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Restoration goals for urban lakes

By Sumita Bhattacharyya

For us to enjoy the lakes spread across our towns and cities, all its components should work well, including the water quality. How do we know when the water quality of a lake is good or bad? Well, it is easier to say when it is bad. There would be floating waste or slimy scum on the surface of the water and an offensive smell emanating from the lake. The water would appear dark (black, brown or green), and there may not be a lot of different bird species seen or plants growing in and around it.

But when it comes to knowing if a lake is good, we may have multiple qualifications like the lake does not smell, the colour of the water is lighter and we can see a little inside the lake. Or the lake has a wide range of birds and plants. It is better maintained, with comfortable walkways for people, parks for children to play, or benches for visitors to sit among nature. The reasons may differ for different people. However, they are all important to determine whether a lake is good. But our study focuses on water quality, a major component having a wide-ranging impact on the overall lake.

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Online-monitoring of recycled water quality

By Eva Reynaert and Deepthi Nagappa

Communities across the world face water supply challenges due to increasing demand, drought, groundwater depletion and contamination, and ageing infrastructure. In many regions, treated wastewater could be used as an alternative water source as it provides reliable quantities of water, all while relieving the stress on freshwater resources. The challenge for such systems is that safety, especially in terms of microbial water quality, must be ensured at all times.

In India, the reuse of treated wastewater has been getting increased attention due to rising pressures on water supplies, especially in water-scarce cities. In the city of Bengaluru, the Karnataka State Pollution Control Board (KSPCB) has mandated 100% wastewater treatment and on-site reuse (zero-liquid discharge or ZLD) for large apartment buildings since 2004. The treated water is reused for landscaping, car washing and more importantly, toilet flushing. However, there is limited information on short-term variations of the microbial water quality from such on-site water reuse systems, as water samples are usually sent to specialised (i.e., NABL-accredited) laboratories only once a month.

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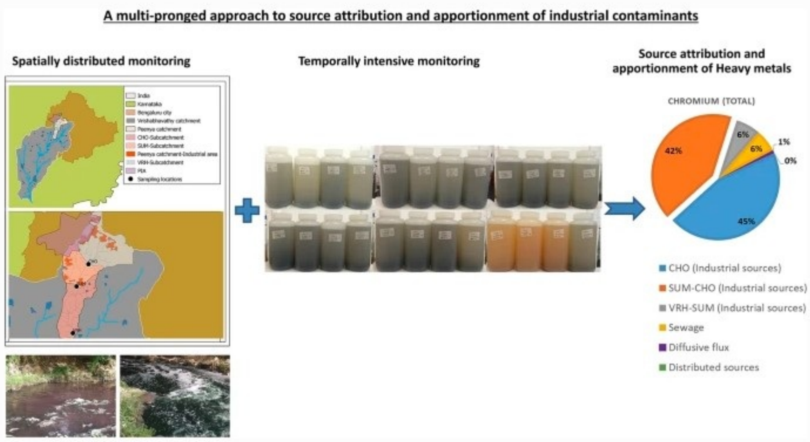
Gaps in water quality monitoring framework - A case study of Vrishabavathi river

By Priyanka Jamwal and Chandan KB



A study on Heavy Metal (HM) contamination of Vrishabhavathi stream at the industrialised catchment area of Bengaluru city. HM contamination is caused by both first-generation (industries) and second-generation (distributed sources, domestic sewage, sediments) sources. A multi-pronged approach was applied to quantify the contribution of first- and second-generation sources to the stream.

The study showed that there was a gap between regulation and implementation. The first-generation sources contributed significantly to the HM load (60%–80%) and domestic sewage contributed significantly to Cu, Ni, and Mn load (15%–20%). The contribution of distributed sources and sediments to HM load was insignificant. The highest concentrations of HM were observed at night, which frequently exceeded FAO's irrigation water-quality standards. Empirically, the study highlights the continued plight of urban streams in rapidly industrialising centres and the failure to regulate first-generation sources. Methodologically, it demonstrates the importance of temporally intensive measurement of contaminant concentration and load. Ambient water quality standards should include standards for HM with new policy implications strictly enforcing a load-based regulation and problem-oriented monitoring.

Read more

Intervention for wastewater management and water source protection

By Sminu T V and Anjali V Raj

Water is life. Currently, our water resources are vulnerable to contamination from numerous anthropogenic sources including agricultural and stormwater runoff, onsite sanitation systems and domestic wastewater. The massive surge in wastewater generation in urban and rural areas poses a potential threat to water resources and needs to be addressed quickly. Conventionally, sewage and stormwater runoff were managed through grey infrastructures like sewage treatment plants and stabilisation ponds. However, they are primarily centralised infrastructures requiring high capital costs and maintenance. Recently nature-based solutions (NbS) have gained more attention over grey infrastructures as low-cost, decentralised and sustainable alternatives for treating domestic wastewater, stormwater runoff, agricultural runoff, and industrial wastewater. NbS involves different ecosystem-based landscape approaches such as constructed wetlands, floating treatment wetlands, rain gardens, bioswales, retention basins, green roofs and green gardens designed to mimic natural ecosystems. NbS provides many ecosystem services, such as flood hazard mitigation, water quality treatment, thermal reduction and urban biodiversity enhancement. It also delivers cultural services such as recreation, education and aesthetic appreciation. The NbS focuses on natural treatment systems for sustainable wastewater management. These systems are applicable in both urban and rural contexts.

