

LEVERAGING SMART TECHNOLOGIES FOR WASH IMPROVEMENTS

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Digital Technologies – Need of the hour to “modernize” WASH

< Scale and variability of development needs in India is huge but human resource relatively

Moving to a “Developed” mindset!

< Some problems are decision and human resource intensive – segregation?

< While for others, need to move away from human touch!

Moving from infrastructure creation to service delivery

Data driven planning requires “digital data” & continuous, real-time monitoring

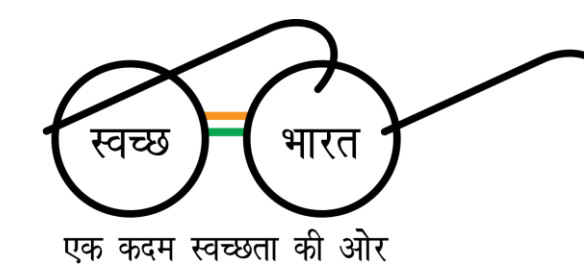
Various Government programs supporting digital shift and providing push for integration of digital technology to strengthen public services



Digital India
Power To Empower



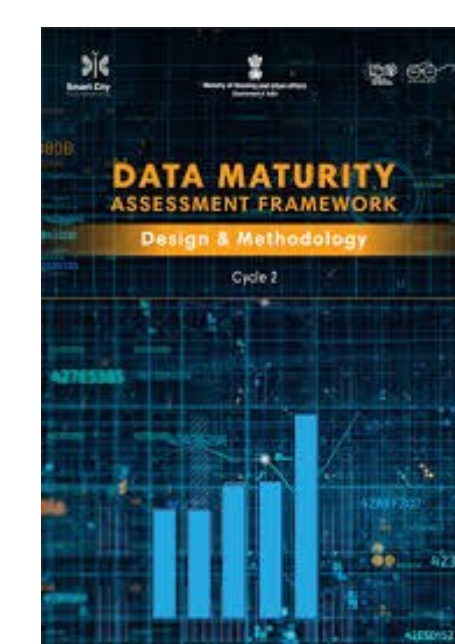
Smart City
MISSION TRANSFORMATION



स्वच्छ भारत
एक कदम स्वच्छता की ओर



Atal Mission for Rejuvenation and Urban Transformation



DATA MATURITY ASSESSMENT FRAMEWORK
Design & Implementation

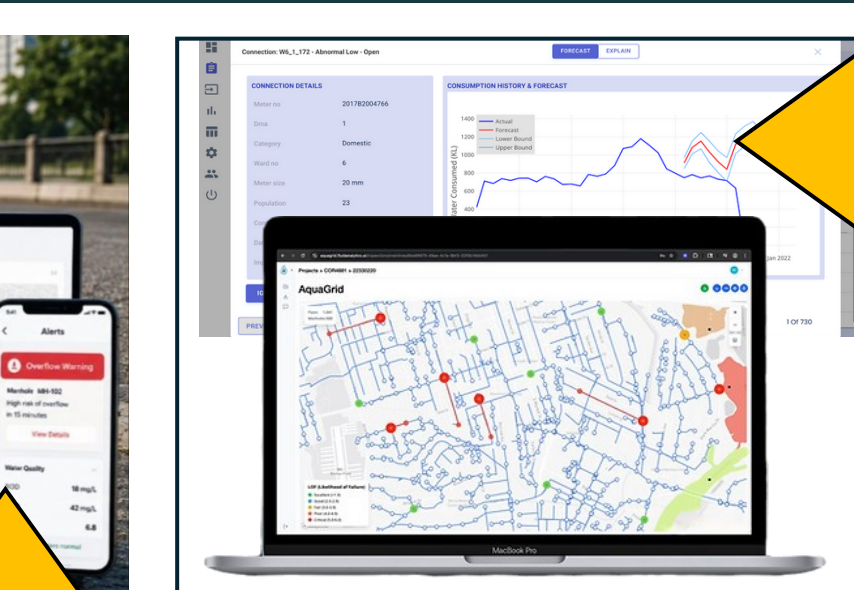
Water Supply and Sewerage



- Many cities have installed SCADA and integrated with ICCC
- Systems typically cover transmission while leakages are worst in distribution network
- Puri's Drink from Tap program - Sensors on distribution network to track pressure, flow and chlorine levels



