party post-implementation audits** for all river rejuvenation projects.

4.2 Technical and Data Systems

- Adopt a **National Monitoring Protocol** covering water, sediment, biodiversity, and social indicators.
- Integrate multiple data sources into a **Federated Monitoring Dashboard** with AI-driven analytics for anomaly detection.

4.3 Community and Participatory Mechanisms

- Institutionalize the **River Scouts** model nationally.
- Engage communities via Panchayat and volunteer networks to report observations and anomalies through mobile platforms.

4.4 Capacity and Knowledge Management

- Train government and local monitoring staff on data collection, calibration, and validation.
- Establish “Centres of Monitoring Excellence” in collaboration with IITs and NITs.

4.5 Policy and Legal Measures

- Enforce mandatory feedback loops in DPR approval and fund release processes.
- Ensure data transparency through open-access portals and standardized formats across ministries.

5. Concluding Remarks

Panel 4 reaffirmed that **closing the loop from monitoring to action** is essential for credible, adaptive, and transparent river basin management. Institutional independence, technological innovation, and participatory monitoring are the three pillars of this transformation. Only through these can monitoring evolve from a reporting formality into a **dynamic instrument of governance**.

“Monitoring tells the story; action gives it meaning.”

Poster Abstracts

Mahanadi River at a Glance

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Abstract: The poster provides a comprehensive overview of the Mahanadi River Basin, focusing on its geographic, hydrologic, and ecological attributes as well as ongoing management efforts within the region. Originating from the Sihawa Mountains, the 851 km long Mahanadi River traverses the states of Chhattisgarh and Odisha, ultimately meeting the Bay of Bengal. Major tributaries—Pairi, Mand, Seonath, Tel, Ib, Jonk, and Hasdeo—contribute to the river's extensive stream network and diverse ecosystem. The basin is classified into upper, middle, and lower sub-basins, covering over 139,000 sq. km collectively, and features significant hydrological infrastructure including numerous dams, barrages, and canals that support irrigation, water supply, and flood control. Mapping of the basin highlights vulnerable zones, disturbed and undisturbed areas, and point sources of pollution, underlining the challenges posed by anthropogenic pressures and environmental change. The poster also addresses biodiversity, noting the presence of threatened flora such as Cleistanthus collinus (VU), Borassus flabellifer (EN), and Pterocarpus marsupium (NT), and documenting rich fish and herpetofauna diversity. This synthesis of spatial, ecological, and infrastructural data underscores the critical need for integrated management of the Mahanadi River Basin to preserve its natural and human resources in the face of ongoing development and environmental challenges.

Keywords: ***Mahanadi River Basin, Major Tributaries, Major Infrastructure, Sensitive Areas, Biodiversity***

Lives Along the River: Demographic Insights from the Mahanadi Basin

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Abstract: The Mahanadi River Basin, spanning across the states of Chhattisgarh (52.42%) and Odisha (47.14%), with minor extents in Maharashtra, Madhya Pradesh, and Jharkhand, represents a critical hydrological and socio-economic region of India. This poster presents a comprehensive demographic analysis of the basin, focusing on population dynamics, socio-economic conditions, and their implications for sustainable development and resource management. Drawing on Census data (1901–2011), state statistical abstracts, and national demographic projections (2011–2036), the study examines variations in population growth, density, sex ratio, workforce participation, and urbanization trends across districts. The poster highlights significant population growth in both states over the last century, with rapid increases post-1951 reflecting urbanization and industrial expansion. While Raipur, Durg, and Bilaspur in Chhattisgarh, and Cuttack, Khordha, and Sundargarh in Odisha emerge as the most populous and urbanized districts, tribal-dominated regions such as Bastar, Kanker, and Kandhamal remain sparsely populated. The basin's demographic profile is marked by a relatively balanced gender ratio in Chhattisgarh (991 females per 1000 males) and gradual improvement in Odisha (979 in 2011), though child sex ratios show concerning declines. Age-structure analysis reveals a predominantly young population, signaling future workforce potential but also rising demands for education, health, and employment infrastructure. Workforce participation patterns indicate rural dominance, with agriculture employing the majority, though industrial and service sectors are expanding in urbanized districts. Socio-economic indicators, including literacy, household conditions, and health metrics, demonstrate regional disparities, with urban centers faring better than rural and tribal areas. Population projections suggest continued growth and urbanization, underscoring the urgent need for integrated planning in water resource management, flood preparedness, and livelihood diversification.

Keywords: ***Mahanadi River Basin, Demography, Population Dynamics, Urbanization***

Geology, Geomorphology and Lithology of the Mahanadi River Basin

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Abstract: The Mahanadi River Basin, spanning five states and 141,589 sq. km, is defined by its lithological and geomorphological attributes, which shape physiographic diversity, mineral wealth, water resources, and agricultural productivity. Core lithological units include the Precambrian Basement Gneissic Complex (33.77% of major aquifers), Sandstone (13.64%), Alluvium (13.59%), Limestone (10.62%), and Shale (9.28%), along with Laterite, Khondalite, and Basalt. Fertile alluvial soils in the deltaic plains of Chhattisgarh and Odisha sustain intensive agriculture, while upland terrains with sandy and rocky soils support forests but limit cultivation. The basin's sedimentary aquifers and diverse geology enhance groundwater storage and economical growth, with Odisha and Chhattisgarh ranking among India's top producers of iron ore, coal, bauxite, and dolomite. Geomorphological maps illustrate river styles, zonation, longitudinal elevation shifts, floodplains, and river islands, aiding agricultural and ecological planning. Importantly, geomorphological insights provide a foundation for river conservation and river space management, ensuring the balance between natural dynamics and human use. Landslide susceptibility mapping highlights the need to assess geomorphic risks for safe land-use and infrastructure planning. Overall vulnerability is low to moderate, though localized events occur along hill ranges and transport corridors due to intense rainfall and slope instability. Together, these attributes underscore the basin's critical role in sustainable agriculture, mineral development, groundwater management, and disaster preparedness in central India.

Keywords: ***Mahanadi River Basin, Lithology, Geomorphology, Aquifer, Mineral, Landslide Susceptibility***

Hydraulic, Hydrologic and Climatic Profile of the Mahanadi River Basin

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Abstract: This poster presents a comprehensive profile of the Mahanadi River Basin, integrating its hydraulic, hydrologic, and climatic characteristics to inform a holistic understanding of the river system. The hydraulic analysis maps water resources assets and details the river's longitudinal elevation profile, incorporating historical cross-section data from 1975 to 2023 at key sites like Tikarapara and Rajim to document changes over time. Hydrologic characteristics are examined through a focus on annual precipitation patterns and the impact of major hydraulic structures, such as the Hirakud Dam, on river flow. Furthermore, the study delves into the climatic profile of the basin by analyzing ETCCDI climate indices under the SSP5-8.5 scenario. Projected annual rainfall and temperature data for future time periods (2026–2100) are presented for the Chhattisgarh and Odisha regions, highlighting the potential for future climate variability. The analysis also contextualizes past extreme events, referencing major flooding incidents in 2014 and 2021. The integrated findings of this profile serve as a vital tool for researchers and policymakers, providing essential data to develop informed management and adaptation strategies for the Mahanadi River Basin in the face of ongoing environmental and climatic changes.

Keywords: ***Mahanadi River Basin, Hydraulic Characteristics, Hydrologic Characteristics, Climatic Profile, Climate Indices, Water Resources Management***

Nirmal Dhara: Planning, Pollution Control, and Clean Water of the Mahanadi River Basin

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Abstract: This poster summarizes the Nirmal Dhara mandate for the MRB through an end-to-end framework that couples geospatial monitoring audits with longitudinal water-quality analytics, sanitation diagnostics, and service-delivery assessments while explicitly integrating water supply and solid waste management (SWM). Data obtained from CPCB/SPCB stations for headwaters to delta to evaluate coverage, continuity, and gaps; harmonize DO, BOD, COD, nutrient, and coliform records into seasonal/compliance grades; and perform upstream–downstream screening around industrial clusters. The inventory of WTPs and STPs/SeTPs, benchmarking design capacity versus utilization to flag performance bottlenecks and target optimized O&M were also obtained. On water supply, analysis on piped-coverage, continuity, source sustainability (surface/groundwater abstraction pressure), and non-revenue water (NRW); by overlaying supply deficits with water-quality hotspots, the framework pinpoints neighborhoods where source protection, asset rehabilitation, pressure management, and NRW reduction most efficiently improve potable reliability and public-health outcomes have been performed. For SWM, digitize ward-level generation, collection efficiency, and treatment capacities (MRF/composting/WtE), delineate dumpsite footprints, and assess leachate risk to nearby water bodies ; prioritizing segregation at source, decentralized processing, engineered landfills, and legacy dumpsite remediation to curb organic and pathogen loads have been done. Land-use/land-cover trajectories (1985–2024) indicate escalating anthropogenic pressure that modulates pollutant exposure and attenuation across sub-basins; spatial analytics show dense monitoring and asset clustering in the lower basin with sparser coverage in western uplands, and industrial loads concentrated along key corridors. Present analysis translate diagnostics into decision-ready outputs: (i) hotspot ranking, (ii) a basin status index, and (iii) city action plans that align treatment-coverage expansion, septage management, SWM containment, real-time monitoring, and 24×7 safe-water service goals. This is an initiative, taken for this framework to accelerate compliance, prioritize investments, and deliver measurable clean-water outcomes at basin scale: linking evidence to action across planning, pollution control, SWM, and water-supply service delivery.

Keywords: ***Mahanadi River Basin, Nirmal Dhara, water quality, water supply, solid waste management, STP/SeTP capacity, hotspot ranking***

Narmada River at a Glance

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Abstract: This study provides a comprehensive overview of the Narmada River Basin, encapsulating its key geographical features, extensive hydrological infrastructure, and significant biodiversity. The objective is to present a holistic, data-driven snapshot to support integrated river basin management. The assessment is built on the compilation of extensive geospatial data, including the basin's administrative boundaries, elevation distribution, and a detailed line diagram of the stream network from its origin at Amarkantak to the Gulf of Khambhat. A core component is a detailed inventory and classification of the basin's dams by purpose, structural type, height, and completion year. The findings reveal a landscape predominantly located in Madhya Pradesh (89.26%). The river is heavily regulated by numerous dams, with just ten multipurpose structures accounting for over 92% of the total water storage capacity. Ecologically, the basin is a repository of rich biodiversity, supporting flagship species such as the Bengal Tiger and Leopard. The study successfully delineates ecologically sensitive, vulnerable, and undisturbed zones across the basin, providing a crucial input for targeted conservation efforts. This consolidated profile serves as an essential reference for understanding the complex interplay between development and conservation.

Keywords: ***Narmada River Basin, River Profile, Dam Inventory, Geospatial Analysis, Biodiversity, Water Infrastructure***

Lives Along the River: Demographic Insights from the Narmada Basin

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Abstract: This study presents a detailed demographic analysis of the Narmada River Basin, home to over 16.2 million people, to provide a socio-economic baseline for regional planning. The analysis utilizes census data to map and quantify key demographic indicators, including population density, sex ratio, tribal population concentration, and Work Participation Rates (WPR), across the basin's sub-regions. A defining characteristic of the basin is its significant Scheduled Tribe (ST) population. This is particularly pronounced in the Gujarat portion of the lower basin, where the ST community constitutes 65.6% of the population. Districts such as Mandla, Dindori, Dhar, and Barwani are major tribal hubs. The sex ratio exhibits considerable variation; several tribal-majority districts, including Balaghat (1,028) and Alirajpur (1,009), report ratios favorable to females, while other districts show a strong male predominance. The basin also shows a high female Work Participation Rate (WPR), which, in the Gujarat basin area, is 41.2%, significantly higher than the state average of 26.6%. This demographic profile reveals a complex social fabric, and these insights are crucial for developing equitable and culturally sensitive policies for sustainable development.

Keywords: ***Narmada River Basin, Demography, Tribal Population, Sex Ratio, Work Participation Rate (WPR), Socio-economic Analysis***

Geology, Geomorphology and Lithology of the Narmada River Basin

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Abstract: This study presents a comprehensive geological, geomorphological, and lithological characterization of the Narmada River Basin, a critical system for understanding the evolution of rivers within rift valleys. The basin's unique landscape is fundamentally controlled by its position along the Narmada-Son Lineament, a major tectonic feature where faulting and uplift dictate the river's distinct east-west course. The analysis integrates detailed geospatial mapping of the basin's geology, aquifer systems, lithological composition, and soil textures. A significant component of this work involved mapping the active floodplain using a 10-year (2015–2024) time series of Sentinel-1 SAR data, processed on the Google Earth Engine to delineate the annual maximum water extent. The geological investigation reveals a complete stratigraphic sequence from the Archaean basement to recent Quaternary alluvium, with extensive coverage by the Deccan Traps. The basin's lithology is dominated by basalt and various quaternary sediments. This complex geological framework gives rise to a diverse geomorphology, featuring prominent erosional landforms such as gorges and waterfalls, alongside depositional features like vast floodplains and river terraces. This foundational analysis is essential for hydrogeological modeling and guiding sustainable land use planning.

Keywords: ***Narmada River Basin, Geomorphology, Geology, Tectonics, Narmada-Son Lineament, Floodplain Mapping***

Hydraulic, Hydrologic and Climatic Profile of the Narmada River Basin

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Abstract: The Narmada River is a vital water resource for central India, making a thorough understanding of its characteristics essential for regional planning. This study presents a comprehensive assessment of the Narmada River Basin, integrating its hydraulic, hydrologic, and climatic profiles to create a foundational dataset for sustainable water management. The methodology involved the detailed analysis of the river's longitudinal profile across its upper, middle, and lower sections, along with key hydraulic cross-sections. An extensive spatial inventory was compiled, mapping critical features such as CWC monitoring stations, groundwater wells, major dams, canal networks, and bridges. The climatic analysis contrasts historical data with future projections under the SSP585 scenario, revealing significant long-term shifts. Projections indicate a substantial increase in mean annual precipitation from a historical average of 1092.98 mm to a future average of 1538.40 mm, alongside a rise in mean annual temperature. This highlights the basin's increasing vulnerability to extreme weather events. The basin has a documented history of frequent and severe floods, and studies identify it as one of India's most prone to widespread flooding, a risk at times exacerbated by dam mismanagement. This integrated database serves as a critical tool for developing robust strategies for flood mitigation, climate change adaptation, and equitable water resource allocation.

Keywords: ***Narmada River Basin, Hydrology, Climate Change, SSP585, Flood Risk, Water Resource Management***

Nirmal Dhara: Planning, Pollution Control and Clean Water of the Narmada River Basin

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Abstract: The Nirmal Dhara initiative embodies a comprehensive strategy to ensure an unpolluted stream in the Narmada River Basin by tackling pollution from municipal and industrial sources. This study evaluates the framework for pollution control, which integrates effective wastewater treatment, solid waste management, and clean water supply projects aligned with national programs like the Swachh Bharat Mission. The assessment analyzes waste generation data, the deployment of diverse Sewage Treatment Plant (STP) technologies, water supply coverage, and Land Use Land Cover changes between 2017 and 2023. Significant progress has been made, including the establishment of robust solid waste processing systems, exemplified by the 11.5 MW Waste-to-Energy plant in Jabalpur , and the adoption of varied STP technologies like SBR and Oxidation Ponds to suit different urban and rural contexts. Furthermore, tap water connectivity has seen substantial improvement under the Ghar Ghar Nal Jal Scheme. However, key challenges persist, including infrastructural disparities, incomplete sewerage networks in cities with high treatment capacity, and insufficient resources in peripheral areas. The observed expansion in built-up areas and croplands further underscores the mounting pressure on the basin's water resources. While the initiative has successfully built critical infrastructure, addressing these systemic gaps is vital for achieving holistic and sustainable water quality management.

Keywords: ***Nirmal Dhara, Narmada River Basin, Pollution Control, Sewage Treatment Plant (STP), Solid Waste Management, Swachh Bharat Mission***

Godavari River at a Glance

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Abstract: This study provides a holistic overview of the Godavari River Basin, highlighting its extensive hydrological network, significant water infrastructure, and status as a major biodiversity hotspot. The assessment consolidates geospatial data to map the river's extensive network of tributaries—including the Pravara, Manjra, Purna, and Indravati—and its vast water storage systems. The basin contains nearly 19,146 surface water bodies, including 870 major reservoirs such as Jayakwadi and Sriramsagar, which heavily influence the river's flow regime. Key segments impacted by these alterations, resulting in low environmental flows, have been identified near Nashik and downstream of major dams. Ecologically, the basin is exceptionally rich, supporting diverse ecosystems from forests to mangroves. Protected areas like Papikonda National Park and wetlands such as Kolleru Lake serve as critical habitats for over 2,500 plant species and endangered fauna, including the Bengal tiger, Olive Ridley turtle, and Great Indian Bustard. This integrated profile serves as a crucial baseline, underscoring the need to balance water resource development with the urgent need for conservation of the basin's vital biodiversity.

Keywords: ***Godavari River Basin, Biodiversity Hotspot, River Network, Water Infrastructure, Environmental Flow, Conservation***

Lives Along the River: Demographic Insights from the Godavari Basin

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Abstract: This study presents a comprehensive demographic analysis of the Godavari River Basin, a region inhabited by approximately 82.7 million people as per the 2011 Census. The research examines key population characteristics, including distribution, age structure, and vital health statistics, to provide a socio-economic baseline for regional planning. The basin, which spans 74 districts, exhibits extreme variations in population density, from over 11,000 persons/sq. km in urban Nagpur to just 20 persons/sq. km in rural Maredumilli. The age structure is youthful, with a large working-age population (46-58%) and a significant cohort under 20 years old (32-48%). A key finding is the consistent improvement in public health indicators across the basin's states between 2010 and 2020, with significant declines in birth rates, death rates, and infant mortality rates (IMR). For example, the IMR in Madhya Pradesh fell from 62 to 43 per 1,000 live births in this period. This detailed demographic profile provides critical data for tailoring policies in healthcare, education, and employment to support the sustainable development of the basin's large population.

