

ASE & EOS Seminar Series



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Ponds and lakes - the missing wetlands in Natural Climate Solutions

Prof. David Taylor, National University of Singapore



Volcanic crater lake, Bisoke, Virunga volcanoes, central Africa

Abstract: Meeting global climate targets requires both deep reductions in greenhouse-gas emissions and protection or enhancement of natural carbon sequestration. Terrestrial carbon-rich ecosystems are consequently attracting considerable attention as potentially important and cost-effective Natural Climate Solutions (NCS). In the tropics, forests—including mangroves—and peatlands feature prominently in discussions of pathways towards net zero. Although I love trees and bogs, their dominance raises an obvious question: why are ponds and lakes ignored as potential NCS?

Freshwater lentic ecosystems (ponds, lakes and reservoirs) remain conspicuously underrepresented in discussions of NCS. Despite occupying only a small proportion of the Earth's surface, however, they are disproportionately important components of the global carbon cycle. Lentic waters act as highly active biogeochemical factories, receiving, transforming and redistributing carbon derived both from their catchments

and from within the aquatic system. They can release substantial quantities of carbon to the atmosphere as CO₂ and, particularly under anoxic conditions, CH₄. At the same time, they are important sites of organic-carbon deposition and burial, with global burial potentially comparable in magnitude to that in marine sediments. This apparent contradiction is central to understanding their climatic significance. Moreover, not all buried carbon is necessarily secure. A proportion, particularly in nutrient-enriched systems, may remain relatively labile and susceptible to remobilisation when depositional conditions change, including during seasonal water-level fluctuations, disturbance and ecosystem restoration.

Drawing on published and emerging evidence, I argue that the role of freshwater lentic ecosystems in NCS requires much greater attention, particularly in the tropics, where high biological productivity, rapid biogeochemical processing and large numbers of small water bodies, including ponds constructed for aquaculture, may amplify their importance. Rather than treating lentic ecosystems as isolated landscape features with a largely neutral role in the carbon budget, we should recognise them as dynamic, connected and still uncertain components of the Earth system. Depending on how they are managed and their response to environmental, including climate, changes, they have the potential to contribute to either the mitigation or amplification of future warming and its impacts.



Bio: David Taylor is Professor of Tropical Environmental Change, Provost's Chair, and Head of the Department of Geography at the National University of Singapore. He previously held the University Chair of Geography at Trinity College Dublin, where he also served as Head of the School of Natural Sciences and before that Head of the Department of Geography. His research focuses on the human dimensions of environmental change in the tropics, particularly in sub-Saharan Africa and Southeast Asia, integrating physical, ecological and social perspectives. David completed his PhD on peatlands in central Africa and currently leads the Carbon Governance in Southeast Asia project, having previously co-led the Integrated Tropical Peatland Research Programme.

On-line CV at: <https://discovery.nus.edu.sg/3403-david-mark-taylor>

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Virtual access:

<https://ntu-sg.zoom.us/j/87272490908?pwd=FaTanK97wCwF6sJP1Pqbwbfbfhehier.1>

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