

Halogenated organic compounds and bio-reclamation of waters by *Lemnaceae*

Water is a universal solvent and is critical to human health and human survivability. Freshwater is used and reused, directly and indirectly, in urban communities and accumulates inorganic and organic solutes in these recycle and reuse activities. Persistent Organic Compounds (POCs) are an advancing and potentially alarming part of water reuse. State-of-the-art reclamation of used waters includes microbial metabolic processing for removal of organic matter, yet many POCs frequently remain in the reclaimed waters. Urban waters in surface runoff, groundwater flows, streams, lakes and reservoirs also accumulate POCs. The presentation will focus on POCs and aquatic-plant biological pathways and opportunities for enzymatic sequestration and processing; toxicity assessments; and potential for sustainable biologically-coupled mineralization.

Lemnaceae are ubiquitous aquatic plants in global freshwater systems and they have been used for centuries in natural and constructed wetlands for nutrient removal and polishing of used water prior to release to natural environments or reuse. POCs include pharmaceuticals, personal-care products, pesticides, herbicides, preservatives, antimicrobial agents and many industrial solvents. These POCs are frequently halogenated organics with chloro-, bromo- and fluoro- substituents being common.

Lemnaceae, or duckweeds, are common, small (1-20mm) vascular plants of nutrient-rich freshwaters and can be critical players in reclamation of used waters. Duckweed species have been used in our research to explore the extent and rate of uptake of POCs, especially halogenated aromatic compounds frequently found in reclaimed waters. The presentation will provide insights and definitive data on enzymatic processing of POCs; identification of glycosidic-intermediates and sequestered materials in plant tissue; toxicity assessment approaches for POCs; coupled plant-bacterial mineralization of POCs; and potential for deployment of plant-based systems for sustainable processing of waters for extensive reuse and recycle.



F. Michael Saunders

Director-NUS Environmental Research Institute
Professor of Environmental Engineering
National University of Singapore

Date: Fri, 30 Jan 2009
Time: 4 pm
Venue: LT 20
Host: A/P Sanjay Swarup