Keywords: ***Godavari River Basin, Demography, Population Distribution, Health Indicators, Infant Mortality Rate (IMR), Census Analysis***

Geology, Geomorphology and Lithology of the Godavari River Basin

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Abstract: This study provides a comprehensive geological and geomorphological characterization of the Godavari River Basin, highlighting its complex lithology and significant economic resources. The basin's geology is dominated by Deccan Flood Basalts, which cover 73% of the area. A key feature is the presence of Gondwana formations within the Pranhita-Godavari Valley, which host major coalfields. Furthermore, the offshore Krishna-Godavari (KG) basin is a proven hydrocarbon province with 75 discovered oil and gas fields. The basin's hydrogeology is characterized by predominantly unconfined and semi-unconfined aquifer systems, primarily hosted within basalt and gneissic rocks. Geomorphological analysis reveals extensive floodplains and diverse riverine features. The soil texture is predominantly clay (61%), with analysis showing widespread macronutrient and micronutrient deficiencies that vary regionally; for instance, 94% of the Telangana region is low in nitrogen, while 99% of Chhattisgarh is zinc-deficient. This foundational geological framework is essential for managing groundwater and agricultural resources and for guiding the sustainable exploration of the basin's vital coal and hydrocarbon assets.

Keywords: ***Godavari River Basin, Geology, Lithology, Economic Geology, Krishna-Godavari Basin, Aquifer System, Soil Nutrients***

Hydraulic, Hydrologic and Climatic Profile of the Godavari River Basin

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Abstract: This study presents a comprehensive hydraulic, hydrologic, and climatic profile of the Godavari River Basin, a critical peninsular river system in India. The assessment integrates extensive observational data with future climate projections to provide a foundational understanding for sustainable water resource management. The analysis is based on a wide range of data, including the river's longitudinal profile, temporal changes in cross-sections, and a detailed inventory of its extensive water infrastructure, which includes over 870 major reservoirs and 921 dams. Climate analysis incorporates projections from two Shared Socioeconomic Pathways (SSP-245 and SSP-585) to evaluate future trends. The findings reveal a basin that is both heavily engineered and highly sensitive to climate shifts. Projections indicate a consistent warming trend and suggest that future high-intensity rainfall events will be increasingly concentrated in the southern and central parts of the basin. Furthermore, drought analysis using the Standardized Precipitation-Evapotranspiration Index (SPEI) identifies the south-western regions as particularly vulnerable to moisture deficits. This integrated assessment highlights the basin's significant climate-related vulnerabilities and serves as an essential scientific basis for strategic planning and developing climate-resilient water management policies.

Keywords: ***Godavari River Basin, Hydrology, Climate Change, SSP Scenarios, Drought Vulnerability, Water Infrastructure***

Nirmal Dhara: Planning, Pollution Control and Clean Water of the Godavari River Basin

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Abstract: The Nirmal Dhara developmental plan for the Godavari Basin outlines an integrated strategy for pollution control and sanitation to address the challenges of increasing urbanization. The assessment covers industrial profiles, water supply networks, and waste management systems across the basin's urban centers, which include 26 cities with populations over one lakh. Analysis of the infrastructure reveals a mixed scenario: while household tap water connections show widespread coverage, the sewerage network is extensive in some districts like Karimnagar but limited in others such as Adilabad. Major cities like Nagpur (130 MLD) and Nashik (78 MLD) possess significant sewage treatment capacity, though gaps persist. Solid waste management efficiency is high in states like Chhattisgarh and Madhya Pradesh; however, hazardous waste remains a significant challenge, particularly in Maharashtra and Telangana. National initiatives such as the Swachh Bharat Mission are advancing sanitation and hygiene goals, complemented by local projects like Namami Godavari that focus on riverfront development. This plan emphasizes a holistic approach, concluding that sustainable river health depends on bridging critical gaps in sewerage and hazardous waste management.

Keywords: ***Godavari River Basin, Nirmal Dhara, Pollution Control, Sewage Treatment Plant (STP), Solid Waste Management, Sanitation***

Krishna River at a Glance

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Abstract: The “Krishna River at a Glance” presents a detailed profile of the Krishna River Basin, focusing on its geographical setting, hydrology, biodiversity, cultural heritage, and ecologically sensitive areas. Originating from the Western Ghats near Mahabaleshwar in Maharashtra, the Krishna River flows through Maharashtra, Karnataka, Telangana, and Andhra Pradesh before draining into the Bay of Bengal, covering a basin area of approximately 258,948 sq. km. The basin is divided into seven major sub-basins—Upper Krishna, Middle Krishna, Lower Krishna, Upper Bhima, Lower Bhima, Upper Tungabhadra, and Lower Tungabhadra—with major tributaries including the Bhima, Tungabhadra, Munneru and Musi. The region hosts key water infrastructures such as dams like Almatti, Narayanpur, Tungabhadra, Srisailam, Nagarjuna Sagar, and Prakasam Barrage, which influence river flow regimes. Biodiversity within the basin is rich and varied, encompassing Western Ghats forests with endemic flora and fauna, the Nagarjuna Sagar–Srisailam Tiger Reserve sheltering Bengal tigers and leopards, Deccan mahseer habitats in clear river stretches, and mangrove ecosystems in the delta supporting migratory birds. Several wetlands and riparian zones are identified as ecologically sensitive, providing critical habitats for aquatic and terrestrial species. Culturally, the Krishna River Basin is interwoven with history and spirituality, hosting prominent pilgrimage sites such as Pandharpur, Alampur, Vijayawada Kanaka Durga Temple, and Srisailam, along with ancient temples, ghats, and irrigation heritage structures that reflect centuries-old human–river relationships. The study serves as a key reference for the Condition Assessment and Management Plan of the Krishna River Basin.

Keywords: ***Krishna River Basin, Sub-basins, Dams and Reservoirs, Biodiversity, Cultural Heritage, Sensitive Areas, Maharashtra, Karnataka, Telangana, Andhra Pradesh***

Lives Along the River: Demographic Insights from the Krishna Basin

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Abstract: The Krishna River Basin (KRB), spanning Maharashtra, Karnataka, Andhra Pradesh, and Telangana, supports a population of 87.68 million (2011 Census), with 60.8% residing in rural areas about 1.55 times the urban population. Rural dominance is most pronounced in Karnataka (61.3% rural), while Maharashtra exhibits the highest urbanization (45.2%). Major urban centers include Pune, Hyderabad, Guntur, Davanagere, and Shimoga. From 1941 to 2011, the basin's population nearly quadrupled, with peak growth between 1951–1971. Growth rates have moderated post-1991, reflecting broader demographic transitions. The basin's age structure reveals a youthful population, with children (0–9 years) forming the largest cohort, and a substantial working-age group (20–49 years) vital for economic productivity. Sex ratios are stable in the basin (965 in 2011), with improvements in Andhra Pradesh and Karnataka but persistent decline in Maharashtra. Socio-economic analysis shows agriculture as the principal occupation, supplemented by manufacturing, trade, and service sectors. Male literacy averages 72.3%, highest in Maharashtra (77.7%), while female literacy (60.1%) lags, particularly in rural Andhra Pradesh (46.1%). Workforce participation stands at 38.7% overall, with males (51.8%) far exceeding females (25.2%). Rural female participation (31.2%) is more than double that of urban females (15.5%), underscoring agriculture's role in rural livelihoods. Per capita NSDP is highest in Maharashtra due to strong industrial bases, with steady growth across the basin driven by diversification and infrastructure development. The findings emphasize the need for targeted rural education initiatives, gender equity in workforce participation, and balanced rural-urban development to harness the basin's demographic and economic potential.

Keywords: ***Age Structure, Demographic transitions, Growth, Literacy, Sex ratio and Socio-economic Analysis***

Geology, Lithology and Geomorphology of the Krishna River Basin

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Abstract: The Krishna River Basin's geology, geomorphology, and lithology provide a scientific basis for understanding landforms, aquifer systems, and natural hazards essential for sustainable river basin management. Geomorphological mapping reveals entrenched meanders, braided channels, floodplains, and river islands, reflecting dynamic fluvial processes and human influence. The identified floodplain stretches, concentrated mainly in the middle and lower reaches of the basin, correspond to wider channel sections and confluence zones where periodic overbank flows and lateral channel migration shape the landscape. Lithological analysis shows nearly 60% of the basin underlain by Deccan Trap basalts, with granite–gneiss complexes in the central part and sedimentary formations in the lower reaches, while soils include black cotton soils across the Deccan plateau, red loamy soils in uplands, and fertile alluvial soils in the delta. Aquifer distribution indicates Semi-confined to Confined aquifers dominate the basin (223,310.59 sq. km), serving as primary groundwater reservoirs; Unconfined aquifers cover (50,013.80 sq. km), facilitating direct recharge in high-rainfall and irrigation return-flow regions; and Transitional aquifers (6,928.21 sq. km) exhibit mixed recharge and storage characteristics. Landslide susceptibility is highest in the Western Ghats due to steep slopes and intense rainfall, causing recurrent slope failures. Mining covers ~369.85 sq. km, dominated by limestone ~ 269.61 sq. km and manganese ~ 4.49 sq. km, with ~98% of extraction through opencast methods causing significant land degradation, while underground mining (~6 sq. km, mainly gold ores) remains limited. Although mining supports industrial and economic growth, it poses risks to groundwater, soil stability, and hydrological balance. This integrated assessment of geomorphology, lithology, soils, aquifers, hazards, and mining forms a critical input for the Condition Assessment and Management Plan, supporting sustainable resource utilization and long-term water security in the Krishna River Basin.

Keywords: ***Krishna River Basin, Geomorphology, Lithology, Deccan Traps, Soils, Aquifers, Floodplains, Landslide Susceptibility, Mining Impacts***

Hydraulics, Hydrology and Climatic Profile of the Krishna River Basin

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Abstract: The Krishna River Basin (KRB), spanning ~258,948 sq. km across Maharashtra, Karnataka, Telangana, and Andhra Pradesh, is shaped by monsoon-driven inflows, pronounced spatial rainfall variability, and extensive hydraulic regulation. Rainfall exceeds 3000 mm/year in the Western Ghats but falls below 600 mm/year in rain-shadow interiors, with historical (1901–2024) data showing a basin average of ~920 mm, slight upward trends, and warming of 0.5-1 °C in maximum and 0.1–0.4 °C in minimum annual temperatures. Relative humidity peaks above 80% in monsoon and drops below 40% in dry seasons; wind speeds range from 5 m/s in coastal/highland zones. Hydrologically, the basin supports major tributaries like Bhima, Tungabhadra, Musi, and Munneru, and relies on both surface storage and groundwater, the later critical in semi-arid zones but under depletion pressure. Hydraulically, the KRB hosts 718 dams (including Nagarjuna Sagar, Srisailam, Almatti, Ujjani, Narayanpur, Tungabhadra, Ghataprabha, Malaprabha, and Jurala), 370 barrages (e.g., Prakasam, Nira–Bhima, Siddheshwar), 52 bridges, 38 ghats, and canal systems irrigating ~96,900 sq. km. Cross-sectional surveys from 40 CWC stations reveal significant variability in channel width, depth, and slope-deep. Longitudinal profiles from SRTM DEM highlight elevation drops influencing velocity and sediment movement. Projected intensification of monsoon extremes, rising temperatures, and warmer nights will heighten water allocation challenges, underscoring the need for integrated climatological, hydrological, and hydraulic management for sustainable and equitable water governance in the KRB.

Keywords: ***Climate Projections, Groundwater, Rainfall, Relative humidity, Wind speed, Cross-section, Longitudinal Profile***

Nirmal Dhara: Planning, Pollution Control and Clean Water of the Krishna River Basin

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Abstract: The Nirmal Dhara initiative within the Krishna River Basin focuses on assessing, planning, and implementing strategies for pollution control, wastewater management, and sustainable sanitation to achieve clean water goals. The poster presents a comprehensive profile of the basin's pollution status, wastewater treatment capacity, sanitation infrastructure, and industrial footprint. Water quality analysis, based on CPCB monitoring locations, highlights critical stretches prone to pollution. The basin generates significant sewage loads, with treatment facilities unevenly distributed across Maharashtra, Karnataka, Telangana, and Andhra Pradesh. A total of 135 Sewage Treatment Plants (STPs) are identified, with Maharashtra accounting for nearly half (66 STPs), followed by Karnataka (41), Telangana (21), and Andhra Pradesh (7), reflecting higher sewage treatment capacity in the Upper Krishna Sub-basin region. In addition, 120 Water Treatment Plants (WTPs) and 281 industries are mapped, highlighting infrastructure loads and pollution risks. District-level sewage network coverage shows sharp disparities, with Pune, Kolhapur, and Shivamogga achieving excellent coverage (>75%), while several districts in Telangana and Andhra Pradesh remain poorly covered (<25%), and in many others, data remains unavailable. Solid waste management performance also varies significantly, with Ahmednagar, Pune, Kolhapur, and Khammam performing excellently (81–100%), while central Karnataka and Telangana districts show only good to fair performance (61–80%). Poor performance (51–60%) is noted in Vijayapura, Tumakuru, Nagarkurnool, Prakasam, and Jogulamba Gadwal, while districts such as Guntur, Raichur, and Chikkamagaluru lack data entirely. Land use change analysis reveals rapid urban expansion into floodplains, further stressing water quality. Overall, the assessment provides a foundation for targeted interventions, emphasizing integrated basin-level planning to restore sustainable water quality and improve public health.

Keywords: ***Nirmal Dhara, Krishna River Basin, Water Quality, Sewage Treatment, Pollution Control, Solid Waste Management, Sanitation, Industrial Discharge***

Cauvery River at a Glance

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Abstract: The Cauvery River originates at Talakaveri in the Brahmagiri Hills of Kodagu district, Karnataka, at an elevation of 1,341 m, and flows across the states of Tamil Nadu and Kerala, the Union Territory of Puducherry, before discharging into the Bay of Bengal. Covering an area of over 85,220 sq. km, the Cauvery River Basin (CRB) serves as a vital hydrological, ecological, and socio-economic lifeline for southern India. It supports diverse ecosystems, fertile agricultural lands, major urban centres, and a rich cultural heritage. Over the past millennium, around 101 dams have been constructed in the basin, providing crucial services such as irrigation, drinking water supply, hydropower generation, and biodiversity conservation, including sustaining important fish species like Mahseer and Katla. However, the CRB faces growing challenges from industrial effluents, untreated sewage, agricultural runoff, over-extraction of water, and overall ecosystem degradation. To mitigate these threats, several initiatives have been introduced, including afforestation, reforestation, watershed management, pollution control, community participation, integrated water management, and river rejuvenation programs. Based on indicators such as population density, land-use/land-cover (LULC) change, soil erosion, and reservoir siltation, areas like Nagapattinam, Bengaluru Urban, and Thiruvarur have been identified as highly disturbed. Sustaining and restoring the health of the CRB requires coordinated efforts among governments, stakeholders, and local communities. An important step in improving water management within the basin is the Cauvery-Vaigai-Gundar river linking project, which aims to enhance water availability and support long-term basin resilience.

Keywords: ***Cauvery River Basin, River Rejuvenation, Integrated Water Management, Restoration, Disturbed Areas, Biodiversity***

Lives Along the River: Demographic Insights from the Cauvery Basin

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Abstract: The Cauvery River Basin (CRB) is home to diverse communities whose demographic patterns mirror the region's geography, economy, and urban–rural dynamics. India Census, 2011 shows that the Karnataka stretch of the CRB hosts 24.9 million people, almost equally divided between urban and rural areas, while Tamil Nadu's share has 34.3 million, with a rural majority. Population density is highest in Bengaluru Urban (2,030 persons/sq. km) and Karaikal (1,212 persons/sq. km), and lowest in Chikkaballapura (0.51 persons/sq. km). Urbanization has driven rapid growth in Bengaluru Urban (4.8 to 9.6 million between 1991-2011), while Bengaluru Rural shows stagnation due to migration; the creation of new districts like Krishnagiri, Namakkal, and Thiruvarur also contributed to notable demographic shifts. Bengaluru Urban displays a male bias (52.20% males, 47.80% females) due to employment-driven migration, whereas rural Tamil Nadu (e.g., Thanjavur, Thiruvarur) retains either balanced or female-skewed populations. Declining birth, death, and infant mortality rates (2010-2020) across Karnataka, Kerala, Tamil Nadu, and Puducherry reflect better health and socio-economic conditions. Southern and central CRB districts have larger working populations linked to industry, agriculture, and urbanization. Land-to-people ratios reveal contrasts: Kodagu have more land per person based on net sown area, barren and unculturable land, and cropped area, while Bengaluru Urban face high population pressure.

Keywords: ***Cauvery River Basin, Land-to-people Ratio, Population Density, Mortality Rate, Sex Ratio, India Census***

Geology, Geomorphology and Lithology of the Cauvery River Basin

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Abstract: This study explores the spatial variability in lithology, geomorphology, and geology across the basin, highlighting the transitions in channel morphology and the implications for land use and hazard susceptibility. Geomorphologically, the river transitions from confined bedrock-controlled channels in the upper reaches to unconfined, meandering channels in the lower plains, reflecting changes in valley setting and channel morphology. The basin's geology is dominated by metamorphic rocks (54,729.55 sq. km) and igneous formations (19,574.01 sq. km), with sedimentary areas (2,706.16 sq. km) and unconsolidated sediments contributing to localized porosity and hydrocarbon potential. Soil types also vary across the basin: fine-textured soils (58,259.4 sq. km) dominate the upper and lower plains and support paddy cultivation, while medium (15,257.9 sq. km) and coarse soils (9,203.55 sq. km) are more common in middle zones. Non-soil areas (2,846.79 sq. km), such as rocky outcrops and water bodies, limit agricultural use. A high concentration of landslide susceptibility points is observed along the Western Ghats, particularly in Wayanad, Nilgiris, Palakkad, and Idukki districts, where steep slopes, intense monsoonal rainfall, and active tectonic processes contribute to slope instability. The study documents both recent and historical landslide events, highlighting vulnerable zones such as Sakleshpur (NH-75), Sringeri (NH-169), Wayanad, and the Nilgiris. Notable incidents include the Pettimudi landslide in Idukki (2020), which resulted in fatalities, and a series of recurrent landslides in the Nilgiris from 1824 to 2015, pointing to persistent geomorphological instability in the region. The documented landslide events emphasize the need for focused attention on vulnerable zones, particularly in the Western Ghats, to reduce future hazards and support regional development.

