

## **Spatiotemporal Linkages between Habitat Quality and Water Quality: A Case Study of Yan Oya, Sri Lanka**

G.K.L. Wickramasinghe\*, G.D.D.J. Bandara, G.M.P. Kumara<sup>2</sup>, N.D.K. Dayawansa<sup>1</sup> and M.I.M. Mowjood<sup>1</sup>

Postgraduate Institute of Agriculture  
University of Peradeniya  
Sri Lanka

Evaluating the relationships between land-use practices, habitat quality, and water quality is crucial for sustainable river management. This study investigates how agricultural and forest land use influence the spatial and temporal dynamics of habitat quality and water quality in the Huruluwewa catchment of the Yan Oya basin. Field data were gathered monthly (January-June 2025) across 12 selected sampling locations in 50 km river reach from Habarana to Kahatagasdigiliya in Yan Oya, representing upstream-downstream gradients and varying land-use conditions. The water quality index was calculated based on pH, temperature, dissolved oxygen, turbidity, total dissolved solids, and electrical conductivity. Habitat assessments were conducted using the U.S. EPA's Rapid Bioassessment Protocol. Land-use quantification was performed by developing a land-use/land-cover map. Correlation analysis revealed that increases in cultivated land were negatively correlated with the HQI ( $r = -0.635$ ,  $p < 0.05$ ) and WQI ( $r = -0.277$ ,  $p < 0.05$ ), reflecting sedimentation and reduced riparian cover from farming. Forest cover improved HQI ( $r = 0.406$ ,  $p < 0.05$ ) by stabilizing banks and enhancing habitat structure, although it showed no significant effect on WQI. Additionally, habitat and water quality index demonstrated a weak but statistically significant positive correlation ( $r = 0.235$ ,  $p < 0.05$ ) indicating that improvements in habitat quality were accompanied by slight increases in water quality. The six-month dataset provides preliminary evidence of interactions among land use, habitat integrity, and water quality, underscoring the importance of integrated watershed management strategies in agriculturally intensive landscapes. However, a more comprehensive understanding requires long-term monitoring and broader spatial coverage.

**Keywords:** Habitat quality index, Riparian land use, Water quality index, Agricultural pressure, River health

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\*Corresponding author: [kasunlakmal2592@gmail.com](mailto:kasunlakmal2592@gmail.com); ORCID: 0009-0001-4189-2485

<sup>1</sup>Department of Agricultural Engineering, Faculty of Agriculture, University of Peradeniya

<sup>2</sup>Department of Bio-System Technology, University of Sri Jayewardenepura