

Unravelling Nutrient Dynamics in Lake Burley Griffin

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Lake Burley Griffin is an artificial urban lake located near the geographic centre of Canberra, Australia. During the warmer months the lake is often closed because of cyanobacteria blooms which are linked to nutrient concentration in the lake. While previous studies have investigated nutrient dynamics in the lake, these are only partially relevant because of major changes to urban catchments and infrastructure have altered the nutrient loading to the lake. An assessment of nutrient dynamics is required to identify in-lake nutrient loading and associated factors.

Water samples were collected weekly during warmer months (October-April) and monthly during colder months (May-September) at different depths across five sites over a year. Samples were analysed for dissolved nutrients (i.e., ammonia, filterable reactive phosphorus, and nitrate/nitrite), total nutrients (i.e., total nitrogen and total phosphorus), and total organic carbon using standard analytical methods. At all in-lake sites, water physicochemical parameters were measured at 1 m depth intervals during each sampling visit to relate with nutrient data. Loggers were deployed to continuously measure temperature and dissolved oxygen, to identify lake transition patterns. Storm sampling was conducted across five inflows and the outflow during large rain events (>10 mm/day).

Lake began stratifying in mid-October when the daily average water temperature reached 20°C. Stratification persisted throughout summer until mid-autumn, with occasional partial or complete mixing events. These mixing events were driven by rainfall, inflow discharge, and/or sudden drops in air temperature. However, some large rain events did not always break the thermal profile, likely due to warm water delivered by the inflows. In-lake total nutrient concentrations showed a strong association with rainfall, while some higher concentrations were linked to small rain events following dry periods. Inflow nutrient concentrations, particularly phosphorus during event flows, exceeded the threshold levels for algal growth. When the lake was stratified, high dissolved nutrient concentrations in the hypolimnion were indicative of internal loading. This was evident for ammonia, where increases in ammonia concentration were related to decreases in dissolved oxygen.

Results from ongoing monitoring indicate that in-lake nutrient dynamics are driven by event flows and internal loading. Nutrient enrichment could exacerbate algal blooms, given the lake's average residence time of over two months. A detailed assessment of nutrient dynamics and associated physical parameters will provide a comprehensive understanding of the lake, aiding in the prediction of nutrient variability under future climate-driven rainfall changes.

The Heartware approach: How Local Values drive Sustainable Socio-Technical Change for Integrated Lake-River Basin Management

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This paper proposes the application of the Heartware approach as a critical lens for advancing Integrated Lake–River Basin Management, highlighting the role of local values, shared narratives, and emotional connections in driving sustainable socio-technical change. Conventional river basin frameworks often emphasize technological ("Hardware") and institutional ("Software") solutions, yet they frequently overlook the humanistic and relational dimensions that are essential for fostering inclusive and enduring stewardship. Drawing on comparative insights from watershed management experiences in Japan - particularly influenced by the ILBM epistemic community in Lake Biwa — and over a decade of action research in Malaysia (Mohamad et al, 2015, 2018; Mohamad, 2023; Abd Kadir, Mohamad and Mac-Bride, 2024) this paper demonstrates how community-shared values and place-based meanings significantly shape environmental governance outcomes.

A more recent and practical application of the Heartware framework is illustrated through Place-Based Citizen Science (PBCS) initiative using the Eco-Heart Index (Sakai et al, 2018; Mohamad et al, 2021). This tool empowers communities to assess water quality using culturally resonant symbols, facilitating deeper engagement, scientific literacy, and emotional attachment to local ecosystems. Such innovations not only democratize environmental monitoring but also nurture a profound sense of place and responsibility among stakeholders.

The paper argues that embedding basin governance within the cultural and historical fabric of communities offers a promising pathway for strengthening the interface between science, society, and the environment. Ultimately, the Heartware approach contributes toward a more relational, participatory, and culturally embedded model for sustainable lake–river basin management, advancing the goals of ILBM and global sustainability agendas.