Keywords: ***Cauvery River Basin, Lithology, Geomorphology, Geology, Soil Type, Landslide***

Hydraulic, Hydrologic, and Climatic Profile of the Cauvery River Basin

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Abstract: This study investigates the dynamic and complex nature of the Cauvery River Basin (CRB) through an integrated analysis of its hydraulic infrastructure, hydrologic behavior, and climatic variability. It delineates the spatial distribution of major dams and rain gauge stations, alongside various Central Water Commission (CWC) monitoring stations, categorized as: Gauge and Discharge (GD), Gauge, Discharge, and Water Quality (GDQ), Gauge, Discharge, Quality, and Rainfall (GDQ & RF), Gauge, Discharge, Sediment, and Quality (GDSQ), and Gauge, Discharge, Sediment, Quality, and Rainfall (GDSQ & RF). Key hydraulic characteristics, including variations in cross-sectional profiles, reveal how the Cauvery River and its tributaries respond to both natural geomorphic processes and human interventions. The longitudinal profile methodology provides a scalable and cost-effective approach for assessing bed slope, water surface slope, and flow resistance across the basin. From a climatic perspective, the analysis identifies a significant upward trend in annual rainfall from 1950 to 2024 ($\tau = 0.169$, $p = 0.03$), although interannual variability remains high, with noticeable post-2000 rainfall peaks. Projections using CMIP6 scenarios (SSP126-SSP585) anticipate ongoing variability, with higher-emissions pathways (SSP370, SSP585) indicating a potential shift toward wetter conditions after mid-century, albeit with large uncertainty margins. By situating these findings within the context of recent climate-related events-such as the 2023 water crisis and 2019's erratic monsoon impacts in Kodagu-the study underscores the urgent need for resilient water management strategies in the CRB, emphasizing its growing sensitivity to climatic and hydrologic extremes in a changing environment.
Keywords: ***Cauvery River Basin, Dams, Cross-sectional Profiles, Longitudinal Profile, CMIP6, Emissions Pathways***

Nirmal Dhara:
Planning, Pollution Control and Clean Water of the Cauvery River Basin

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Abstract: The Cauvery River Basin (CRB) is a critical socio-ecological system of southern India, sustaining urban-rural water demands,intensive agriculture, and diverse ecosystems. However, rapid urbanization, industrialization, and land-use transformation have intensified pressures on water quality, service delivery, and ecological flows. This study presents an integrated framework under the Nirmal Dhara initiative for planning, pollution control, and clean water in the CRB, coupling geospatial monitoring audits with longitudinal water-quality analytics, sanitation diagnostics, and service-delivery performance. Spatio-temporal datasets from CPCB monitoring stations were harmonized to evaluate DO, BOD, COD, nutrient, and coliform trends, alongside compliance grading and hotspot detection along industrial and urban stretches. Land use/land cover (LULC) trajectories (2017–2024) highlight the expansion of built-up areas and contraction of vegetation and wetlands, indicating escalating anthropogenic stress. Overlay analysis of water-supply networks, treatment plant (WTP/STP) capacities, and sewerage infrastructure reveals critical performance bottlenecks,underutilization of installed capacity, and non-revenue water (NRW) deficits. Integration of industrial profiles and drainage connectivity identifies priority clusters vulnerable to effluent discharge and untreated sewage inflows. Sanitation diagnostics incorporate solid waste segregation, transportation, treatment, and disposal pathways, linking waste leakages with basin-wide contamination risks. The holistic framework demonstrates how coupling geospatial intelligence with service-delivery analytics enables hotspot ranking, targeted interventions, and resilient basin management strategies. By aligning water-quality restoration with integrated water-sanitation-waste management, this study advances the Nirmal Dhara vision for sustainable and equitable flows in the Cauvery River, offering a transferable model for river-basin management in India.

Keywords: ***Cauvery River Basin, Nirmal Dhara, Water Quality, Sanitation Diagnostics, Water Supply, Hotspot Analysis***

Periyar River at a glance

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Abstract: The Periyar River, Kerala's longest at 260.7 km and draining a basin of 5,216 sq. km spanning Kerala and Tamil Nadu, serves as a vital hydrological lifeline and ecological corridor. Originating in the forested Western Ghats within the Periyar Tiger Reserve, a biodiversity hotspot home to Bengal tigers, Asian elephants, and the unique Neelakurinji bloom, the river courses through forested uplands and fertile midlands before emptying into the Arabian Sea. This poster visually traces its tributary network and elevation profile alongside a spatial map of 17 major dams (notably the massive Idukki and historic Mullaperiyar), which support hydroelectric power, irrigation, and inter-state water sharing, underpinning Kerala's renewable energy and agricultural sectors. The river's fertile floodplains nurture spice plantations of cardamom, pepper, nutmeg, clove, and ginger, while culturally and infrastructurally significant landmarks such as the Aluva Mahadeva Temple, Malayattoor pilgrimage site, and Cochin International Airport (the world's first fully solar-powered airport) dot its banks. By integrating hydrological, ecological, agricultural, cultural, and infrastructural dimensions into a unified visual and textual synthesis, the poster underscores Periyar's multifaceted role in regional resilience. As Kerala grapples with growing environmental stress and climatic change, this synthesis highlights the urgent need for integrated, basin-scale management strategies to safeguard the river's ecological integrity, socio-economic benefits, and sustainability for future generations.

Keywords: Periyar River Basin, Biodiversity, Hydraulic structures, Hydroelectric Power, Socio-cultural landmarks

Lives Along the River: Demographic Insights from the Periyar Basin

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Abstract: Demography, the statistical study of human populations, offers crucial insights into the socio-economic and spatial patterns shaping the Periyar River. Understanding these trends helps identify opportunities and challenges for sustainable river basin management. The Periyar Basin, spanning parts of Idukki, Ernakulam, Thrissur, and Coimbatore districts, is home to 3.71 lakh people, with a slightly higher female population than males. Urban population dominates, with Kochi Corporation as the largest hub, while rural settlements such as Kannan Devan Hills remain significant in the highlands. Population density ranges from Ernakulam's 1,072 persons/sq. km, indicating intense urban pressure, to Idukki's 255 persons/sq. km, reflecting its hilly, less accessible terrain. Occupational patterns reveal regional contrasts: Idukki relies heavily on agriculture, whereas Ernakulam's workforce is concentrated in the tertiary sector. Tribal communities, comprising 49,780 individuals, are predominantly found in Idukki, with Devikulam taluk hosting the largest share. Demographic characteristics, including birth and death rates, sex ratio, and land-to-people ratios, directly influence resource demands, waste generation, and policy priorities. Positively, a balanced sex ratio and diverse livelihoods offer social stability; however, high urban density and uneven land distribution pose challenges to equitable resource allocation and river health. These demographic insights are essential for designing targeted interventions that promote sustainable development while preserving the ecological integrity of the Periyar River Basin.

Keywords: ***Demography, Population Density, Urbanization, Tribal Communities, Sustainable Development***

Geology, Geomorphology, and Lithology of the Periyar River Basin

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Abstract: The lithological profile and geology of the Periyar River Basin are a foundational step in comprehending its geological evolution and the environmental processes of the region. The objective of the lithological profiling is to identify and map the primary rock units and to elucidate their influence on the river basin's geomorphology, hydrology, and overall environment. The lithology dictates the stability of the landscape, influencing erosion rates, soil composition, and the potential for natural hazards such as landslides. Crucially, the rock types govern water-rock interactions, which determine groundwater storage capacity, aquifer characteristics, and the chemical quality of surface and groundwater. The geologic profile of the Periyar aims to collect relevant data to understand tectonic activities, landslides, and human interventions, including excavations, mining, and deforestation, that may have influenced its natural geological characteristics. Geomorphological assessments, integrating multi-temporal satellite data, reveal distinct river styles, valley settings, and critical landforms. These geomorphic features provide vital insights into river dynamics, hazard susceptibility, and sustainable basin management strategies. Through the integration of field surveys, remote sensing data, and data from previous studies, our study provides a comprehensive lithological detailing, geology, and geomorphological characteristics of the Periyar River basin.

Keywords: ***Lithological profile, Geologic profile, Geomorphological assessments, River styles, Landforms***

Hydraulic, Hydrologic and Climatic Profile of the Periyar River Basin

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Abstract: This study presents a comprehensive hydrometeorological and climate assessment of the Periyar River Basin, integrating spatial, hydraulic, and climate datasets to support sustainable water resource management. A detailed spatial map delineates the distribution of river and rain gauging stations managed by IMD, IDRB, and CWC, alongside the locations of major dams, emphasizing their multipurpose roles in irrigation, hydropower, flood control, and water supply. A tabulated summary complements this by detailing key dam characteristics, including year of commissioning, technical specifications, and storage capacities. Hydraulic cross-sections across selected river reaches illustrate channel geometry and flow capacity, offering insights into flood conveyance and river health. The climate profile of the basin is developed using historical and projected meteorological data from the IMD Data Supply Portal and bias-corrected CMIP6 simulations. Historical data (1951–2014) and future projections (2015–2100) under four Shared Socioeconomic Pathways (SSP1-2.6, SSP2-4.5, SSP3-7.0, and SSP5-8.5) at 0.25° spatial resolution reveal a consistent warming trend, with increased variability and uncertainty under higher emission scenarios. The integrated analysis underscores the need for adaptive management strategies to address future climatic and hydrological challenges in the basin.

Keywords: ***Hydrometeorological Monitoring, Climate Change Projections, CMIP6 Scenarios, Dams and Reservoirs, Hydraulic characteristics***

Nirmal Dhara: Planning, Pollution Control, and Clean Water of the Periyar River Basin

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Abstract: The Periyar River Basin, spanning Ernakulam and Idukki districts, is facing increasing environmental stress due to industrial discharges, urban expansion, and inadequate waste management. Ernakulam, particularly the Eloor region, is a major contributor to industrial pollution, while Idukki, although less industrialized, has limited pollution monitoring. Water quality assessments in 2022–2023 revealed exceedances in total dissolved solids (TDS), hardness, and microbial contamination at locations such as Eloor, Pathalam, and Aluva, with risks peaking during monsoon periods. Rapid urbanization driven by Kochi's growth and tourism in Munnar has resulted in a 15–20% loss of agricultural and wetland areas since the 1990s. Infrastructure initiatives include Smart City Kochi, promoting sustainable urban renewal through smart transport, waste and water management, and green technologies, as well as a planned decentralized sewerage network covering 530 sq. km and serving 13 lakh people with 21 new STPs. Solid and liquid waste management programs under Haritha Keralamand the Suchitwa Mission are being implemented, though sanitation coverage remains uneven. Nirmal Dhara emphasizes targeted pollution control measures, enhanced monitoring, community participation, and integrated water resource management to restore the Periyar's ecological balance. These findings underline the urgent need for coordinated, multi-sectoral action to ensure clean, sustainable, and healthy river systems for future generations.

Keywords: ***Nirmal Dhara, Infrastructure Planning, Water Quality, Pollution Control, Sustainable Management***

Active Channel and Riverbank Threats for Identified Stretches of Mahanadi River

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Abstract: The Mahanadi River, eastern India's lifeline, is on the move reshaping its banks, shifting channels, and altering its flow in ways that could impact ecosystems, livelihoods, and industries alike. A new study analyzing a 270 km stretch between Baipur and Gopinathpur, Cuttack, reveals striking insights into the river's morphometric dynamics. Researchers divided the river into five reaches and used advanced tools like the Digital Shoreline Analysis System (DSAS) and Kalman Filter modeling to track and predict changes. Their findings show that while much of the river follows a sinuous path, the Kantilo stretch meanders more dramatically. Bank stability is uneven: reaches two and three appear relatively steady, while others show signs of significant instability. Alarmingly, the flow area-to-channel area ratio has declined by 25 - 30% due to upstream dams and barrages, shrinking the river's capacity and stressing aquatic habitats. Climate change is compounding the challenge. Irregular rainfall now fuels frequent flooding in the lower reaches, while even low discharges cause bank erosion. The study found the right bank to be more unstable than the left, a warning sign for settlements and farmland lying downstream. The work underscores the urgent need for sustainable river management. By decoding how the Mahanadi shifts and bends, the research not only sheds light on local erosion and flood risks but also highlights the broader interplay of climate, infrastructure, and ecology in shaping India's great rivers.

Keywords: ***Mahanadi River Basin, Morphology, Bank Erosion, River Meandering, Sinuosity***

Jal Prahari: An Android Application for River Health Monitoring

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Abstract: The Jal Prahari app is a mobile tool created at the Center for Mahanadi River Basin Management & Studies (cMahanadi), NIT Raipur, designed to make river health monitoring easier and more effective. Built using the latest Android technologies like Kotlin, Jetpack Compose, and Firebase, this app allows researchers, field workers, and community members to collect and share vital river health data. Jal Prahari features easy login options, multiple survey types (one-time, monthly, and audio), and clear instructions, making it simple for users with different backgrounds to contribute to river conservation. Data collected in the field can be stored and synced in real time, and the app works even in areas with limited internet connectivity. The app uses a smart design so that information is secure and the experience remains fast and reliable. While Jal Prahari currently does not support cloud image storage or live map tracking due to free-tier limits on Firebase, future upgrades plan to add these features for richer data collection and better field navigation. By combining technology and environmental research, Jal Prahari aims to help make water management more informed and encourage broad community involvement in protecting the Mahanadi River.

Keywords: ***River Health Monitoring; Android Application; Latest Android Technologies; Field Data Collection; Sustainable Water Management; Community Engagement***

Narmada River Atlas

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Abstract: The Narmada River, originating from Amarkantak in Madhya Pradesh, is one of the most significant west-flowing rivers of India, draining into the Arabian Sea through the Gulf of Cambay. Extending over 1,300 km, the river traverses Madhya Pradesh, Maharashtra, and Gujarat, playing a vital role in supporting agriculture, ecosystems, hydropower generation, and millions of livelihoods. The Narmada Basin is characterized by a complex network of tributaries, reservoirs, and hydraulic structures that together form a critical foundation for integrated basin management. This poster presents a flow diagram of the Narmada River and its major tributaries, along with key dams and control points across the basin. Prominent dams such as Bargi (400.53 km), Tawa (677.02 km), Indira Sagar (892.81 km), Omkareshwar (935.01 km), and Sardar Sarovar (1206.60 km) are shown, highlighting their positions along the river course. Tributaries including the Tawa, Dudhi, Hiran, Barna, and Orsang, among others, are also depicted, emphasizing their contribution to the river system. By systematically mapping the river and its hydraulic infrastructure, the diagram serves as an important reference for understanding river morphology, planning hydrological studies, and supporting sustainable water resource management in the basin.

Keywords: ***Narmada River Basin, Tributaries, Hydraulic Structures, Water Resource Management***

Areal Drone Survey

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Abstract: The Narmada River Basin, extending across central and western India, plays a crucial role in sustaining agriculture, ecology, and communities. High-resolution spatial data is essential for effective river basin management, particularly for assessing channel morphology, floodplains, and adjoining infrastructure. Aerial surveys using drones provide an advanced means of data collection, offering rapid coverage and improved accuracy. As part of the "Condition Assessment and Management Plan (CAMP) for the Narmada River Basin," information on aerial surveys has been compiled to evaluate existing datasets and identify data gaps. The survey details—covering stretches of the upper, middle, and lower basin—were reviewed based on available records, timelines, and accessibility. The table presented in this poster summarizes the surveyed stretches, the agencies involved, and the availability of data. This systematic documentation provides clarity on where high-resolution data already exists and highlights priority areas requiring future surveys. The outcomes of this exercise will aid in streamlining data acquisition strategies, ensuring regulatory compliance under The Drone Rules, 2021, and supporting hydrological modelling, flood risk assessment, and infrastructure planning.

Keywords: ***Narmada River Basin, High-resolution spatial data, Survey***

Ichthyofaunal Diversity and Conservation Priorities in the Godavari River Basin

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Abstract: The Godavari Basin, India's second-largest river system, harbors remarkable ichthyofaunal diversity, shaped by its vast riverine network and diverse ecological conditions. Surveys conducted across the basin recorded 152 freshwater fish species in the main channel and substantial diversity in tributaries such as Indravati (37 species), Manjira (57 species), Wainganga (51 species), Purna (36 species), and Pranhita (37 species). Cyprinidae dominate the assemblage, followed by Bagridae and Danionidae, together forming the bulk of the species composition. Endemism is significant, with 44 species confined to the basin, including Parapsilorhynchus prateri (Critically Endangered), Tor kulkarnii (Endangered), and Gagata itchkeea (Vulnerable). These species not only hold ecological value as bioindicators but also sustain cultural and economic livelihoods. However, escalating threats, ranging from industrial effluents, agricultural runoff, sand mining, and deforestation-induced siltation to the impacts of dams, barrages, and overfishing, are driving habitat degradation and population declines. The study underscores the Godavari's dual importance as a biodiversity hotspot and a critical socio-economic resource, emphasizing the urgent need for integrated conservation strategies to protect endemic and threatened taxa while ensuring sustainable fisheries and livelihood security for dependent communities.

Keywords: ***Godavari Basin, Fish Diversity, Endemic Species, Conservation, Sustainable Fisheries***

Changing Landscapes: Land Degradation in the Godavari Basin (2003–2019)

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Abstract: Land degradation is an increasing global concern, directly affecting food security, ecological stability, and livelihoods. The Godavari River Basin, one of India's largest and most ecologically diverse river systems, is experiencing growing land degradation pressures from both natural and human-induced processes. This study analyses temporal trends in land degradation across the basin for three time periods—2003–05, 2011–13, and 2018–19, using data from the Desertification and Land Degradation Atlas Dashboard (SAC-ISRO).Findings reveal a steady rise in degraded land, from 29.73% of the basin's geographical area in 2003–05 to 32.63% in 2018–19. Among degradation processes, water erosion remains dominant, increasing from 18.69% to 20.59%, followed by vegetation degradation, which increased from 9.51% to 10.16%. Settlement expansion nearly doubled, reflecting rapid urbanization, while waterlogging also showed a sharp rise after 2011.On the other hand, barren and rocky lands showed marginal decline, and salinity levels remained unchanged. At the state level, Maharashtra (45.31%) and Odisha (43.08%) reported the highest degradation shares in 2018–19, whereas Andhra Pradesh had the lowest (6.40%), though with notable increases in waterlogging and settlement expansion. The study also incorporates district-level analysis to identify the major degradation processes at disaggregate level. Overall, the results underscore the urgent need for integrated watershed management, sustainable agricultural practices, and urban planning to reduce further land degradation. The basin-level approach provides a consolidated perspective, supporting region specific and coordinated interventions to safeguard land resources for future generations.