- NimbleVision – SMART Sewer sensors for monitoring overflow.
- CWAS piloting in Mansa and Viramgam

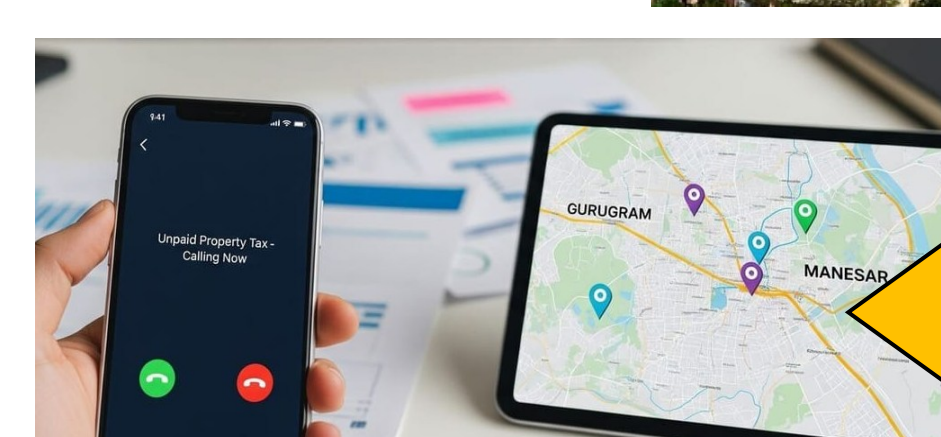


- Endobot: Robot pipe crawler supported by AI analysis
- Detect leakage and maintenance requirements without extensive digging

- SmartTerra and FluidAnalytics: AI enabled NRW reduction in
- Detect water loss even in intermittent supply
- Implementation in Pune, Large scale digital twin - Valencia Metropolitan Water Supply System in Spain

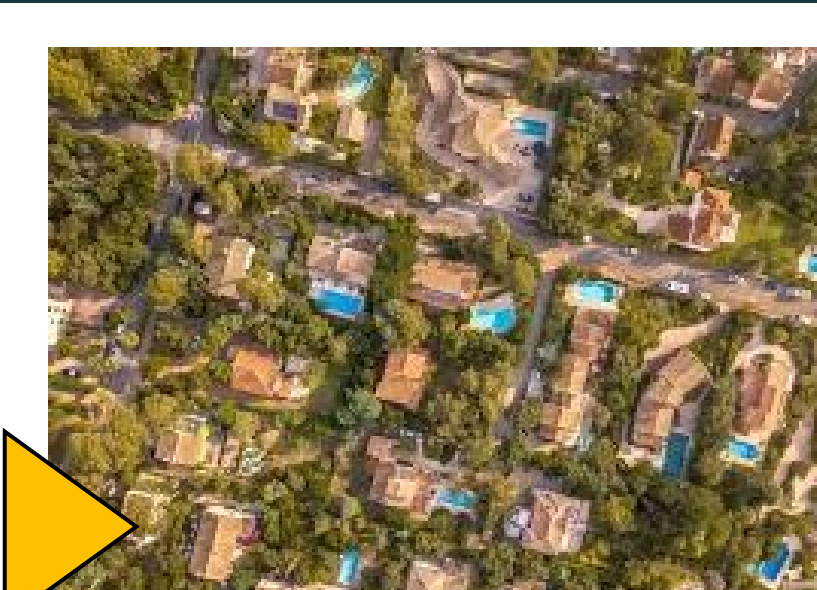
- Digital Twins and AI based control systems for treatment Optimize energy use, chemical dosing, maintenance schedules, and output quality - regulatory compliance
- Increasingly common in industrial applications in India. Taken up in large scale by Chinese STPs. Case of Singapore's Changi treatment plant. Example of Surat.