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Where Does The Water Go In Bengaluru?

By Muhil Nesi

Bengaluru's water problems may sometimes seem contradictory. Stories of drying borewells and lakes compete with outcries about flooded streets. But these twin problems are clearly interconnected.

Growing demand for land in the city is reflected in a dramatic increase in urbanised land-use over the decades. The consequent encroachment of wetlands, replacement of green spaces with concrete, and the gradual loss of interconnectivity between lakes are one reason for increasing flash floods.
With abundant rainfall (>900 mm annually over the last five years) and little room for recharge, wells run dry as drains overflow. Despite being allocated Cauvery water, the expanding city, particularly the newer suburbs, has become increasingly dependent on groundwater. So, groundwater depletion is a problem.

As Bengaluru flooded again in August, Muhil Nesi wrote a two part blog series (Part 1 | Part 2) about the need to map the flow of water through the urban water system to understand the paradox of flooded streets and dry borewells.

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Nature-Based Solutions for Water Security

By Veena Srinivasan

The term Nature-based Solutions (NbS) refers to the sustainable management and use of natural features and processes to tackle socio-environmental challenges in general, and climate change in particular. These solutions are 'inspired and supported by nature', cost-effective, and simultaneously provide environmental, social, and economic benefits and help build resilience.

Examples of NbS include the restoration of mangroves along coasts to moderate the impact of waves and wind on coastal settlements or, green roofs or walls in cities to mitigate heat stress and act as carbon sinks while enhancing biodiversity or creating ‘room for the river’ for flood protection. Decentralised, small-scale solutions based on science can be owned by local communities that participate in all aspects of projects from planning to operation.

Read more

Understanding the groundwater sanitation nexus in small towns: a case study from India

By Priyanka Jamwal and Chandan KB

The separation of greywater and blackwater at the household scale has successfully addressed the issue of open defecation in rural villages and small towns across India. Eighty per cent of the population in India depends on groundwater sources to meet their domestic and livestock water demand. The impact of the high density of pit latrines on groundwater quality is well documented in the literature. Several solutions, such as the deployment of modified septic tanks and constructed wetlands, have been proposed to address the groundwater contamination issues. However, few studies have assessed and compared the impact of greywater and blackwater on groundwater quality. Our study on understanding the groundwater sanitation nexus in one of the small towns in India aims to assess the relative impact of greywater and blackwater disposal on groundwater quality. We categorised borewells into three subsets: a) located in the densely populated region, b) located near the open stormwater drains, and c) within the village. The water quality data showed the presence of nitrates (above drinking water standards) in borewells located within a densely populated area and near stormwater drains. The contaminant load varied across seasons, with maximum levels observed during the pre-monsoon period. Compared to borewells in the village, high COD levels were also observed in the borewells located near the open stormwater drain, indicating the contribution of greywater to organic contaminant load in groundwater.

Groundwater quality data was obtained from samples that were collected from agricultural fields where the density of soak pits or Onsite Sanitation Systems (OSS) was low and semi-urban areas where the density of OSS was high.

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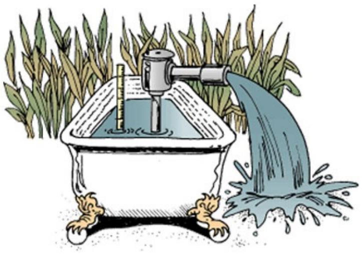
Rural Water Planning is Caught Between an Egg Carton and a Bathtub

By Veena Srinivasan



India faces a looming groundwater crisis. The Central Ground Water Board estimates that groundwater in about a quarter of India’s blocks are overexploited or critical.

But to be able address this effectively, we need solutions to work at scale and a clear grasp of ‘what works where’. Can better information about groundwater use and impact of past interventions prompt behavioural change among farmers? Why does this succeed in one place but fail in another?

To solve this puzzle about why informational interventions seldom scale well requires understanding how groundwater works, how information about it is used, by who, how and why. Interventions need to be tailored specific to how farmers might behave, which in turn depends on the aquifer’s characteristics.

Read more

The link between wastewater management and environmental quality in rural India

By Anjali V Raj and Priyanka Jamwal

The wastewater generated in rural areas is a mixture of greywater, livestock waste and sometimes blackwater (child faeces and urine). This wastewater is often channelled into open stormwater drains or fed into kitchen gardens/fields. Open stormwater drains are either diverted into a ditch/collection pond that fertilises agricultural fields or fed into surface water bodies through open channels. The wastewater from these drains is of high strength due to the presence of kitchen rejects (containing oil and grease) and livestock waste. Hence it is a major threat to ground and surface water resources if not managed properly.