Keywords: ***Godavari River Basin, Land degradation, Water erosion, Vegetation degradation, Settlement expansion***

Learnings From the Work Done in International Basins & Possible Implementation in Godavari River Basin

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Abstract: Rivers around the world are under increasing stress from nutrient enrichment challenges, salinization, sediment overload, and climate-driven hydrological alterations. A Comparative study is being done on worlds of six international basins Danube, Rhine, Murray Darling, Amazon, Colorado, and Mekong offer valuable lessons for the sustainable management of India's Godavari River Basin. The Danube Basin demonstrates the effectiveness of transboundary governance under the EU Water Framework Directive. Over two decades, tertiary wastewater treatment coverage rose from 46% to 73%, reducing nitrogen and phosphorus emissions. Floodplain restoration currently retains 33,200 tons of nitrate annually, with potential for an additional 38,000 tons through reactivation of 1,440 sq. km of floodplains. The Murray Darling Basin highlights how hydrological extremes amplify water-quality risks, with nutrient loads spiking to 103 to 105 kg per day during post-drought flushes. Godavari faces complex challenges, including untreated disposal of municipal sewage and industrial effluents, dumping of solid waste, groundwater depletion, sedimentation from catchment erosion, proliferation of aquatic weeds, and salinity intrusion in the delta. Addressing these issues requires drawing on global best practices, implementing basin-wide emission inventories and nutrient reduction targets.

Keywords: ***Nutrient Management, Wastewater Treatment, Wetland Restoration, Salinity Control, Climate Change Adaptation***

Spatio-temporal patterns of the Godavari River Basin's Climate: implications on the Management of Water Resources

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Abstract: The Godavari River Basin, is the second largest basin and highly water-dependent areas of India, is extremely vulnerable to changes in the climatic conditions. This study investigates long-term climatological trends in precipitation and drought conditions using observed data from IMD (1980–2023) and GCM (1950–2100). The spatio-temporal trend analysis shows distinct monsoon-driven rainfall patterns, with daily-averaged precipitation varying from 0 to 5.9 mm/day, peaked during July–August across most basin-connected cities. The inter-annual variability is high, with relatively drier conditions in Jalna and Latur compared to wet zones such as Chandrapur, Nagpur, and Nanded. The basin-average yearly heavy precipitation intensity is predicted to rise from historical values ranging from 1.5 to 2.0 × 10^{-4} kg/m²/s (1950–2014) to around 2.5 × 10^{-4} kg/m²/s under SSP-245 and above 3.0 × 10^{-4} kg/m²/s under SSP-585 by 2100, indicating a significant intensification of extreme rainfall events. Significant negative anomalies (-1.0 to -1.5) are seen during the pre-monsoon months and onset of monsoon (March–June) in the SPEI-based drought analysis, especially in the Southwest part of basin, suggesting a high vulnerability to moisture deficiencies. On the contrary, the retreating and post-monsoon period (August–December) exhibits positive SPEI values, indicating a brief recovery. These findings indicate a growing problem of dual nature; increasing intense precipitation and the likelihood of recurring events. The incorporation of precipitation and drought estimates plays an essential role into basin-scale water resource management for climate- resilient planning, reservoir operation and agricultural adaptation.

Keywords: ***Godavari River Basin, Drought, Precipitation, Climate-resilient planning***

Hydrology Geospatial Dashboard for the Godavari River Basin

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Abstract: The Godavari River Basin, one of the largest and most significant basins in India, plays a vital role in sustaining regional water resources, agriculture, and ecological systems. Despite its importance, the effective monitoring and visualization of hydrological data remain limited by fragmented datasets and the lack of integrated spatial platforms. This study proposes the development of a geospatial infrastructure designed to disseminate critical hydrological information, with a particular emphasis on river discharge and cross-sectional data within the basin. The framework integrates discharge observation points into an interactive geospatial interface, enabling spatially referenced exploration of long-term hydrological records. Users can query specific sites across the basin, retrieve time series data, and generate hydrographs for selected temporal windows, thereby facilitating comparative and trend analyses. By coupling GIS based visualization with temporal data interrogation, the platform provides an advanced decision support tool for researchers, water resource managers, and policymakers. The proposed system enhances basin scale understanding of hydrological dynamics, supports water management strategies, and contributes to sustainable development planning in the Godavari River Basin.

Keywords: ***Geospatial Infrastructure, Discharge Data, GIS, Hydrograph, Data Visualization, Water Resources***

River Atlas of Krishna Basin

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Abstract: The Krishna River Basin, one of the largest in peninsular India, spans about 258,948 sq. km and extends nearly 1,400 km, supporting agriculture, water supply, and hydropower across Maharashtra, Karnataka, Telangana, and Andhra Pradesh. However, reliable and updated stream network datasets are often scarce, leading to gaps in river mapping and basin management. To address this challenge, the River Atlas of the Krishna Basin was developed by compiling and validating named river networks that form the basin's hydrographic framework. Stream data from the National Remote Sensing Centre (NRSC) were used as the baseline, with named streams extracted, verified against Survey of India toposheets, and updated using Google Earth Pro imagery. This methodology corrected positional mismatches and produced a reliable, up-to-date inventory of river systems. The atlas documents 984 named rivers distributed across major sub-basins: Upper Krishna (202), Middle Krishna (57), Lower Krishna (132), Upper Tungabhadra (106), Lower Tungabhadra (106), Upper Bhima (292), and Lower Bhima (89). Prominent rivers such as Bhima (861 km), Tungabhadra (665 km), Musi (299 km), and Muneru (216 km) are among the key networks delineated. By providing an accurate and validated depiction of river systems, this atlas fills a critical data gap and strengthens hydrological datasets vital for water resources planning, flood risk assessment, ecological monitoring, and conservation policy in the Krishna River Basin.

Keywords: ***Krishna River Basin, River networks, GIS, Bhima, Tungabhadra, Musi, Hydrology***

Water Quality of Krishna River Basin

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Abstract: The Krishna River Basin is a vital freshwater resource in peninsular India, supporting agriculture, drinking water supply, and industrial activities. However, rapid urbanization, industrial effluents, and agricultural runoff have significantly deteriorated water quality in both surface and groundwater systems. This study provides a comprehensive assessment of water quality across the Krishna River and its major tributaries, with a focus on identifying pollution stretches and evaluating groundwater status. Findings indicate that the Krishna River is critically polluted between Shindi-Kurundwad and Amaravathi-Hamsaladeevi because of urban sewage and industrial discharge from Karad, Sangli and Vijayawada. Similarly, the Bhima, Tungabhadra, and Musi rivers are severely impacted by wastewater from major cities such as Pune, Kurnool, and Hyderabad, with several stretches exceeding safe thresholds. Groundwater quality was assessed using 1,284 samples provided by CGWB. Results show wide variability, with pH ranging from 5.13 to 9.46 and fluoride concentrations between 0.11 and 6.44 mg/L. Chloride levels reached a maximum of 6,090 mg/L, sulphates up to 1,695 mg/L, and nitrates up to 1,989 mg/L. The Groundwater Quality Index (GWQI) was calculated using the weighted arithmetic method to evaluate overall groundwater suitability. The results show that 12.7% of samples fall under the excellent category, 41.6% good, 35.3% poor, 6.2% very poor, and 4.2% are unfit for use. Overall, while nearly half the samples indicate good water quality, a significant proportion falls within poor to unfit categories, highlighting the urgent need for effective groundwater management and pollution control measures. Spatial distribution maps were prepared using IDW interpolation in ArcGIS 10.8, providing critical insights for water resource planning and sustainable management of the Krishna River Basin.

Keywords: ***Krishna River Basin, Pollution, Groundwater, Water Quality Index (WQI), ArcGIS***

Biological Profile of Krishna Basin

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Abstract: The Belvai Frog Workshop, conducted by Sammilan Shetty's Butterfly Conservation and Research Team (SSBCRT) Belvai, Karnataka emphasized the biological profiling of amphibians in the Kudremukh region of the Western Ghats, a stretch of the river Tunga in the Upper Tungabhadra sub-basin. The workshop facilitated direct observation, species identification, and ecological documentation of diverse anuran species inhabiting forest streams, wetlands, and riparian habitats. A total of 22 species were seen, some of which includes the Malabar Gliding Frog (Rhacophorus malabaricus), noted for its aerial locomotion and striking coloration; the Amboli Bush Frog (Pseudophilautus amboli), an endemic and threatened taxon; the Indian Tree Frog (Polypedates maculatus); the Wrinkled Frog (Nyctibatrachus spp.); and Rao's Intermediate Golden-backed Frog (Indosylvirana intermedia). Additional observations comprised the variety of Butterflies and Snakes. Some of the rarest species of butterflies included the Tagiades japetus commonly called 'Snow Flat' and Tanaecia lepidea commonly called as 'Grey Count'. Snake species like Triangle Keelback(Amphiesma stolatum). Furthermore, records of Macrofungal diversity (Mushroom) such as Coprinellus . The session highlighted the ecological significance of amphibians, reptiles, butterflies, and fungal taxa as bioindicators as a health of ecosystem , while reinforcing the conservation value of Kudremukh in Upper Tungabhadra sub-basin landscapes within the Western Ghats. Documentation from this event strengthens the biological profile of species within the Upper Tungabhadra sub-basin, contributing to baseline data essential for amphibian conservation and riverine ecosystem management.

Keywords: ***Amphibian diversity, Western Ghats, Upper Tungabhadra sub-basin, Riverine ecosystem and Biological Profile***

Social Environment Activity

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Abstract: The social environment forms a critical bridge between policies and people, ensuring that river basin management plans move beyond frameworks into actionable outcomes. In the Krishna River Basin, where water is both a lifeline and a stressed resource, the effectiveness of management depends on institutions, civil society groups, and communities working together. A key example comes from the confluence of the Tunga and Bhadra rivers at Kudli, Shivamogga in Upper Tungabhadra Sub-basin NWMP station code 1896 monitoring by the Central Pollution Control Board. The analysis at this site has recorded a maximum Biochemical Oxygen Demand (BOD) level of 4.0 mg/L, above the safe threshold of 3.0 mg/L, classifying the stretch as polluted. The primary causes include untreated sewage, improper solid waste disposal, and effluents from nearby settlements. To address these challenges, social environmental activity were implemented by cKrishna NITK, Surathkal to combine technical interventions with public engagement. These included school outreach programs, plantation drives and river clean-up activities actively involving students, teachers and local communities. Such initiatives helped to create awareness about water conservation, pollution control, and disaster preparedness while promoting sustainable waste management practices. By linking knowledge with real-world experiences, communities were empowered to take responsibility for safeguarding river systems. The outcome was not only visible improvement in riverbank conditions but also the creation of a culture of shared responsibility. Ultimately, embedding awareness alongside institutional action ensures that river basin management is both technically sound and socially inclusive, strengthening long-term ecological resilience and community wellbeing.

Keywords: ***River Basin Management, Social Environment, Public Awareness, Water Conservation, Pollution Control***

Towards a Region-Specific Biotic Index: Macroinvertebrate-Based Bioassessment of River Health in the Cauvery Basin, India

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Abstract: Traditional water quality monitoring was focused primarily on physico-chemical characterizations, which provide only a partial understanding of aquatic ecosystem health. With the inclusion of biological responses to multiple stressors, biomonitoring offers a more comprehensive, cost-effective, and ecologically relevant approach. Even though macroinvertebrate-based bioassessment methods are widely established in many parts of the world, their application in South Asia remains limited due to the lack of region-specific validation. In this study, the ecological status of the Cauvery River (India) was evaluated through rapid bioassessment techniques and 5 established macroinvertebrate indices, viz., the original Biological Monitoring Working Party (BMWP) score, the Biological Monitoring Working Party-Thailand (BMWP-Thai) score, the Biological Monitoring Working Party-Malaysia (BMWP-My) score, the Hindu Kush-Himalayan biotic score (HKHbios), and the biological index developed for Singapore (SingScore). The study indicated that benthic macroinvertebrate communities were dominated by Mollusca, followed by insects and annelids. Comparative analysis showed that HKHbios provided the closest match to the pre-classified ecological status, while other indices tended to under- or overestimate river health conditions. These results highlight the relevance of HKHbios for biomonitoring in Indian rivers and the importance of developing refined, region-specific indices. Expanding such studies across multiple sub-basins and seasons will strengthen the robustness of tolerance values and contribute to an enhanced biotic index for Indian river basins. This work advances the biomonitoring framework in South Asia by providing evidence-based insights for sustainable river basin management.

Keywords: ***Biomonitoring, Macroinvertebrate, Biotic Index, Cauvery River Basin, Ecological Health Assessment***

Evapotranspiration and Land Use Change Drive Streamflow Decline in the Arkavathy River Basin

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Abstract: The Arkavathy River basin has experienced a significant decline in streamflow over recent decades, with previous studies attributing it to factors such as groundwater depletion, increased eucalyptus cultivation, and land use/land cover (LULC) changes. This study examines long-term hydroclimatic trends, streamflow dynamics, and land use changes in the basin. From 1951–2022, daily and seasonal IMD minimum and maximum temperatures declined significantly, except for a slight, non-significant rise in dry-season minimum temperatures. Rainfall showed a non-significant increase in dry, pre-monsoon, and monsoon seasons, and a non-significant decrease in the post-monsoon season. Streamflow (CWC) during 1979-2015 showed a significant decline in daily, dry, and pre-monsoon flows, and a non-significant decrease during the monsoon and post-monsoon seasons. Moreover, groundwater levels (CGWB) increased significantly at six stations and decreased at one, showing no direct alignment with the declining streamflow trend. GLEAM evapotranspiration (ET) increased significantly from 1980 to 2023. Convergent Cross Mapping (CCM) indicated a moderate influence of minimum temperature (0.58), maximum temperature (0.56), and rainfall (0.48), and a high influence of ET (0.69) on streamflow. LULC analysis (1992 & 2020) revealed rapid urban expansion (75.16 to 194.42 sq. km) and growth in cropland (169.58 to 217.54 sq. km), alongside a decline in surface water bodies (51.44 to 35.44 sq. km). The rise in ET, coupled with expanding urban and agricultural areas, likely intensified water demand, exacerbating streamflow reduction. These findings highlight the combined influence of climatic and anthropogenic factors on regional hydrology and emphasize the need for sustainable water management strategies.

Keywords: ***Arkavathy basin, groundwater level, rainfall, evapotranspiration, streamflow***

Vulnerability to Land Degradation in the Arkavathy River Basin

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Abstract: The Arkavathy River Basin has experienced significant environmental stress over recent decades due to increasing anthropogenic pressures and changing land use patterns. This study evaluates the spatial distribution of land degradation vulnerability using a weighted overlay analysis, integrating multiple geospatial datasets. The datasets used include soil erosion data from ICAR-NBSS & LUP and India WRIS, land use/land cover (LULC) derived from Landsat 8 imagery (2022), and population density data from the Census of India (2011). Based on their relative influence on land degradation, soil erosion was assigned the highest weight (50%), followed by LULC (30%) and population density (20%). The results revealed distinct spatial patterns of vulnerability across the basin. Highly vulnerable areas covered 86.42 sq. km, concentrated mainly in the Bengaluru Urban district with small patches in Ramanagaram district. Moderately vulnerable areas occupied 1,070.44 sq. km, while the largest portion of the basin (2,934.89 sq. km) fell under the less vulnerable category. Only 18.41 sq. km, primarily located in Ramanagaram and Bengaluru Rural districts, was identified as least vulnerable. Areas with high vulnerability were strongly associated with zones of intense soil erosion, rapid urban expansion, and high population density. This study highlights the combined role of natural and anthropogenic factors in driving land degradation. The findings provide a spatial decision-making framework to help policymakers and planners prioritize high-risk areas and implement targeted strategies for sustainable land and water resource management in the Arkavathy River Basin.

Keywords: ***Degradation, soil erosion, population density, weighted overlay, Arkavathy River Basin***

Modeling Snowmelt-Driven Runoff and Hydrological Uncertainty in a Glacierized Himalayan Basin

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Abstract: The Himalayan River systems, fed predominantly by snow and glacier melt, are vital water resources for downstream communities, yet they remain highly sensitive to climatic variability. The hydrological processes and uncertainty in streamflow simulation for the Suru basin, a highly glacierized catchment in the Western Himalaya, were assessed using the Soil and Water Assessment Tool (SWAT) coupled with the SUFI-2 algorithm in SWAT-CUP. The model quantified the contributions of snow and glacier melt to river discharge, alongside calibration, validation, and parametric uncertainty analysis. Model setup incorporated high-resolution DEM, LULC, soil, meteorological, and discharge datasets spanning 2015–2023, with calibration performed for 2017–2021 and validation for 2022–2023. Results demonstrated satisfactory performance, with R^2 reaching 0.86 during calibration and 0.98 during validation, while NSE values of 0.39 and 0.73, respectively, reflected improved reliability in the validation period. The 95% prediction uncertainty (95PPU) encompassed 83% of observed data during calibration and 81% during validation, underscoring acceptable model robustness despite limited data availability. Findings highlight that snow and glacier melt are dominant contributors to streamflow, and that careful calibration of sensitive parameters, particularly precipitation and temperature lapse rates, is critical in mountainous terrain. The study underscores the applicability of SWAT-SUFI-2 in glacierized basins for quantifying hydrological processes and addressing uncertainties, offering valuable insights for sustainable water resource management and climate change adaptation in the Indus headwaters.