Municipal Governance and Citizen services



Property Tax

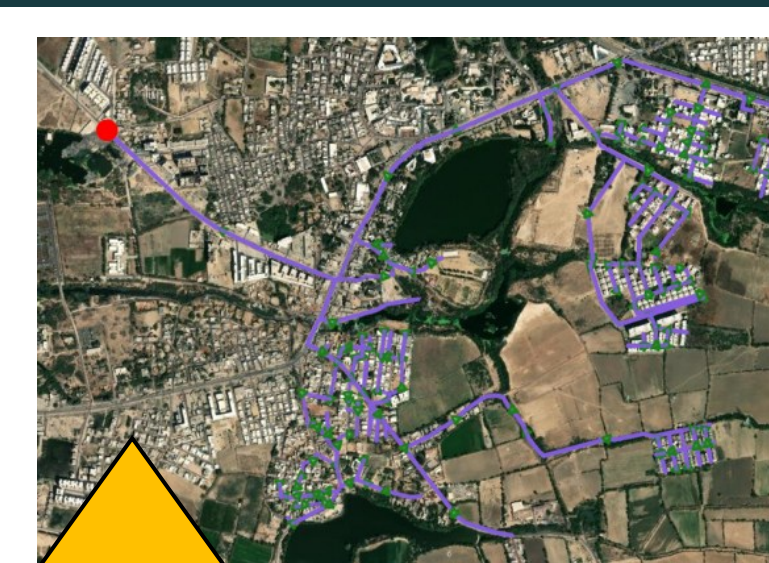
- In India - Reassessment of property tax - intensive exercise now aided by drone, LiDAR and AI based surveys
- Improving property tax compliance – drone/ aerial images to detect unreported taxable assets such as swimming pools – France and Greece
- AI voice phone bots to enhance payments from defaulters- Gurgaon and Manesar governments



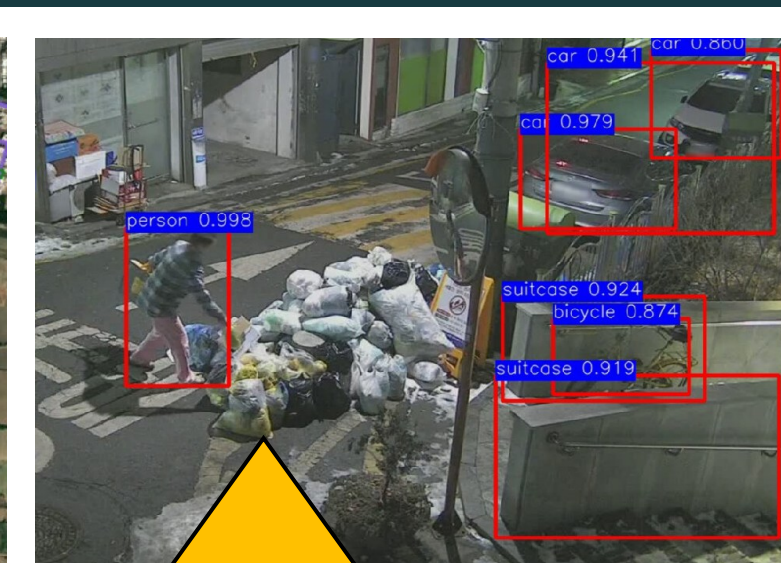
Grievance Redressal and complaint lodging

- Govt of India's Swachhata app and Telangana's Citizen Buddy

Solid Waste Management



- GIS and code-based route optimization for daily door-to-door waste collection - Geospatial Distance Calculation, Route Distance and Time Estimation algorithms
- CWAS pilot in Becharaji - reduced travel of 4.4 km /vehicle / day, annual savings ~30-35% fuel costs