Assessing the willingness to pay of fishermen, biologists and engineers for sustainable management of thondamanaaru lagoon in jaffna district, sri lanka

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As one of the prominent lagoons in northern Sri Lanka, the Thondamanaru lagoon provides a wide range of ecosystem services that are highly valued by society. However, the state intervention of barrage closure to prevent the salinity issues in the groundwater of the region has posed serious challenges on the biodiversity of the Thondamanaaru lagoon as well as the livelihoods of artisanal fishermen living in this area. The situation raises concerns not only among the local people but also among all the stakeholders related to this lagoon ecosystem management such as, biologists, engineers, fishermen. Therefore, this study aims to understand the preferences and willingness to pay of fishermen, biologists, and engineers using a choice experiment approach to support sustainable lagoon management. The attributes considered for this study include the levels of barrage operation, fish stocks, mangroves, tourist facilities, and payments. A total of 180 fishermen, 150 engineers, and 154 biologists were randomly selected for this study, and the preferences of different stakeholders were analyzed using a mixed logit model. The results show the preference order of barrage operation of fishermen and biologists as follows: complete opening of sluice gate throughout the year, opening for one month per year and complete closure of sluice gate, but the preference order of barrage operation of engineers is as follows: complete closure of sluice gate, opening for one month per year and complete opening of sluice gate throughout the year. However, all stakeholders are willing to pay to open the sluice gate for one month per year. Biologists had the highest WTP (LKR 2956.65) for sluice gate opening for one month per year. In contrast, engineers prefer to completely close the barrage and open the barrage one month per year levels than completely open the barrage. Notably, fishermen, biologist, and engineers are willing to pay for an increase in fish stock, mangroves, and improvements in tourism. Furthermore, the findings revealed that fishermen above 50 years of age were more willing to accept compensation for the complete closure of the sluice gate per month compared to those below 50 years of age. Further, engineers' income and their knowledge regarding the lagoon significantly influence their choice, while biologists' gender, knowledge, and understanding of lagoon management practices significantly influence their choice. These findings could be useful to policymakers to develop appropriate policy to maximize the welfare to society from lagoon and sustainable ecosystem management.

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Chilika lake at the crossroads: policy, partnerships, and pollution abatement in action

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Chilika Lake, spanning 1065 sq.km along the eastern coast of Odisha, is Asia's largest brackish water lagoon and a designated Ramsar Site, hosting over 800 recorded species and critical habitats, including several rare and endangered species listed in the IUCN Red List. The lagoon plays a critical role in the ecological balance and sustains the livelihoods of nearly 0.2 million people across 192 fishing villages. However, the ecological integrity of this globally significant wetland is under mounting pressure due to rapid urbanization, particularly from the capital city of Bhubaneswar, a fast-expanding urban center, located 98 km away. The city discharges wastewater through eleven natural drains that merge into the 'Gangua Nallah water canal', ultimately feeding into the Daya River, which flows directly into Chilika Lake. While the city has installed five sewage treatment plants (STPs), only about 30% of wastewater is treated, the remainder flows untreated, contaminating the water ecosystem.

In response to a directive from the National Green Tribunal, the Government of Odisha constituted a multi-stakeholder Task Force to assess the pollution load and implement corrective measures. The study mapped multiple contributors to the pollution—including unregulated industries, insufficient solid and biomedical waste management, and poor enforcement of environmental regulations. Key stakeholders identified include Bhubaneswar Municipal Corporation, WATCO, IDCO, the State Pollution Control Board, the District Medical Office, Drug Control Department, and the Water Resources Division.

Of 935 industrial units surveyed, 474 were found operating without valid consents, and 20 lacked effluent treatment plants. Approximately 50000 urban households, along with an additional 444 slum pockets remain unconnected to the sewer network. Nature-based solutions were piloted, such as in-situ drain treatment and stabilization ponds. WATCO initiated the acquisition of 44 acres land to construct an additional STP at the confluence of the Gangua and Daya Rivers. A critical component includes adoption of a community-based monitoring system to prevent illicit discharges and foster behavioural change. These interventions collectively aim to enhance governance, support inclusive planning, and reduce ecological degradation. The strategy focuses on source-to-sea pollution management, coordinated stakeholder action, policy reform, and community-based monitoring systems. These integrated efforts are aimed at restoring Daya and Chilika's health, preserving its ecosystem, and sustaining the livelihoods that depend on it, offering a scalable governance model for integrated lake basin management in India and beyond.

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Conserving Aquatic Biodiversity in Dam-Impacted Rivers: Critical Habitat Fish Species and Ecosystem Health in the Upper Victoria Nile, Uganda