Keywords: ***Snowmelt runoff, Glacier hydrology, Hydrological modeling, SWAT model, SUFI-2, Model uncertainty***

Disentangling Weathering, Reactive Transport, and Anthropogenic Controls on Dissolved Metal Dynamics in the Cauvery River Basin

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Abstract: Monsoon-dominated rivers are critical arteries of the global carbon and metal cycles, yet the sources and in-stream processes regulating dissolved metal variability remain poorly quantified. We present a basin-wide assessment of dissolved solutes and physicochemical parameters from 18 sites along the Cauvery River and major tributaries, sampled during the 2024 non-monsoon and monsoon. Major ions and geogenically released metals (e.g., Sr, Rb, Ba, U) show progressive downstream enrichment that gets diluted during the monsoon. Using [Cl^-+SO_4^{2-}] and [NO_3^-+PO_4^{3-}] as tracers reveals that major cations systematically increase with agricultural inputs. Weathering tracers (Rb, Sr, Li, Ba, U) exhibit exceptionally strong correlations with Si/Cl ($R^2 > 0.90$), defining a robust lithogenic baseline. Several anthropogenically mobilized metals (V, Cr, Ni, Cu, Co) also follow the baseline Si/Rb strongly during non-monsoon (except for a few deviations) but weaken during monsoon. These deviations reveal key reactive transport processes or flushing from anthropogenic hotspots during the monsoon. Vanadium and arsenic display pronounced negative regression residuals at sites with elevated Fe/Mn ratios (redox-sensitivity tracers), unequivocally indicating Fe-oxide scavenging, particularly at bedrock and geomorphological transitions. Furthermore, solute loads decrease immediately below Mettur Dam, suggesting that sedimentation traps significant solute fractions, which are remobilized during the monsoon as observed for As, Cu, Zn, Pb, and Cd. Conversely, Pb, Zn, and Cd covary tightly spatiotemporally and remain decoupled from weathering or anthropogenic tracers, likely reflecting atmospheric deposition. This integrated process-based framework disentangles natural weathering, hydro-chemical modulations, and anthropogenic enrichment, providing novel quantitative constraints on metal cycling and a transferable approach for source apportionment and flux attribution in monsoon-dominated river catchments.

Keywords: ***Cauvery dissolved data, river water quality, reactive transport, weathering, anthropogenic pollution***

UiO-66-NDC Metal–Organic Framework Modified Electrode for Highly Sensitive and Selective Electrochemical Fluoride Ion Detection

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Abstract: A highly sensitive and selective electrochemical sensor for fluoride ion (F^-) detection was developed. The sensing interface was engineered by modifying the electrode surface with a UiO-66-NDC metal–organic framework (MOF), synthesized through a solvothermal assembly of zirconium-based nodes and 2,6-naphthalenedicarboxylic acid (NDC) linkers. The resulting MOF exhibited a high surface area, well-defined porosity, and abundant active sites, enabling efficient adsorption and electrochemical recognition of fluoride ions. The prepared MOF was thoroughly characterized using FTIR, XRD, TGA, XPS, Raman spectroscopy, and SEM-EDS, which confirmed its structural and compositional features. The primary mechanism of interaction involves the electrostatic attraction of fluoride ions (F^-) to the positively charged zirconium sites within the framework, along with possible complexation or coordination at open zirconium centers. The results revealed a significant enhancement in fluoride sensing performance compared to unmodified electrodes, attributed to the high surface area, tunable pore structure, and strong binding affinity of the UiO-66-NDC framework. The LOD was found to be 0.11 micromolar of fluoride in NaOH buffer. These findings indicate that the UiO-66-NDC-based electrochemical platform offers a robust, efficient, and reusable sensing material for fluoride detection, with strong potential for applications in water quality assessment and pollution management.

Keywords: ***Metal–organic framework (MOF), Electrochemical sensor, Fluoride ion detection, High sensitivity***

Electrochemical Sensing of Cr(VI) Using Interlayer-Engineered MXene/Polyaniline Hybrid: Experimental and DFT Analysis

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Abstract: The present study reports the synthesis of a MXene/Polyaniline (MXene/PANI) composite via chemical oxidative polymerization of aniline monomers on Ti_3C_2Tx-MXene layers. Surface functionalities (–O and –OH) on the MXene served as nucleation sites, facilitating uniform PANI deposition. The resulting composite exhibited a porous structure, which enhanced electrolyte–ion interactions and improved electrochemical performance. Comprehensive physicochemical characterization using FTIR, XRD, TGA, XPS, Raman spectroscopy, and SEM-EDS confirmed the structural and compositional features of the hybrid. Density functional theory (DFT) simulations revealed that the Ti_3C_2Tx/PANI structure displayed an eightfold increase in dynamic delocalized surface states, promoting stronger interaction with Cr(VI), consistent with experimental findings. When integrated onto an electrode surface, the MXene/PANI composite demonstrated excellent resistance against interfering species and high detection efficiency for Cr(VI) in both distilled and wastewater samples, underscoring its potential as a robust sensing platform for heavy metal detection.

Keywords: ***MXene/Polyaniline composite, Cr(VI) detection, electrochemical sensor, density functional theory (DFT), wastewater monitoring***

Eco-Friendly Zinc Methylimidazolate Framework for Electrochemical Detection of Atrazine: Experimental and Molecular Docking Studies

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Abstract: In this work, an eco-friendly route was employed to synthesize zinc methylimidazolate, which was subsequently utilized as the active material for constructing an electrochemical sensor targeting atrazine, a commonly used herbicide and persistent environmental pollutant. The sustainably synthesized framework displayed remarkable electrochemical responsiveness, enabling highly sensitive and selective detection of atrazine. To complement the experimental findings, molecular docking simulations were carried out, offering detailed insight into the binding interactions between atrazine molecules and the zinc methylimidazolate structure. These computational results confirmed the strong affinity of atrazine toward the framework, in agreement with the sensing performance. The fabricated sensor demonstrated a detection limit of 1.73 µM, emphasizing its practical applicability for monitoring pesticide contamination in water. By integrating experimental validation with theoretical modeling, this study provides a comprehensive perspective on the sensing mechanism and establishes zinc methylimidazolate as a sustainable and efficient material for next-generation environmental sensing platforms.

Keywords: ***Metal–organic framework (MOF); Electrochemical sensor; Atrazine detection; Real time studies***

Laser-Induced Graphene Synthesis from Biomass Using DFT for Eco-Friendly Cr(VI) Detoxification Aligned with SDGs

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Abstract: Laser-induced graphene (LIG) was fabricated from jackfruit (Artocarpus heterophyllus Lam.) leaves using a one-step, reagentless CO_2 laser process, producing an eco-friendly carbon material tailored for Cr(VI) removal from water. The resulting LIG exhibited notable adsorption capacity, removing up to 323.78 mg/g of Cr(VI) in optimal conditions (pH 2, 0.1 g/L adsorbent dose, 8-hour contact). Kinetic analysis displayed rapid initial uptake, shifting from pseudo-second order and mixed fractional-order models at low Cr(VI) concentrations to pseudo-first order and Avrami kinetics at higher concentrations. Adsorption isotherms indicated that the process followed multilayer adsorption on diverse surface sites, with the Freundlich model best describing the behavior ($R^2 = 0.891$). XPS measurements confirmed partial reduction of Cr(VI) to the less toxic Cr(III) at the LIG surface, which was substantiated by DFT calculations showing a fourfold boost in surface reactivity upon Cr(VI) binding. The pore size distribution of LIG matched well with hydrated Cr(VI) ions ($HCrO_4^-$, $Cr_2O_7^{2-}$), ensuring efficient penetration and adsorption. Regeneration experiments showed a gradual decrease in adsorption efficiency: 80.73%, 58.75%, and 31.24% were retained after three usage cycles. These findings demonstrate the potential of green LIG as a robust, renewable adsorbent for water purification applications.

Keywords: ***Laser-induced graphitic; Cr(VI); Adsorption isotherm model; Kinetic; Regeneration studies***

Microalgal Technologies Coupled with Quantitative Microbial Risk Assessment for Sustainable River Basin Management

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Abstract: Microbial contamination in rivers remains a critical challenge, posing significant risks to both human health and aquatic ecosystems. A pressing need exists for decentralized, nature-based treatment strategies that can effectively reduce microbial abundance while improving water quality for safe recycling and reuse. Microalgae, the miniature biochemical factories, provide a promising solution for simultaneous nutrient and pathogen removal, while enabling resource recovery opportunities. Our previous studies using *Chlorella pyrenoidosa* demonstrated effective microbial reduction, achieving 98% total bacterial removal, 98% *Enterobacteriaceae* removal, and complete elimination of *Salmonella* sp. Integration with Quantitative Microbial Risk Assessment (QMRA) further indicated reduced health risks for priority pathogens, including *E. coli* O157:H7 and adenovirus, highlighting the dual benefits of microbial load reduction and public health risk mitigation. Building upon these findings, we propose a framework to translate this proof-of-concept to river stretches by combining continuous water quality monitoring, targeted QMRA-based risk evaluation, and deployment of integrated microalgal and resource recovery systems to complement existing treatment infrastructure. This integrated approach shall provide an evidence-based, scalable pathway for enhancing river water safety and ecological health, offering actionable insights for decision-makers and sustainable management of riverine environments.

Keywords: ***Nature-based solution, Microalgae, QMRA, Pathogens, Water quality***

Assessment of the Water, Sanitation, and Hygiene (WASH) Situation and Identifying the Implementation Challenges of the Water Surveillance System in Dhulikhel Municipality

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Abstract: This poster presents a comprehensive assessment of the Water, Sanitation, and Hygiene (WASH) situation and the challenges to implementing a WASH surveillance system in Dhulikhel Municipality. Using a multi-method study design, the research aimed to determine the household prevalence of diarrheal disease, assess the WASH knowledge and practices of caregivers, and identify barriers to effective WASH surveillance. The study involved a cross-sectional survey of 368 households, supplemented by qualitative interviews and focus groups with key stakeholders. The findings reveal a 14.8% prevalence of diarrheal disease among children under five. Interestingly, the study found no significant association between caregiver WASH knowledge/practice and the prevalence of diarrheal disease, suggesting other factors are at play. The poster also identifies key barriers to surveillance, including a lack of financial and technical resources, poor inter-institutional coordination, and low stakeholder motivation. The study concludes that building stronger, climate-safe water systems and upgrading surveillance tools are essential for improving public health and safety.

Keywords: ***WASH (Water, Sanitation, and Hygiene), Diarrheal Disease, Water Quality, Water Surveillance, Implementation Challenges***

Status of Fish Diversity in Cauvery River Basin

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Abstract: The Cauvery River, one of the major rivers of southern India, is a recognized biodiversity hotspot that supports a wide range of freshwater habitats and sustains numerous fish species, including several endemic and economically important varieties. Despite its ecological significance, fish diversity in the CRB(Cauvery River Basin) faces increasing threats from habitat degradation, overfishing, introduction of exotic species, pollution, sand mining, and river regulation through dams that alter natural flow regimes. Consequently, many native fishes are now listed under threatened categories of the IUCN Red List, ranging from Critically Endangered to Near Threatened with the Mahseer listed as Endangered and the Mrigal carp as Vulnerable. Conservation initiatives such as the establishment of fish sanctuaries (e.g., Shivanasamudram Fish Sanctuary), taxonomic research and monitoring, and legislative and policy measures have been implemented, but challenges remain. This report reviews the diversity and conservation status of fishes in the Cauvery River Basin, highlighting current threats and emphasizing the need for integrated, multi-stakeholder conservation strategies. Ensuring the future of the river's unique ichthyofauna requires stricter pollution control, sustainable water management practices, regulation of invasive species, and community-based habitat protection programs.

Keywords: ***Fish diversity, IUCN Red List, water management and monitoring, Cauvery River Basin Management***

Status of Soil Erosion and Sediment Yield in Ponnaniyar River Basin

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Abstract: The Ponnaniyar River Basin, an ungauged basin and one of the tributaries of the Cauvery River in southern India, is predominantly an agricultural region that supports a wide range of crop production. However, significant changes in Land Use/Land Cover (LULC), particularly the conversion of agricultural land into open land, have led to severe soil erosion and sediment yield. These processes threaten crop productivity, habitat, and biodiversity, and negatively affect socio-economic development. By utilizing Remote Sensing (RS), Geographic Information System (GIS), and empirical approaches such as RUSLE and RUSLE-SDR, erosion and sediment yield mapping can be carried out to identify vulnerable regions and reveal the spatial pattern of soil loss across degrading sites. This study shows that the basin experiences severe erosion, with average soil loss and sediment yield estimated at 20.45 tons/ha/yr and 3.57 tons/ha/yr, respectively, in the year 2021. In addition, Sub-Watershed (SW) level soil loss analysis and forecasting for the years 2026 and 2030 indicate that downstream SWs of the basin are particularly vulnerable to severe soil erosion. To ensure sustainable agricultural production, the construction of additional water harvesting structures such as check dams, percolation ponds, and nala bunds is essential. Furthermore, this study provides valuable insights for farmers, policymakers, and decision-makers to implement effective soil and water conservation measures.

Keywords: ***LULC, Soil Erosion, Sediment Yield, Prioritization of SWs, Prediction, Ponnaniyar River basin***

Study on Water stress Index for Noyyal basin

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Abstract: The Noyyal River Basin, located in Cauvery basin of India, is facing water scarcity due to rapid urbanization, industrial growth, and agricultural activities. The rising water demand from Coimbatore and Tiruppur cities has stressed the basin's water resources. To evaluate current conditions and predict future risks, this study develops a Sub-Basin Water Stress Index (WSI) integrating geospatial data with land use land cover (LULC) based water demand.

The sub-basins were delineated from Digital Elevation Model (DEM), and LULC, rainfall, slope, and soil map were prepared. Water demand was estimated by assigning sector-specific coefficients to LULC classes: agriculture (irrigation demand), urban areas (domestic and industrial demand), and forests/grasslands (ecological demand). Water supply was estimated based on rainfall distribution, recharge potential, slope, and soil permeability. The WSI was computed as the ratio of demand to supply, with higher values reflecting critical stress. To capture future risks, LULC for 2030 was predicted using CA–Markov model, and corresponding water stress is analysed.

The result shows a spatial variability in current water stress, with sub-basins covering urban and industrial land use experiencing high stress, while those with forest cover showed lower stress. Future projection indicates significant increase in stress, particularly in sub-basins where urban expansion is expected to replace agricultural and natural land cover. By integrating present and future scenarios, this study highlights the need for targeted water management including rainwater harvesting, artificial recharge, tank restoration, and strict regulation of industrial water use.

Keywords: ***Noyyal Basin, Water Stress Index, Future LULC, Sub-Basin Analysis, Sustainable Water Management***

Future Climate–LULC Dynamics in the Amaravathi Basin

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Abstract: The Amaravathi basin, a tributary of the Cauvery River in southern India, is increasingly vulnerable to climate change, which is altering the hydrological and ecological systems. Historical data indicate a warming trend with the consecutive wet days (CWD) decreasing by 15% and consecutive dry days (CDD) increasing, while temperature extremes such as warm spell duration index (WSDI) have remaining above average for 17 years. Future climate projection across the shared socio-economic pathways show continued warming with maximum temperature under the SSP5-8.5 expected to rise by 0.71℃, 1.67℃, and 2.79℃ in the near, mid and far future. Precipitation is projected to rise across scenarios with the SSP5-8.5 projecting a 20.7% increase compared to baseline, and intensification of rainfall in the southern basin. The historical land use analysis (1995-2023) indicates a 5.5% reduction in agriculture and a 7.8% rise in built-up area, while future projections (2030–2070) suggest a further decline in agriculture by 14% and 40% rise in urban cover. This report emphasizes the basin's vulnerability to warming and rapid urbanization which helps in climate adaptation and management strategies. These findings align with the Sustainable development goal (SDG) 13.

Keywords: ***Climate change, Warm spell duration, Temperature indices, Future climate projection, Vulnerability***

Estimating Suspended Sediment Concentration in the Periyar River using Optical Remote Sensing Technique

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Abstract: The rivers in Kerala often face significant challenges related to sediment transport, primarily driven by changes in land use and human activities. Suspended sediment concentration (SSC) is a critical parameter that throws light on sediment transport and dynamics, river morphology, and water quality. Traditional field-based methods for SSC monitoring are costly, time-intensive, and lack scalability. This study aims to leverage remote sensing techniques to estimate SSC along the Periyar River in Kerala, India, using high-resolution Sentinel-2A and 2B imageries. The main objective of the study is to evaluate empirical models for estimating suspended sediment concentration using multi-spectral bands and indices derived from Sentinel-2 imageries. Observed SSCs at the gauging stations of the Central Water Commission (CWC) were utilized to calibrate and validate the empirical models. The proposed methodology used the red (B4), green (B3), and near-infrared (B8) bands, which are highly sensitive to sediment dynamics, alongside atmospheric correction techniques and a radiometric index, namely, the Normalized Difference Water Index (NDWI). The integration of SSC estimates with discharge data facilitates quantification of sediment loads and spatial analysis of sediment dynamics. This study is expected to provide a cost-effective and scalable framework for SSC monitoring, supporting sustainable river basin management and aiding policymakers in addressing sedimentation-related challenges.

Keywords: ***Suspended Sediment Concentration, Remote Sensing, Sentinel-2, Periyar River Basin***

Day 2

Record Notes

of the
2nd Stakeholder Advisory Committee (SAC) Meeting

For Six River Basins' Condition Assessment and Management Plan (CAMP) Project

Date & Venue: 26 September 2025, A V Rama Rao Auditorium, IISc Bengaluru


MINISTRY OF
JAL SHAKTI
Stakeholders' Conclave
&
Stakeholder Advisory Committee (SAC)
Secretary, DoWR, RD&GR, Ministry of Jal Shakti
Venue:

Record Notes of the

2nd Stakeholder Advisory Committee (SAC) Meeting

For Six River Basins' Condition Assessment and Management Plan (CAMP) Project

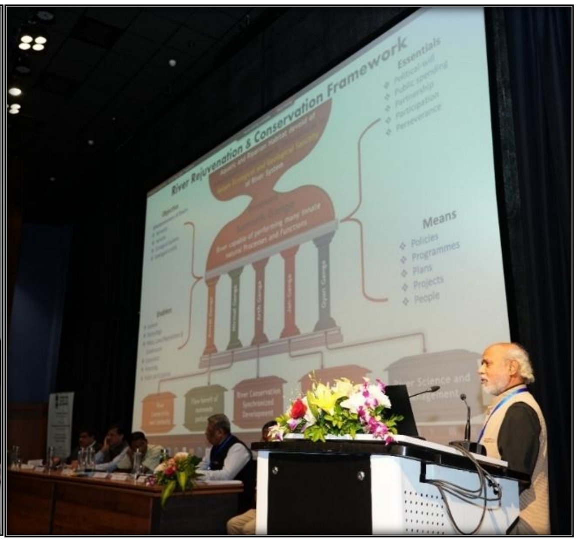
Chair:	Shri V L Kantha Rao, Secretary, Department of Water Resources, River Development & Ganga Rejuvenation (Do WR, RD & GR), Ministry of Jal Shakti (MoJS), GoI
Accompanying Chair:	Professor G Rangrajan, Director, IISc Bengaluru; Dr Sunil Kumar Ambast Chairman, Central Groundwater Board; Professor Vinod Tare, Former Professor, Founder & Advisor, cGanga, IIT Kanpur; Mr Karan Singh, Joint Secretary, NRCD, Do WR, RD & GR, MoJS, GoI; Shri Mohan Raj K P, Managing Director, Krishna Bhagya Jal Nigam Limited, GoK.
Participants:	Senior officials from Ministry of Jal Shakti, NRCD, Central Ground Water Board, Basin State representatives, IITs, NITs, cGanga, and other partner institutions (as per list at Annexure I: List of Participants).