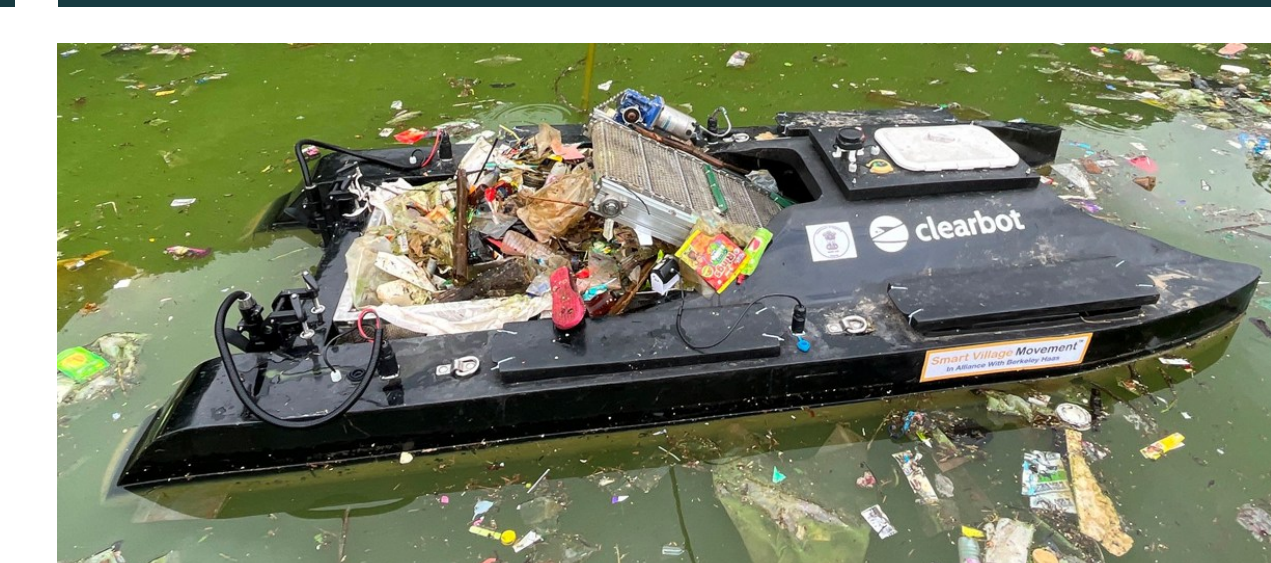
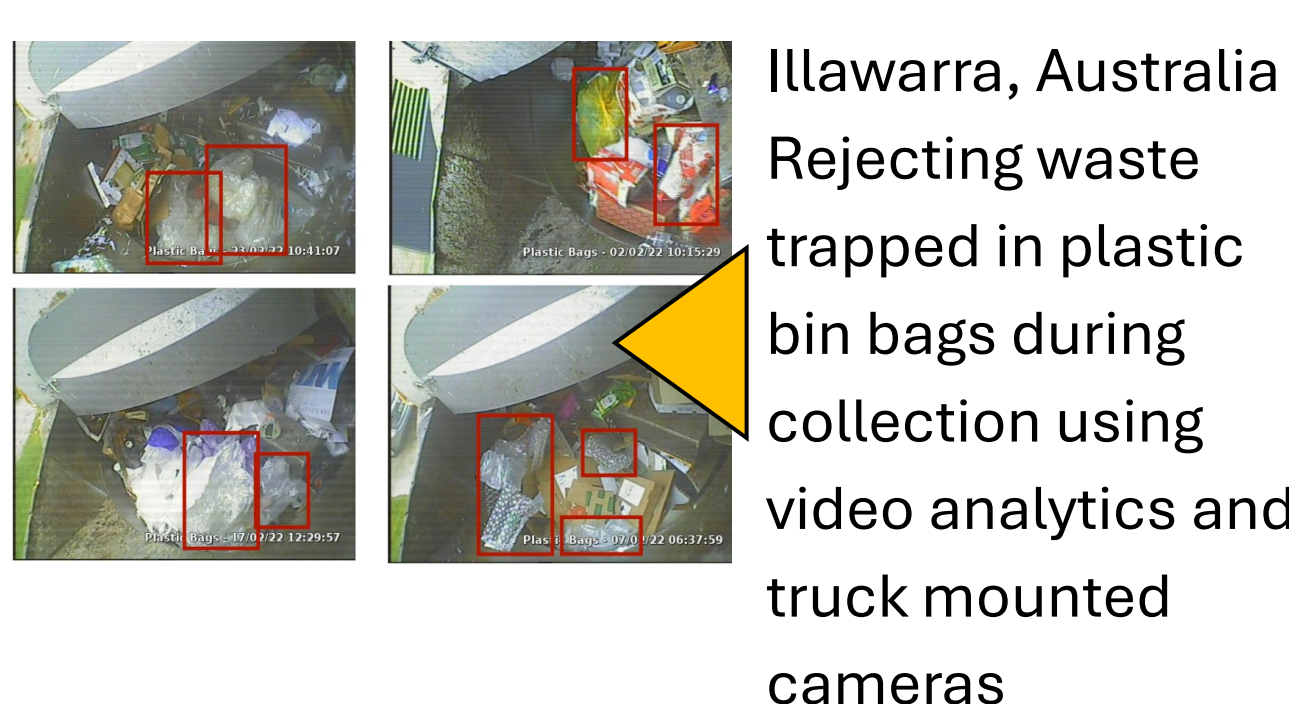
- CCTV, dashcam and Drone based surveillance – computer vision for illegal dumping, open burning
- Monitoring of Garbage Vulnerable points - CWAS pilot in Becharaji