On our recent visit to S.M. Gollahalli, a village in Doddaballapura taluk of Bangalore rural district, we found the scenario there was no different. Open stormwater drains were receiving greywater from kitchens and bathrooms and livestock wastes from small livestock facilities adjoining the houses. The village has an existing household waste collection, segregation and disposal system and hence solid waste (except livestock waste) was not getting mixed up in the drain. A few metres away from the habitation, near the fields, a part of the wastewater from the drain was diverted into small collection ponds. Farmers use this wastewater to irrigate and fertilise their agricultural fields. The rest of the wastewater continued to flow through the ditch and fed into rajakaluves (channels or drains that link one lake to another, constructed to drain off excess water and storm water into water bodies) that lead into the Arkavathy River.

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9 Priorities for India’s Drinking Water Sector: Summary of REAL-Water Roundtable

By Veena Srinivasan

How do we ensure source sustainability in areas where groundwater is overexploited? How are drinking water systems vulnerable to floods? How effective are wastewater systems in rural India? These were some of the important questions raised during a wide-ranging roundtable discussion held in New Delhi on August 17 as part of the Rural Evidence and Learning for Water (REAL-Water) program.

CSEI-ATREE is part of a consortium led by the Aquaya Institute that is researching strategies for expanding access to safe, equitable, and sustainable rural water services. One year into this project, we conducted a roundtable discussion to share our research agenda with researchers and practitioners involved in the water sector, as well as senior government officials such as the Additional Secretary and Director (AS & MD) of the Jal Jeevan Mission, Vikas Sheel; and the Additional Secretary of the Department of Water Resources, Debashree Mukherjee.

Read more

Assessing Ecosystem Services of Relic Myristica Swamps in a Changing Landscape

By Priya Ranganathan

Nestled in tiny pockets of the biodiverse Western Ghats, one of India’s most endangered and ancient ecosystems breathes.

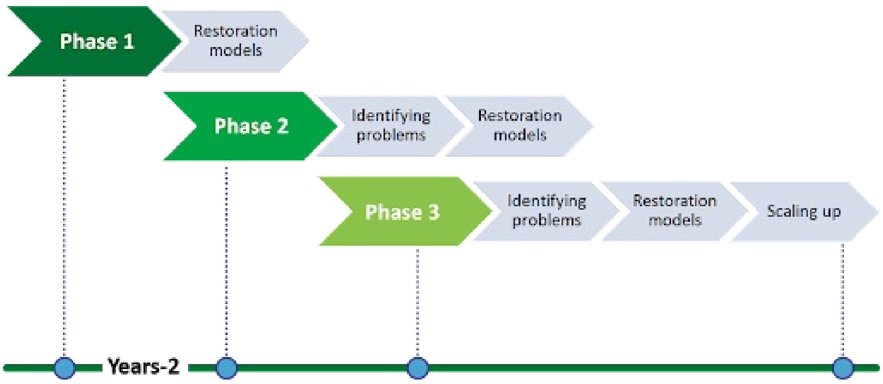
I am a PhD student at ATREE and a 2022 Prakriti Research Fellow, studying the impacts of landscape fragmentation and a loss of hydrological connectivity on the relic Myristica swamps of Uttara Kannada district, Karnataka. Using an ecohydrological approach and focusing on community-centric conservation, I am looking at the ways in which people relate to these biodiverse freshwater ecosystems by quantifying the various ecosystem services of swamps and their ecohydrology. My research is guided by Dr. Jagdish Krishnaswamy from IIHS and ATREE who has worked extensively on the ecohydrology of the Aghanashini river basin in Uttara Kannada, and Dr. G. Ravikanth, who has years of experience in studying the flora of Myristica swamps.

As a part of the Prakriti Research Fellowship by CARPE-Ecosattva, I am utilising a three-pronged approach to understanding the complex ecology and ecosystem services of Myristica swamp. But what are Myristica swamps? These relic swamp forests were first formed when India was still a part of the supercontinent of Gondwanaland, during the time of the dinosaurs. At the end of the Cretaceous period, when India separated from Madagascar and began drifting northwards, its movement over an active volcanic hotspot known as the Deccan Traps caused violent volcanic eruptions that led to the creation of the Western Ghats and, subsequently, India’s unique vegetation and climatic conditions.

Read more

Restoration of Tamiraparani Social-Ecological System (TamiraSES)

By Team TamiraSES



Ecological processes are closely linked to social systems and cannot be viewed in isolation. The coupled-complex social-ecological systems of the Tamiraparani riverscape have been divided into social-ecological sub-systems to develop a restoration plan. Hotspots of concern have been identified for Phase I of the restoration plan based on the ground survey, and consensus with the district administration. The models proposed progress bottom-up, combining scientific methods, and are inclusive of key stakeholders. In the first phase, villages were selected based on the representation of issues along the Tamiraparani riverscape. Five villages (municipality: 1, town panchayat: 3 and village panchayat: 1) were selected for establishing a network of Social-Ecological Observatories in the Tamiraparani riverscape.

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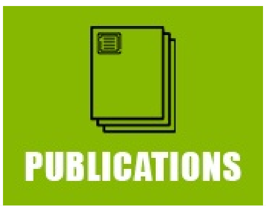

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