1. Inaugural Session

- The meeting commenced with a welcome address by Prof. G Rangarajan, Director IISc Bengaluru, who emphasized the shared responsibility towards river health.
- Shri V L Kantha Rao, Secretary, Do WR, RD & GR, MoJS, GoI highlighted that the SAC is meant to ensure accountability, accelerate outcomes, and convert data collection into actionable river management strategies.

- Shri Karan Singh, Joint Secretary, National River Conservation Directorate (NRCD), Do WR, RD & GR, MoJS, GoI made a brief presentation to give a background of the CAMP Project with highlights as follows:
    - The Condition Assessment and Management Plan (CAMP) is a historic mission initiated as a follow up of the proclamation made by the President of India in 2019 in the Joint Parliament Session.
    - The mission initially started with focus to achieve an uninterrupted and pollution-free Ganga. This initiative has since been enhanced and extended to improve the condition of all other major Indian rivers, escalate the closure of open drains, and thereby restore, rejuvenate, and strengthen the dignity of all citizens.
    - The CAMP Basins Program was formally initiated in February 2024 to target restoration and rejuvenation in six critical river basins: Mahanadi, Godavari, Narmada, Krishna, Cauvery, and Periyar.

- **Key Project Details:**
  - **<u>Execution</u>:** The program involves a consortium of twelve premium national institutions, including IITs at Indore, Gandhinagar, Hyderabad, and Palakkad; NITs at Raurkela, Raipur, Warangal, Surathkal, Trichy, and Calicut; IISc Bangalore; and CSIR-NEERI, Nagpur.
  - **<u>Leadership</u>:** The entire project is coordinated and led by the cGanga Team from IIT Kanpur, under the guidance of Dr. Vinod Tare.
  - **<u>Governance</u>:** The project is planned based on the implementation experience of the Namami Gange Programme and the GRBMP prepared by the Consortium of 7 IITs.
  - **<u>Progress Review</u>:** The status of the quarterly-basis deliverables, including the budget allotted, released, and spent by each institution, was displayed and discussed. The action plans from the first meeting were presented, and the compliance status was reviewed, with instructions given for the quick delivery of all due deliverables.
  - **<u>Support & Issues</u>:** Support extended by NRCD, particularly for procuring data like CARTOSAT-3 satellite images, was highlighted. The primary implementation issues identified were the timely submission of deliverables and the requirement for appointment of nodal officers by state agencies and municipal administration for smoother functioning.



- Prof. Vinod Tare (cGanga, IIT Kanpur) introduced the **Samarth Ganga Framework** as the guiding approach, extending the Ganga Basin learnings to other rivers to set the scene for the technical discussions and outlined the comprehensive framework and foundational strategy guiding the Condition Assessment and Management Plan (CAMP) Project, which is overseen by the NRCD.
  - **<u>Key Focus</u>:** The Samarth Ganga Framework and District River Management Plan (DRMP).
  - **<u>Vision & Goal</u>:** The work is built upon the "Samarth Ganga" framework, where 'Ganga' represents the "spirit of Indian rivers". The objective is to ensure that the river's inherent capability (सामर्थ्य) is not compromised, allowing indigenous flora and fauna to flourish. This requires achieving two basic goals: Aviral Ganga (uninterrupted flow) and Nirmal Ganga (flow condition suitable for the ecosystem).

- **Implementation Model (DRMP):** Planning is done using natural boundaries, but successful implementation requires translating this learning into administrative boundaries. The ultimate unit for action is the district, managed via District River Management Plans (DRMPs). The 'river' is defined holistically, including the channel, associated tributaries, and all surface/subsurface water bodies.
  - *The 330/35-Day Operational Strategy*: The plan must address the duality of India's climate:
  - *Monsoon (30-35 days)*: Focus on making water flow sluggish to promote percolation and restore connectivity to local water bodies for recharge.
  - *Non-Monsoon (330 days)*: Focus on closing the water loop by ensuring sewage does not flow into drains meant for stormwater, thereby converting brown/black water bodies into blue water bodies.
- **Governance & Convergence:** The plan requires convergence among policies, programs, plans, projects, and people. Coordination of studies is proposed at the Divisional Commission level (clubbing 3-4 districts) for efficiency, though the District Magistrate (DM) remains the overall in-charge for implementation.

2. Basin-Wise Progress Presentations

(a) Mahanadi Basin (NIT Rourkela & NIT Raipur)

- Shared outcomes of data collection on demography, hydrology, and pollution sources.
- Challenges: Delayed stakeholder engagement at state level.
- Direction: Strengthen state consultations and develop District River Management Plans as building blocks of basin plans.

(b) Narmada Basin (IIT Gandhinagar & IIT Indore)

- Number of named rivers as per atlas prepared: 1,091
- Hydrological and geomorphological studies in progress.
- Requirement: Validation of datasets with Madhya Pradesh WRD.
- Direction: Reports must be formally shared with state departments; validation process to be completed with support of cGanga.

(c) Godavari Basin (CSIR-NEERI, Nagpur & IIT Hyderabad)

- Reported compilation of large datasets including tributaries, dams, reservoirs, and pollution mapping.
- Stakeholder feedback: River Atlas incomplete; must include all rivers and villages.
- Action: Upload validated Atlas within 15 days; circulate reports formally to state departments.

(d) Krishna Basin (NIT Warangal, NIT Surathkal)

- Progress shared on lithological, hydrological, and geomorphological mapping; water quality monitoring; drone surveys.
- Challenge: high cost of critical datasets.
- Direction: Ministry advised reallocation of project budget for essential data purchase, and collaboration with agencies like GSI, Atomic Mineral Division.

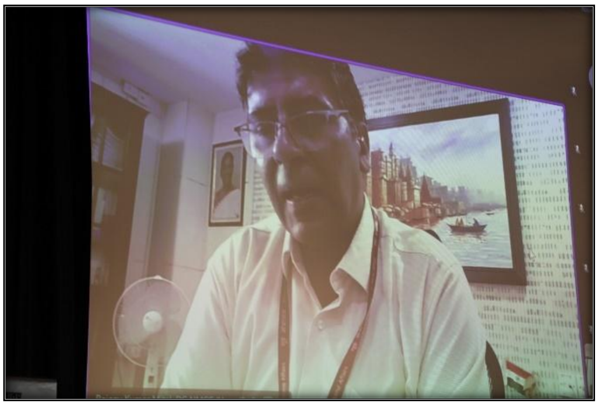
(e) Cauvery Basin (IISc Bangalore & NIT Trichy)

- Mapping of hydrological flows, socio-economic data, and wastewater load completed; cultural and ecological significance of the basin highlighted.
- Direction: Organize state-level consultations in Bengaluru and Chennai. Reports to be shared simultaneously with Karnataka, Tamil Nadu, and Kerala WRDs.

(f) Periyar Basin (IIT Palakkad & NIT Calicut)

- Updates provided on ecological status, riverfront planning, and biological indicators.
- Emphasis on stakeholder-level interactions and practical applications.

(g) Overall Observations



- District-level River Management Plans to form the core of Basin Plans.
- Plans must address both **flood-time challenges (30–35 days)** and **dry season issues (330 days)**, including wastewater management, recharge of water bodies, and integration of cultural/religious practices (e.g., cremation ghats).

3. General Observations & Directives

- Reports and data must be **shared promptly** with basin states, withholding for repeated reviews delays impact.
- Ministry will write to Principal Secretaries of Basin States attaching basin reports.
- Each Central Institute (CI) to upload **quarterly deliverables** on a dedicated portal; final reports to be shared with states simultaneously.
- Thematic sub-groups under cGanga to refine actionable points (e.g., Mission Nirmal Dhara, agriculture–river interactions).
- Coordination with multiple state departments (WRD, Urban Development, Pollution Control Boards) is mandatory for effective uptake.




4. Financial & Administrative Matters

- Project budget: ₹75.63 crore across six basins; annual allocations discussed.
- First instalments released; CIs requested to submit **utilization certificates** and expenditure details urgently for FY 2025–26.
- Basin states urged to **nominate nodal officers** from WRDs, Municipal Administrations, and Pollution Control Boards (MP has complied; others pending).

5. Key Decisions & Action Points

- **River Atlases** to be uploaded on cGanga portal within 15 days.
- Ministry to issue **formal letters with attached reports** to Principal Secretaries of Basin States.
- Institutes to conduct **local/state-level stakeholder meetings** instead of waiting only for SAC.
- **District River Management Plans** to be prepared and integrated into basin plans.
- CIs to reallocate budgets, if needed, for purchase of essential datasets (e.g., drone surveys, satellite images).
- **Quarterly deliverables** to be uploaded promptly; final reports to be shared with states in parallel.
- States to **nominate nodal officers** from WRD, Urban Development, and Pollution Control Boards without delay.
- Utilization Certificates and expenditure reports to be submitted by CIs at the earliest.

6. Closing Remarks

- Secretary reiterated that the project's success depends on **converting research into action** and ensuring **visibility at the state and district levels**.
- He committed to conducting **monthly reviews** of progress.
- The Chair thanked all institutes and stakeholders, urging them to maintain momentum and deliver practical, implementable outcomes.

Meeting concluded with agreement to reconvene the SAC in the next review cycle.

Action Taken Report (ATR)

2nd Stakeholder Advisory Committee Meeting

for Six River Basins' Condition Assessment and Management Plan (CAMP) Project

National River Conservation Directorate (NRCD), DoWR, RD&GR, MoJS

Prepared for Circulation to: Basin PIs, cGanga, State Departments, & Ministry of Jal Shakti, GoI

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1. Mahanadi Basin – NIT Raipur & NIT Rourkela

- **Presentation Gist:** Data collection on demography, hydrology, and pollution; consultations initiated.
- **Decisions:**
    1. Develop District-level River Management Plans (RMPs) as the basis of basin plan.
    2. Strengthen stakeholder consultations in Odisha and Chhattisgarh.
- **Action Responsibility:** PIs (NIT Rourkela & Raipur) with State WRDs.
- **Timeline:** Draft District RMPs within 6 months; state consultations by next SAC review.

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2. Narmada Basin – IIT Gandhinagar & IIT Indore

- **Presentation Gist:** Mapping of 1,091 rivers; hydrological and geomorphological studies underway.
- **Decisions:**
    1. Collaborate closely with Madhya Pradesh WRD for validation and uptake.
    2. Ensure basin reports are formally shared with state departments.
- **Action Responsibility:** PI (IIT Indore & IIT Gandhinagar) with cGanga support.
- **Timeline:** Formal report sharing within 1 month; validation process within 3 months.

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3. Godavari Basin – CSIR-NEERI, Nagpur & IIT Hyderabad

- **Presentation Gist:** 2,307 named tributaries mapped (~50,787 km); 17 reports completed; sediment/nutrient modelling, climate change trends, STPs, and agriculture studies.
- **Decisions:**
    1. Upload River Atlas on cGodavari & cGanga portal within 15 days.
    2. Ministry to send letters with reports attached to State Principal Secretaries.
    3. Define filtering protocol for small tributaries (<5–10 km).
- **Action Responsibility:** PI (IIT Hyderabad/NEERI) & cGanga; Ministry of Jal Shakti for letters.
- **Timeline:** Atlas upload in 15 days; letters within 1 month; protocol within 2 months.

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4. Krishna Basin – NIT Warangal & NIT Surathkal

- **Presentation Gist:** Work on lithology, hydrology, geomorphology, and water quality; drone surveys.
- **Decisions:**
    1. Reallocate budgets for procurement of essential datasets.
    2. Collaborate with GSI and AMD for data sharing.
- **Action Responsibility:** PIs (NIT Warangal & NIT Surathkal) with Ministry facilitation.
- **Timeline:** Budget reallocation within 1 month; GSI/AMD collaboration initiated in 3 months.

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5. Cauvery Basin – IISc Bangalore & NIT Trichy

- **Presentation Gist:** Mapping of hydrological flows, socio-economic data, wastewater loads; cultural significance.
- **Decisions:**
    1. Organize state-level consultations in Bengaluru and Chennai.
    2. Share reports simultaneously with Karnataka, Tamil Nadu, and Kerala WRDs.
- **Action Responsibility:** PI (IISc Bangalore & NIT Trichy).
- **Timeline:** Consultations within 4 months; report sharing ongoing each quarter.

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6. Periyar Basin – IIT Palakkad & NIT Calicut

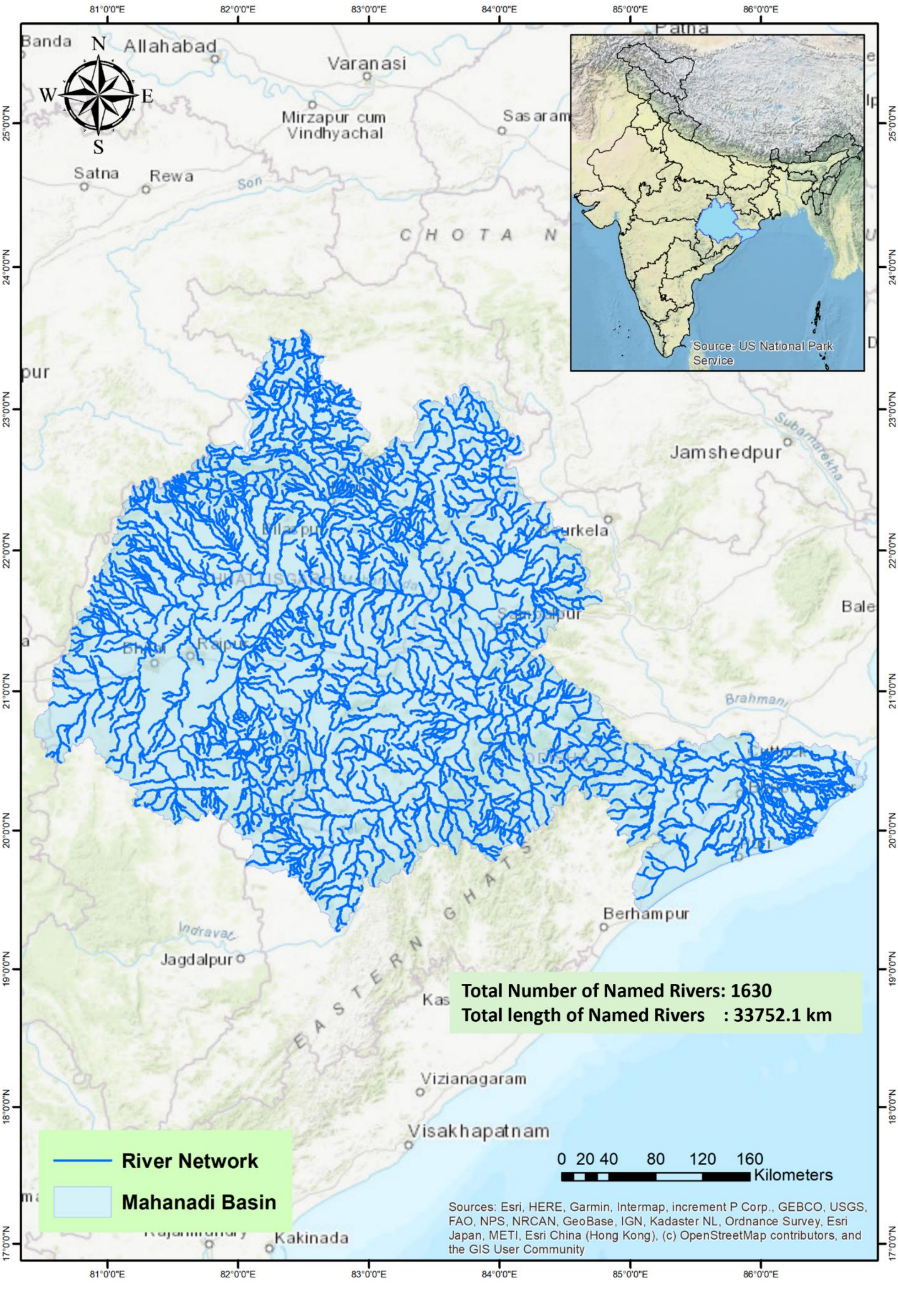
- **Presentation Gist:** Ecological and biodiversity assessments; riverfront and biological indicators.
- **Decisions:**
    1. Intensify engagement with Kerala Irrigation Department & Pollution Control Board.
    2. Demonstrate use of ecological indicators in policymaking.
- **Action Responsibility:** PI (IIT Palakkad & NIT Calicut).
- **Timeline:** Engagement meetings within 2 months; pilot ecological indicator demonstration in 6 months.

Cross-Cutting Actions

- **River Atlases:** Upload for all basins on cMahanadi, cNarmada, cGodavari, CKrishna, cCauvery, cPeriyar (as the case may be) and cGanga portal within 15 days.
- **Formal Communication:** Ministry to circulate basin reports to all State Principal Secretaries (WRD/Irrigation) with cover letters.
- **Quarterly Deliverables:** All PIs to upload outputs regularly; final reports to be shared in parallel with states.
- **Financial Compliance:** All institutions to submit Utilisation Certificates and expenditure statements immediately.
- **State Nodal Officers:** Basin States to nominate officers from WRD, Urban Development, and PCBs (MP done, others pending).