- SMART Bins - Bin overflow monitoring through computer vision analytics
- Optimized route assignment for pickup truck based on fill capacity of bins



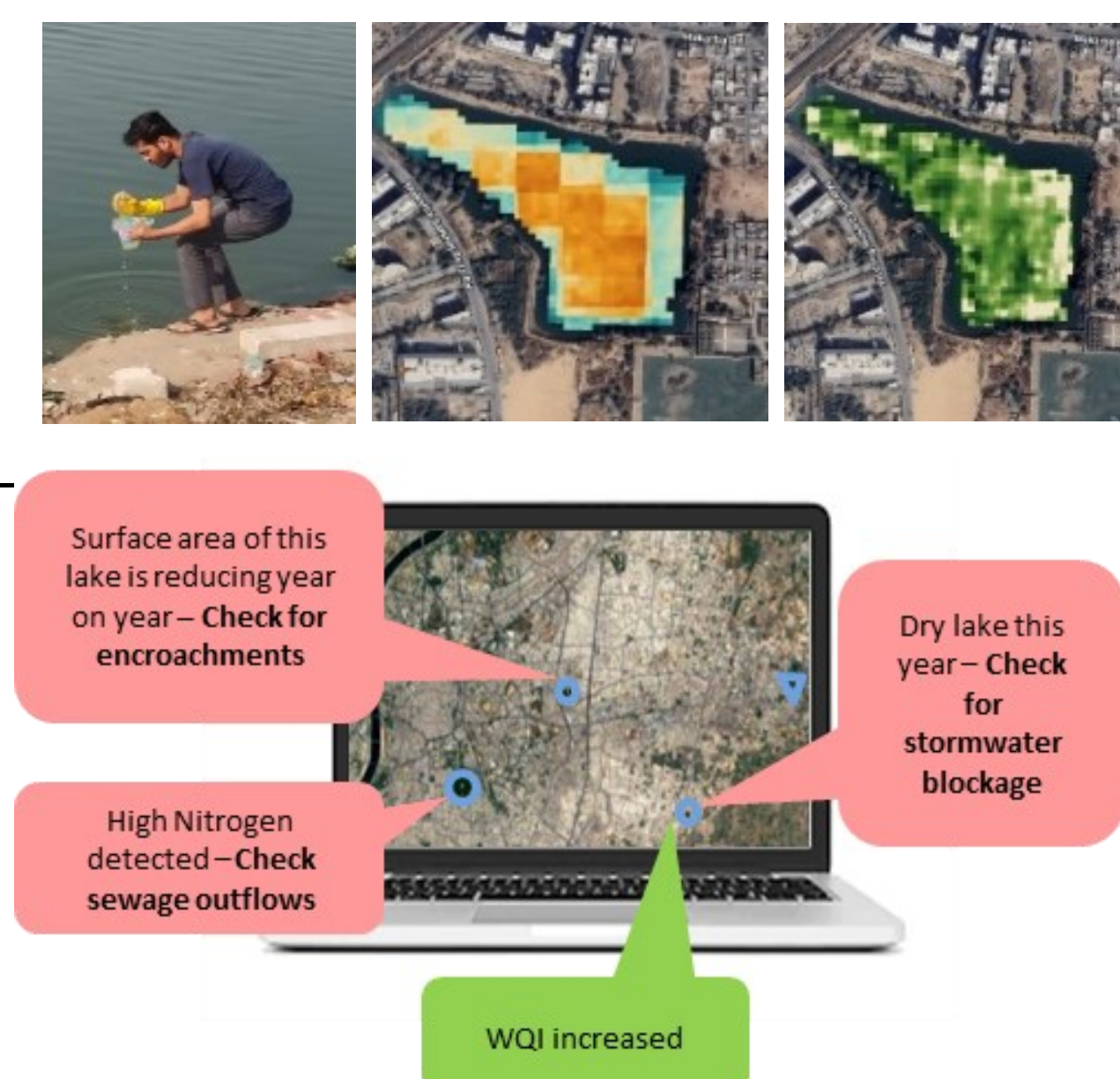
- Machine Vision and Robotic sorting of waste at Material Recovery Facility –automating waste segregation at city scale
- Ishitva , Wastefull Insights, Recykal, Trachcon and similar players with facilities at Ahmedabad, Indore, Vadodara, Umargam