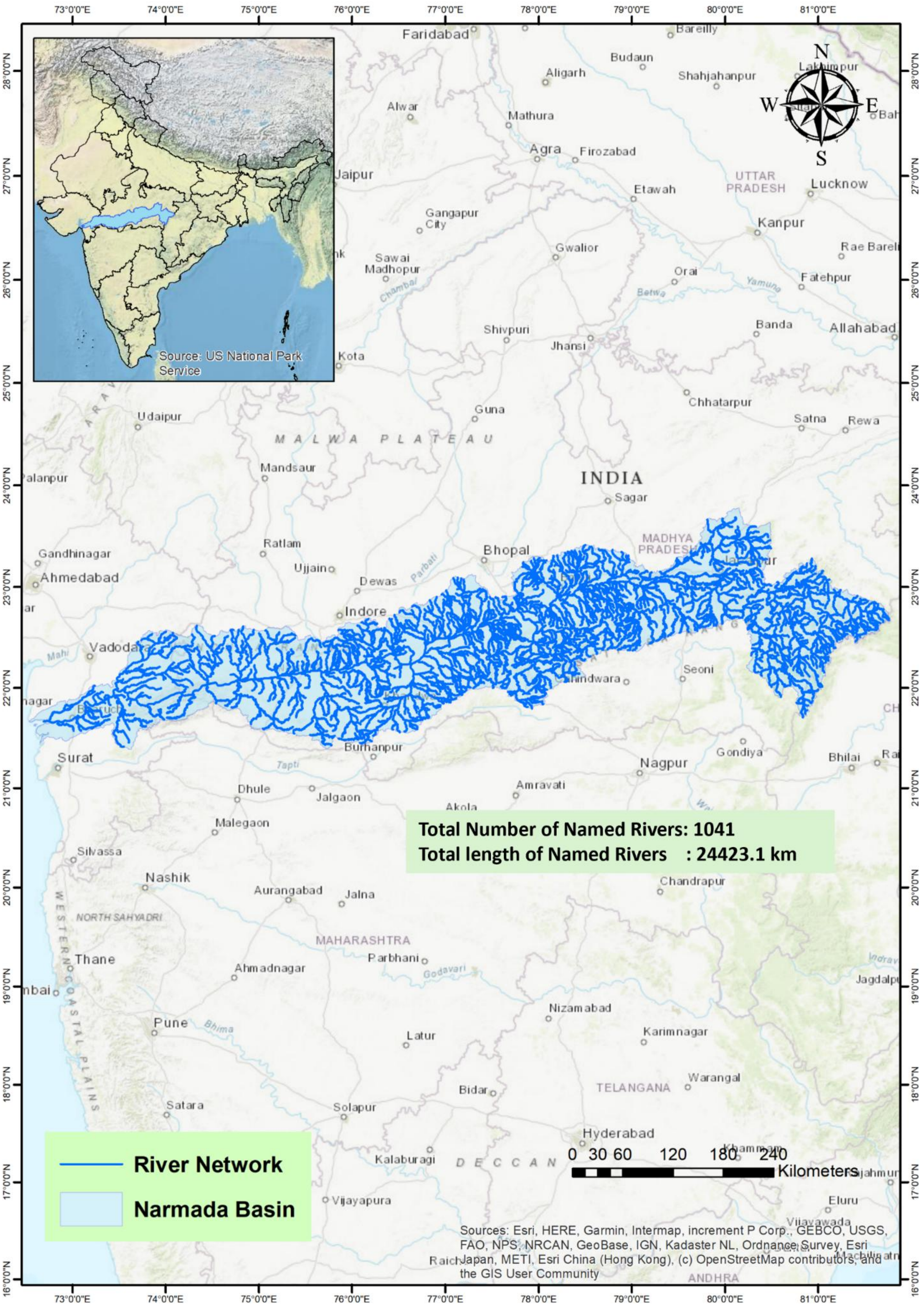
MAHANADI BASIN

Stream Network (Named Rivers)



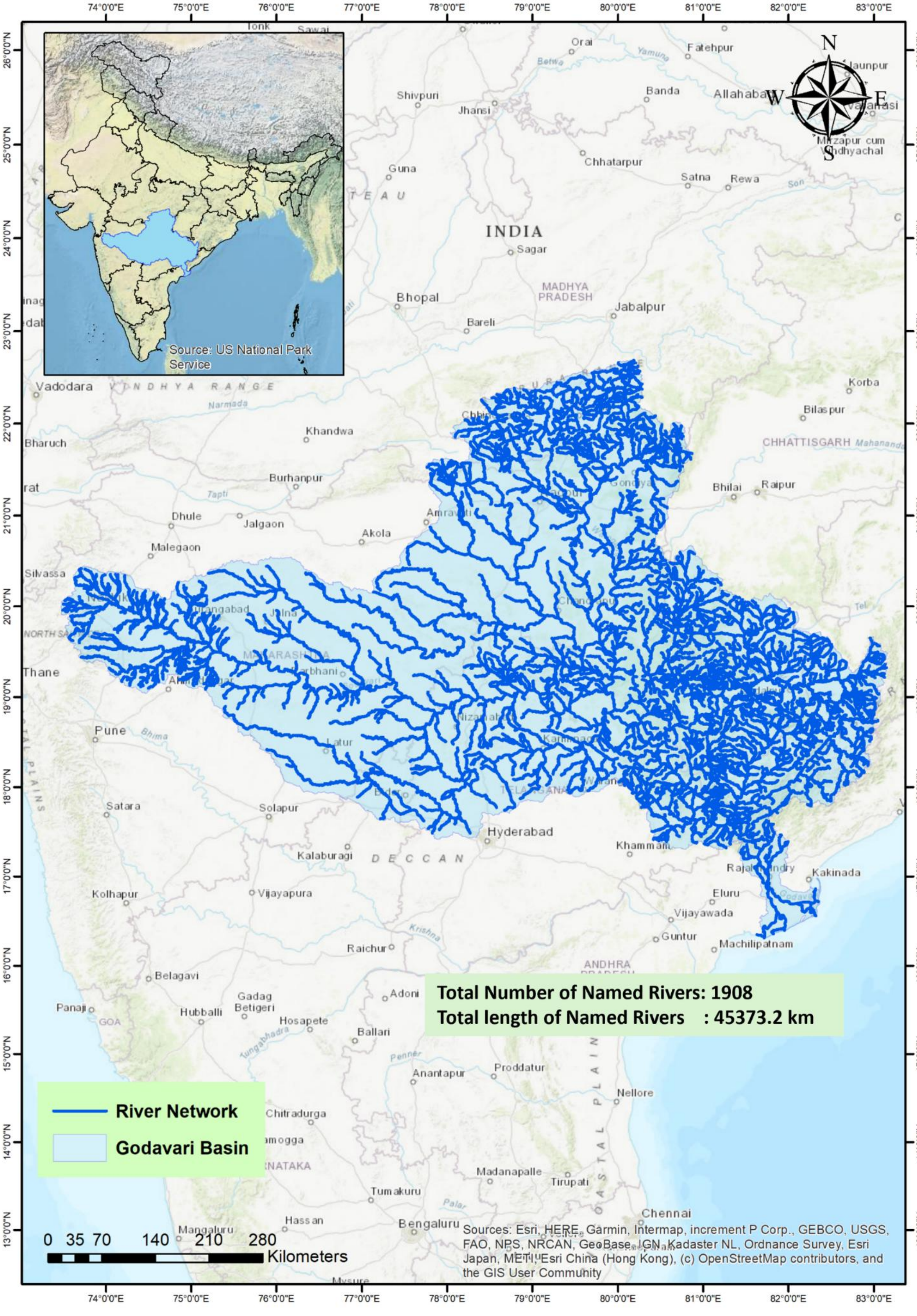
NARMADA BASIN

Stream Network (Named Rivers)



GODAVARI BASIN

Stream Network (Named Rivers)

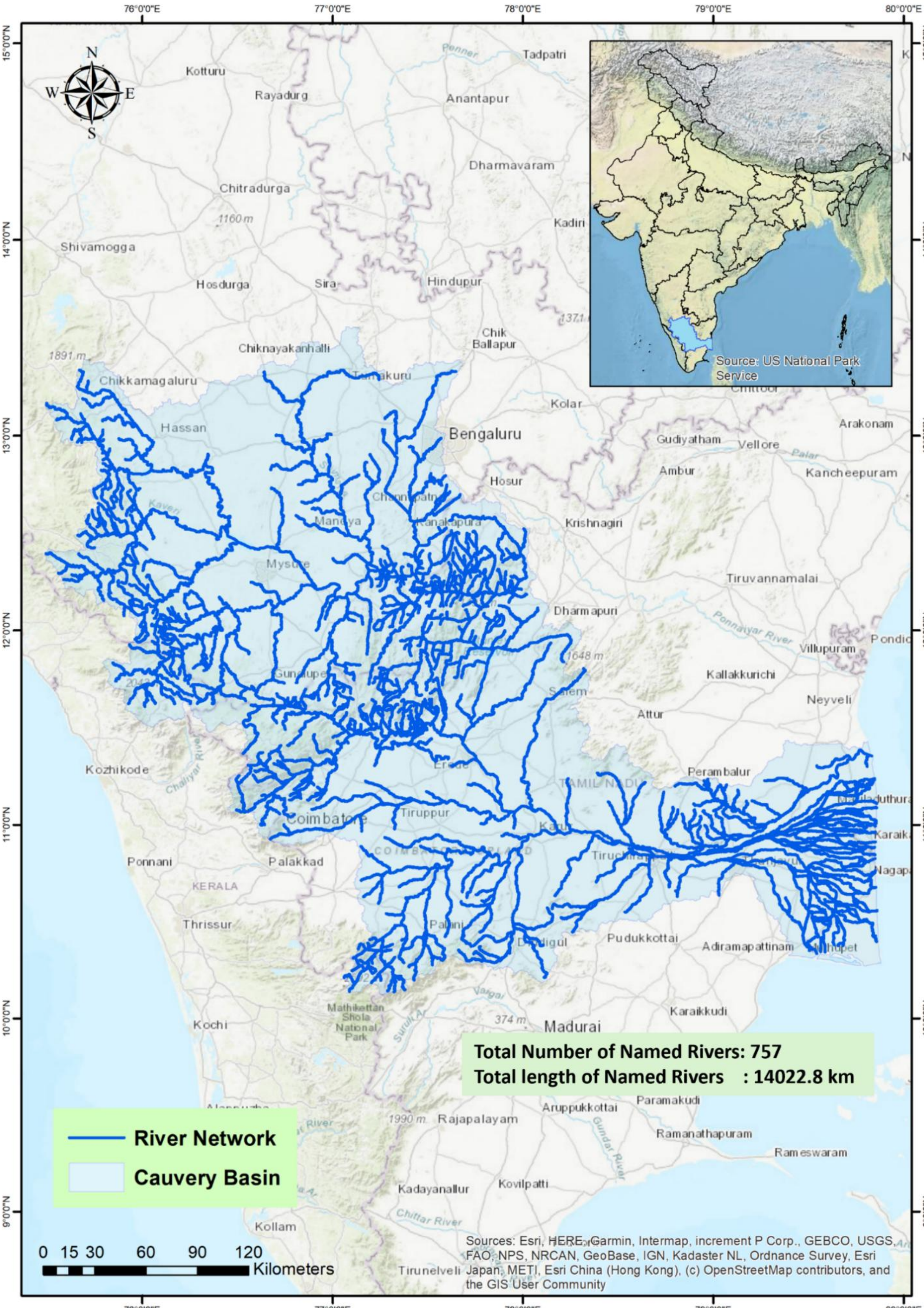


KRISHNA BASIN

Stream Network (Named Rivers)

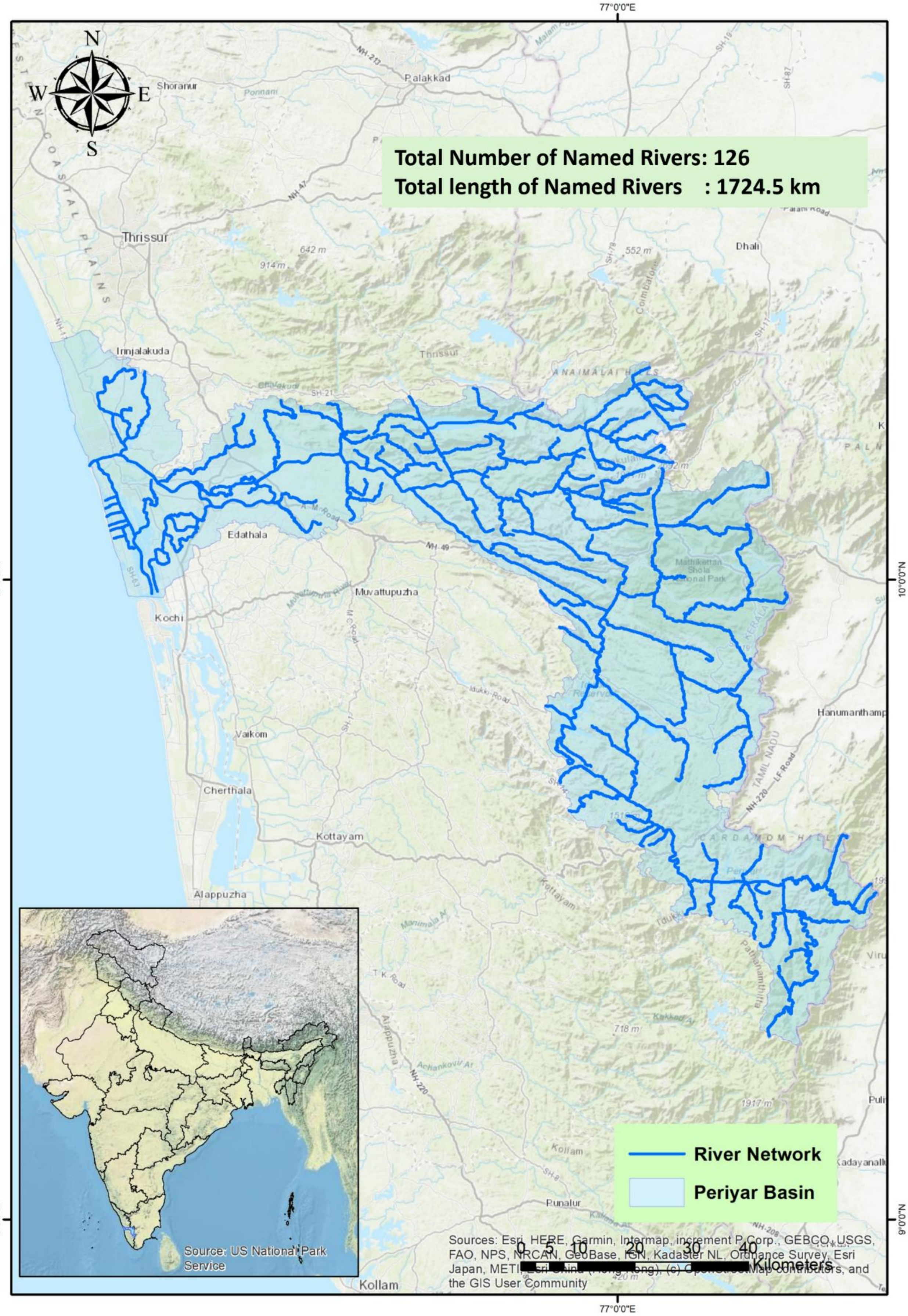
CAUVERY BASIN

Stream Network (Named Rivers)



PERIYAR BASIN

Stream Network (Named Rivers)



List of Participants

a. NRCD, DoWR, RD&GR, Ministry of Jal Shakti

S. No.	Name
1	Shri V. L. Kantha Rao, Secretary, DoWR, RD&GR, MoJS
2	Shri Karan Singh, Joint Secretary, NRCD
3	Shri Sushil Kumar Srivastava, Scientist F, NRCD
4	Shri Anjani Prasad Singh, Scientist F, NRCD
5	Mrs Sabita Madhvi Singh, Scientist E, NRCD
6	Shri Mahesh Kumar Kashyap, Under Secretary
7	Shri Anupam Prasad, Additional Secretary

b. CAMP Members' List: PIs/Co-PIs

cGanga, IIT Kanpur	
1	Prof. Vinod Tare, Founding Head, cGanga and Coordinator CAMP Project for 6 River Basin

cCauvery, IISc Bengaluru	
2	Prof. Praveen C. Ramamurthy, Professor
3	Prof. Srinivas V. V. Professor
4	Prof. Lakshminarayana Rao, Associate Professor
5	Dr. Rajarshi Das Bhowmik, Assistant Professor
6	Dr. Bramha Vishwakarma, Assistant Professor
cCauvery, NIT Trichy	
7	Dr. Aneesh Mathew, Assistant Professor
8	Prof. R. Manjula, Associate Professor
9	Prof. Nisha Radhakrishnan, Associate Professor

cGodavari, CSIR NEERI Nagpur	
10	Dr. Rajesh Biniwale, Senior Principal Scientist
11	Dr. Amit Bansiwal , Chief Scientist
12	Dr. Rakesh Kadaverugu, Senior Scientist
cGodavari, IIT Hyderabad	
13	Prof. Asif Qureshi, Professor
14	Prof. Debraj Bhattacharyya, Professor

cKrishna, NIT Warangal	
15	Prof. N. V. Umamahesh, Professor
16	Dr. V. Vamsi Krishna, Assistant Professor
17	Prof. K Venkata Reddy, Professor
18	Prof. Ajey Kumar Patel, Associate Professor
19	Prof. Shashi Mesapam, Associate Professor
20	Dr. Prasanta Majee, Project Scientist
21	Dr. Srikanth Kandula, Project Scientist
22	Dr. Buri Eshwar Sai, Project Scientist

cKrishna, NITK Surathkal	
23	Dr. Jacklin Jeke Nilling, Assistant Professor
24	Prof. Basavaraju Manu, Professor
25	Dr. Chandan M. C., Assistant Professor
26	Dr. Shwetha H. R., Assistant Professor
27	Dr. Anupama Surenjan, Assistant Professor
28	Prof. Varija K, Professor

cMahanadi, NIT Raipur	
29	Prof. Samir Bajpai, Professor
30	Prof. Ajay Vikram Ahirwar, Associate Professor
31	Dr. Chandan Kumar Singh, Assistant Professor
32	Dr. Sandeep Soni, Sr. Project Scientist
33	Dr. Amit Kumar Shukla, Project Scientist
34	Dr. Kshitij Upadhyay, Project Scientist
cMahanadi, NIT Rourkela	
35	Prof. Binod Bihari Sahu, Associate Professor
36	Prof. Kishanjit Kumar Khatua, Professor