Autonomous trash robots – garbage and hyacinth removal

Remote Sensing and Machine Learning technology for lake monitoring – CWAS research

- Water Quality Testing to train Machine Learning models on satellite images of lakes and corresponding water quality parameters
- Estimating water spread and quality – no need for intensive lab testing or surveying. Visualize across time
- Analysis and action insights
- Supporting Govt of Gujarat in scaling us lessons through their LakeWatch program



Bringing Municipal India into the age of AI

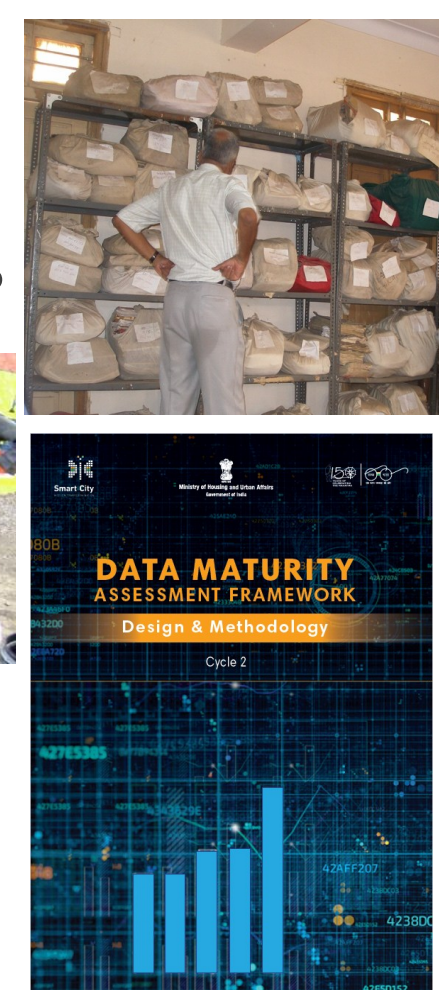


While India's SMART (and large) cities are building integrated command and control centres

The reality of small cities is this. No digital data for AI to work on!! Where to put the sensor??



Data Maturity Assessment Framework – needs to extend to all cities - Strategic tool to evaluate the readiness of cities to effectively leverage the potential of data to address complex urban challenges in 100 Mission Cities.



Resource implications of SMART systems must also be acknowledged

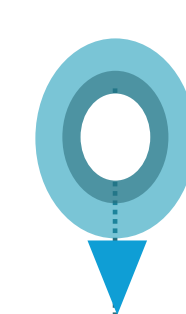


AI systems to be supported by data centers - highly resource-intensive, requiring continuous electricity for computation and significant water for cooling.

As India positions itself as a digital global hub with investment in AI and cloud infrastructure – need to address resource use - particularly in water-stressed urban regions.

Digital Water Hub at CWAS

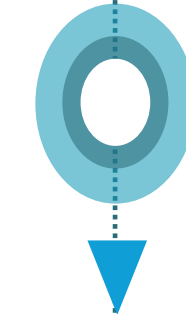
Consolidating research, innovation and capacity building in digital water tech, with focus on contextual solutions for India and the Global South. Aimed at enhancing adoption of digital tech prompted by various Indian flagship missions. Creating impact through IOT, Machine learning, Big data, Artificial Intelligence and integrating with digital governance.



Enable digitalization with local governments



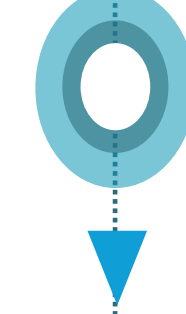
- IoT and SCADA for real-time WASH monitoring
- Digital citizen science
- Digital twins for optimizing water utilities



Provide intelligence



- Geospatial tools, drones and satellite imagery - watershed and water bodies.
- AI/ML in demand forecasting, WASH infrastructure



Support planning



- Visualisation dashboards for municipalities
- Information repositories
- Digital Water Atlas / SCADA Hubs
- Decision support systems for planning and investments

Knowledge partnerships, Academic engagement, dissemination



Training programs, certificate courses, and workshops on data analytics, IoT, tools and water governance



E-learning modules, toolkits and guidelines for practitioners, governments and service providers



Publish research papers, case studies, and policy briefs



Policy dialogues, seminars, and conferences - Digital Water Forum / GSAC



Hackathons, innovation challenges, and internships to engage students and young professionals.



Industry-academia-government partnerships for applied research and co-development of technology solutions

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