cNarmada, IIT Gandhinagar	
37	Prof. Pranab K. Mohapatra, Professor
38	Prof. Vikrant Jain, Professor
cNarmada, IIT Indore	
39	Prof. Manish Kumar Goyal, Professor
40	Prof. Kiran Bala, Professor
41	Dr. Mayur Jain, Assistant Professor

cPeriyar, IIT Palakkad	
42	Prof. Athira P., Associate Professor
43	Prof. Praveena Gangadharan, Associate Professor
44	Prof. Richa Agnihotri, Associate Professor
45	Dr. B. Sridharan, Assistant Professor
cPeriyar, NIT Calicut	
46	Prof. Santosh G. Thampi, Professor
47	Prof. Sathish Kumar D., Associate Professor
48	Dr. Sanjay Singh, Assistant Professor

c. CAMP Members' List: Core Team

S. No.	CAMP	Institute Name	Name
1	cGanga	IIT Kanpur	Rahul Ramachandran, Project Engineer
2	cGanga	IIT Kanpur	Rajith K, Project Associate
3	cCauvery	IISc Bangalore	Dr. Suyog Gupta, Research Associate
4	cCauvery	IISc Bangalore	Dr. Retinder Kour, Research Associate
5	cCauvery	IISc Bangalore	Dr. Daljeet Singh Dhanjal, Senior Project Associate
6	cCauvery	IISc Bangalore	Dr. Dagani Koteswara Rao, Senior Project Associate
7	cCauvery	IISc Bangalore	Dr. Suhail Ahmad, Senior Research Fellow
8	cCauvery	IISc Bangalore	Ramesh N., Project Associate
9	cCauvery	NIT Trichy	Karthikeyan Selvaraj, Project Assistant
10	cCauvery	NIT Trichy	Vidhyashangari, Project Assistant
11	cCauvery	NIT Trichy	Muneesh Kumar, Project Associate
12	cGodavari	NEERI Nagpur	Mansi Varshney, AcSIR Scholar
13	cGodavari	NEERI Nagpur	Asha Dhole, Project Associate
14	cGodavari	IIT Hyderabad	Dr. Sri Vidhya Mummidi, Project Scientist
15	cGodavari	IIT Hyderabad	Dr. Mir Sumira, Project Scientist
16	cGodavari	IIT Hyderabad	Dhanshri Bawankar, Project Assistant
17	cGodavari	IIT Hyderabad	Naresh Essapally, Project Assistant
18	cGodavari	IIT Hyderabad	Syed Azharuddin Hashmi, Project Associate
19	cGodavari	IIT Hyderabad	Thangallapally Rahul, Project Assistant
20	cGodavari	IIT Hyderabad	Fathima Fakiha Imam Khan, Project Assistant
21	cGodavari	IIT Hyderabad	Soumyaranjan Sahoo, Project Assistant
22	cGodavari	IIT Hyderabad	Srija Dangudubiyyam, Project Associate
23	cGodavari	IIT Hyderabad	Anshuman Panigrahi, Project Associate
24	cGodavari	IIT Hyderabad	Nivarthi Naga Sai, Project Associate
25	cGodavari	IIT Hyderabad	Ashis Sarkar, Project Assistant
26	cGodavari	IIT Hyderabad	Aaliya Maryam, Project Assistant
27	cKrishna	NIT Warangal	Gowtham G., Project Assistant
28	cKrishna	NITK Surathkal	Nishanth B., Project Associate
29	cKrishna	NITK Surathkal	Ramya D., Project Associate
30	cMahanadi	NIT Raipur	Satyajeet Sahu, Project Associate
31	cMahanadi	NIT Rourkela	Dr. Sarjati Sahoo, Post Doctoral Fellow
32	cMahanadi	NIT Rourkela	Dr. Snigdha Sarita Mohapatra, Post Doctoral Fellow
33	cMahanadi	NIT Rourkela	Bismay Das, Junior Research Fellow
34	cMahanadi	NIT Rourkela	B. Manikanta, Junior Research Fellow
35	cMahanadi	NIT Rourkela	Piyush Paritosh Sarangi, Junior Research Fellow
36	cMahanadi	NIT Rourkela	Prachi Pragyan Mahanta, Junior Research Fellow
37	cMahanadi	NIT Rourkela	Jayashree Ojha, Junior Research Fellow
38	cNarmada	IIT Gandhinagar	Prabhat Kumar, Post Doctoral fellow
39	cNarmada	IIT Gandhinagar	Bhanu Parmar, Junior Research Fellow

S. No.	CAMP	Institute Name	Name
40	cNarmada	IIT Gandhinagar	Akash Yadav, Junior Research Fellow
41	cNarmada	IIT Gandhinagar	Sunny Kumar Jha, Junior Research Fellow
42	cNarmada	IIT Indore	Dr. Srija Roy, Research Associate
43	cNarmada	IIT Indore	Shreya Dixit, Research Scholar
44	cNarmada	IIT Indore	Adarsh Singh, Research Scholar
45	cNarmada	IIT Indore	Anish Chandra, Research Scholar
46	cPeriyar	IIT Palakkad	Akhila K., Project Assistant
47	cPeriyar	IIT Palakkad	Saivinayak Viswanathan, Project Associate
48	cPeriyar	IIT Palakkad	Majesty George, Project Associate
49	cPeriyar	IIT Palakkad	K. G. Yadhukrishna, Project Associate
50	cPeriyar	IIT Palakkad	Sudhanyasree P. R., Junior Research Fellow
51	cPeriyar	NIT Calicut	Mridul K., Project Associate
52	cPeriyar	NIT Calicut	Fathima Jamsheena P., Project Associate
53	cPeriyar	NIT Calicut	Anand V., Project Associate
54	cPeriyar	NIT Calicut	Niyatha Mohan, Project Associate
55	cPeriyar	NIT Calicut	Jishnu M., Project Associate

d. Meeting Panel Members

S. No.	Names	Designation	Organisation	State
1	Shri. S. Vishwanath	Director	BIOME Environmental Solutions	Karnataka
2	Er. Lingaraj Gouda	Engineer in Chief	Planning and Design, Department of Water Resources	Odisha
3	Dr. Sitaram Taigor	Nodal Officer-Environment Expert	Namami Gange Programme	Madhya Pradesh
4	Shri. Suresh Babu	Senior Director-Ecological Footprint	World Wildlife Fund-India	Karnataka
5	Dr. Priyanka Jamwal	Scientist	Ashoka Trust for Research in Ecology and the Environment	Karnataka
6	Shri. Suman	Executive Engineer	Bangalore Water Supply and Sewerage Board	Karnataka
7	Dr. P. Somasekhar Rao	Director (Technical)	Advanced Centre for Integrated WRM, WRD, Gov of Karnataka	Karnataka
8	Dr. Veena Srinivasan	Executive Director	WELL Labs, Karnataka	Karnataka
9	Shri. John Kingsley A. R.	Secretary	Water Resources Department	Madhya Pradesh
10	Prof. Akshara Kaginalkar	Professor	Atria University	Karnataka

S. No.	Names	Designation	Organisation	State
11	Ms. Emily Prabha	Scientific Officer	Karnataka State Natural Disaster Monitoring Centre	Karnataka
12	Ms. Khushbu Birawat	Water & Environment Consultant	Paani Earth Foundation	Karnataka
13	Mr. Saji Samce		Cauvery Water Regulation Committee	Karnataka

e. Stakeholders

S. No.	Names	Designation	Organisation	State
1	Shri. S. K. Tikam	Chief Engineer	Mahanadi Godavari Basin Raipur, Water Resource Department	Chhattisgarh
2	Shri. K. S. Bhandari	Chief Engineer	Godavari Basin, Water Resource Department	Chhattisgarh
3	Shri. Nazimuddin	Scientist F	DH- WQM-I Division, Central Pollution Control Board	Delhi
4	Dr. Sunil Kumar Ambast	Chairman	Central Ground Water Board	Haryana
5	Dr. Usha. A	River Basin Management Specialist	Advanced Centre for Integrated WRM, WRD	Karnataka
6	Smt. Shashi Kala Iyer		World Wildlife Fund-India	Karnataka
7	Shri. Vinay Kumar Malge	Convenor of Team YUVAA NGO, Bidar	Maintainer, Living Labs network and Member, State Board for Wildlife	Karnataka
8	Dr. H Roopadevi	Senior Scientific Officer	Karnataka State Pollution Control Board	Karnataka
9	Dr. Selvamani	Managing Director	Karnataka Urban Water Supply and Drainage Board	Karnataka
10	Shri. Basavraj	Chief Engineer	Krishna Bhagya Jal Nigam, Almatty	Karnataka
11	Dr. N. Puviarasan	Sc-F & Head	Met Centre Bengaluru	Karnataka
12	Dr. Kaushika G. S.	Hydrologist and SWD Engineer	Clear Water Dynamics Private Limited	Karnataka
13	Smt. Manasa Kulkarni	Assistant Engineer	Water Resources Department, Govt. of Karnataka	Karnataka
14	Shri. Abhilash	Environmental Engineer	Kerala State Pollution Control Board	Kerala
15	Er. Jainet P. J.	Scientist	Centre for WRD and Management	Kerala

S. No.	Names	Designation	Organisation	State
16	Er. Vivek B.	Scientist	Centre for Water Resources Development and Management	Kerala
17	Dr. Rajakumari Singh	Scientist	Madhya Pradesh Pollution Control Board	Madhya Pradesh
18	Ms. Devjani Patra	Member E&R	Narmada Control Authority	Madhya Pradesh
19	Shri. Vikas Rajoria	Additional Project Director	MKPMU, Water Resource Department	Madhya Pradesh
20	Shri. Shubhankar Biswas	Additional Project Director	MKPMU, Water Resource Department	Madhya Pradesh
21	Dr. Udhay Roman	Team Leader	SMMU-KPMG Urban Administration and Development	Madhya Pradesh
22	Er. Jaganatha Pani	Chief Engineer	Planning, Department of Water Resources	Odisha
23	Shri. Sanjaya Kumar Dash	DyDG, State Unit-Odisha, GSI, ER	Geological Survey of India	Odisha
24	Shri. G. Naga Mohan	Chief Engineer	M&ERO, Central Water Commission, Bhubaneswar	Odisha
25	Smt. K. Tudu	Addl. Chief Environmental Scientist	SPCB, Odisha	Odisha
26	Dr. R.L. Narendran	Environmental Scientist	Tamil Nadu Pollution Control Board	Tamil Nadu
27	Thiru. S. Sankarasubramanian	Joint Director of Agriculture (SS)	Agriculture Department	Tamil Nadu
28	Er. A. Vijayakumar	Assistant Executive Engineer	Tamil Nadu Water Supply and Drainage Board	Tamil Nadu
29	Dr. M. Kamaraj	Deputy Hydro Geologist	Tamil Nadu Water Supply and Drainage Board	Tamil Nadu
30	Smt. P. Supriya	Assistant Executive Engineer	State ground and surface water resources data Centre	Tamil Nadu
31	Dr. S. Sivakumar	Chief Engineer	Water Resources Department, Trichy.	Tamil Nadu
32	Shri. Thiru S. Sridharan	Special Secretary, Govt.	Water Resource Department	Tamil Nadu

S. No.	Names	Designation	Organisation	State
33	Shri. Thiru R. Subramanian	Chairman	Cauvery Technical Cell cum Inter-State Waters Wing, Water Resource Department	Tamil Nadu
34	Dr. S. J. Sivakumar	Executive Engineer	WRD, Trichy Region, Trichy	Tamil Nadu
35	Shri. R. Venkat Ramana	Superintending Engineer, O/o Engineer-in-Chief (General)	Hydrology unit, Irrigation and CAD Department, Telangana Hydrology Department	Telangana
36	Shri. Anupam Prasad	Member	Central Water Commission	Central
37	Dr. Abhishek Tippa	Member	WRD	Karnataka
38	Mr. R. R. Singh	Member	CECB, Raipur	Chhattisgarh
39	Mr. R. P. Vasudev	Member	CECB, Raipur	Chhattisgarh
40	Mr. S. K. Verma	Member	CECB, Raipur	Chhattisgarh
41	Mr. Mahendrakumar S. Salare	Chief Engineer	Central Water Commission	Central
42	Swetha N.	Assistant Engineer	ALIMRM, Bengaluru	Karnataka
43	V. V. Killedar	Sub Regional Officer	Maharashtra Pollution Control Board	Maharashtra
44	P. Suresh	Scientist	Kerala State Remote Sensing & Environment Centre (KSRSEC), TVM	Kerala
45	Arpitha H. S.	Project Scientist	KSNDMC	Karnataka
46	Sashikumar N.	Water Specialist	ACIWRM	Karnataka
47	Rekha R.	Chief Engineer Officer	KSPCB, Bengaluru	Karnataka
48	S. M. Mruthyunjaya	Engineer	BWSSB (iDeck)	Karnataka
49	Karthik T.	Engineer	BWSSB (IDeck)	Karnataka
50	Abhinandan A. Malekar	Assistant Engineer	BWSSB	Karnataka
51	Chinmoy H. V.	Technical Assistant	CNNL, Bengaluru	Karnataka
52	Heena Kumari A. S.	Assistant Engineer	CNNL, WRD, GoK	Karnataka
53	K. Kuppusamy	Joint Director of Statistics	Department of Economics & Statistics, Tamil Nadu	Tamil Nadu
54	J. Chandra Babu	Regional Director, CPCB	CPCB, Bengaluru	Karnataka
55	Ashish Kr.	Faculty	ATREE, Bengaluru	Karnataka
56	H. P. Juyuprakash	Scientist B	CGWB	Central

S. No.	Names	Designation	Organisation	State
57	Dr. M. Gobinath	Scientist C	CGWB, MoJS, GoI	Central
58	Achutha Kumar T. N.	Assistant Executive Engineer	WRD, GoK	Karnataka
59	S. Prasande	GM	MSME	Tamil Nadu
60	Shilpa C. Holal	AEE, KNNL	WRD, Bangalore	Karnataka
61	Dr. B. Venkatesh	Scientist G	NIH	Uttarakhand
62	Mamtha B.T.	Executive Engineer	KNNL	Karnataka
63	Aizaz Hussain	Secretary	WRD, GoK	Karnataka
64	Konda Ravinda	OSD, WRD	WRD, GoK	Karnataka
65	Rajesh Amminabhavi	MD, KNNL	WRD, GoK	Karnataka
66	Devaraj H.	AEE, KNNL	WRD, GoK	Karnataka
67	K. Rajesh	EIC	WRD, GoK	Karnataka
68	Rajesh	CE	WRDO	Karnataka
69	Sunil B. Malge	JE	HPD, Pune-01	Maharashtra
70	Shri Anu S. Nair	Executive Director	Institute of Land and Disaster Management Thiruvananthapuram	Kerala

f. Attendees from IISc, Bengaluru

S. No.	Names	Designation
1	Prof. Mohan Kumar M. S.	Honorary Consultant
2	Prof. Prosenjit Ghosh	Professor
3	Prof. Utpal S. Tatu	Professor
4	Dr. Thejna Tharammal	DST INSPIRE Faculty
5	Dr. Soumita Boral	DST INSPIRE Faculty
6	Dr. Maya Raghunath Suryawanshi	DST INSPIRE Faculty
7	Dr. Ankita Bhatt	DST INSPIRE Faculty
8	Dr. Manikanta Velpuri	DST INSPIRE Faculty
9	Dr. Kavita Verma	Research Scientist
10	Dr. Manjari Manisha	Scientist
11	Dr. Nagaraja O	Senior Project Associate
12	Dr. Manikanta Velpuri	DST INSPIRE Faculty
13	Dr. K Satish Kumar	Senior Project Associate
14	Dr. Dagani Koteswara Rao	Senior Project Associate
15	Dr. Daljeet Singh Dhanjal	Senior Project Associate
16	Dr. Suhail Ahmad	Senior Project Associate
17	Dr. Simranjeet Singh	Senior Project Associate
18	Dr. Sunil Kumar Naik	Senior Project Associate
19	Dr. Pavithtra N	Senior Project Associate
20	Vishaka Chauan	PhD Student
21	Balaram Shaw	PhD Student

S. No.	Names	Designation
22	Rajini	PhD Student
23	Vemuri Harini	PhD Student
24	Chethan V A	PhD Student
25	Vandana S	PhD Student
26	Dnyaneshwar Gawai	PhD Student
27	Rahul Singh	PhD Student
28	Vishnudatha V	PhD Student
29	Divya Dhakar	PhD Student
30	Dhrutikam Jena	PhD Student
31	Alok Kumar	PhD Student
32	Safal Jung Thapa	PhD Student
33	Rishikesh	PhD Student
34	Krishna Kumar Pandey	Technical Assistant

g. Online Attendees

Individuals

- Dilfia Pushkaran
- Dipti Jarange
- Equeenuddin
- J. Sumathi
- Jatin Anand
- JP Singh, Director, NRCD
- Koshy P. S., SE, MIC
- Krishna Kumar Pandey – Organiser
- Libi
- Minakshee Mahana
- Niranjan Malick
- P. K. Tripathi, Member
- P. Krishnaiah
- Rajeev Kumar Mital, DG, NMCG
- Ramasamy
- Rowql, Dowl
- Sandeep
- Sanjeev Gupta
- Siva Kumar Reddy
- Sudarshan Pagar
- SVB Patel

Departments / Designations

- SSNNL, Ekta Nagar
- Water Resources Department
- WRD VJW
- AEE, APPCB
- CE, GDS
- CE, Godavari Andhra Pradesh
- CE, Hydrology
- CE, WRD, GoK
- CEHP
- CMD GTM
- DEE, GSD 2, Srikakulam
- HPD, Chhatrapati Sam
- HPD CSN
- JD Water
- WRD, Karnataka
- RO, Kadapa

जल शक्ति मंत्रालय
MINISTRY OF
JAL SHAKTI

सत्यमेव जयते

Stakeholders' Conclave

on 25th September 2025

&

2nd Meeting of

Stakeholder Advisory Committee (SAC)

on 26th September 2025

under the chairmanship of

Secretary, DoWR, RD&GR, Ministry of Jal Shakti

Venue:

A.V. Rama Rao Auditorium, 2nd Floor,
New Chemical Science Building,
Indian Institute of Science (IISc), Bengaluru

भारतीय विज्ञान संस्थान

ICWaR

cGanga

cCauvery

cMahanadi

cPeriyar

IIT PALAKKAD

cNarmada

cGodavari

NEERI

cKrishna