## The importance of macrophyte species selection in constructed wetlands: a review

**Jacques Brisson** and Florent Chazarenc

[1] Institut de Recherche en Biologie Végétale, Université de Montréal, Québec, Canada
*Email*: jacques.brisson@umontreal.ca, florent.chazarenc@univ-savoie.fr

*Phragmites australis*, *Typha* sp., *Phalaris arundinaceae* and *Scirpus lacustris* are among the most widely used species in constructed wetlands (CW). Choosing one for a specific CW is usually based on availability, common practice, personal preferences or other criteria not directly related to removal efficiency. Yet, there is a growing number of experimental studies comparing performances between plants species of comparable life forms and sizes and several of them report significant differences. Should we pay more attention to macrophyte species selection? We reviewed experimental studies published in peer-reviewed journals on the effect of macrophyte species selection on pollutant removal in CW. The studies cover a wide range of macrophyte species, experimental approaches, climatic conditions (from tropical to cold-temperate) and types of effluent (domestic, industrial, etc.).

Frequent methodological limitations in these studies force caution in the interpretation of their results. Studies using microcosms are extremely useful for controlled, repeatable, well-replicated investigations. However, their small spatial scale does not necessarily reflect what occurs in nature (larger edge effects, larger temperature fluctuation, different plant development, etc.). Macrocosms and pilot-scale experimental wetlands better mimic real-scale conditions, but studies using this approach often suffer from a lack of replication. Yet, the fact that the majority of theses studies, irrespective of the scale of the experimental unit, found differences in efficiency between plant species sugg s that macrophyte species selection does matter. However, there is little generalization to be made that couia nelp guide species selection for constructed wetlands, except for the exact conditions in which the experiments were done. For example, the same pair of species that was tested in different studies occasionally gave opposite results in terms of which one did best. More studies are needed to determine the mechanisms or plant properties that could explain differences in plant efficiency.

## Mobility of environmentally significant elements in actual acid sulfate soils, East Trinity, Cairns

**John Broughton** and Bernd Lottermoser

School of Earth Sciences, James Cook University, Cairns 4870 Australia
*Email*: John.Broughton@jcu.edu.au ; Bernd.Lottermoser@jcu.edu.au

Tidal exchange is used to rehabilitate actual acid sulfate soils at East Trinity, Cairns, Queensland. This study reports on the mobility of environmentally significant elements (Al, As, Ba, Co, Cu, Fe, Mn, Ni, Pb, Zn) in actual acid sulfate soils during reflooding. Variations in element concentrations with soil depth were assessed by sampling actual, reflooded actual and potential acid sulfate soils (AASS, RAASS and PASS, respectively). Samples were geochemically characterised by XRF methods. Laboratory experiments were conducted to establish mobility of elements during PASS oxidation. The isocon technique used mathematical methods to ascertain element losses and gains during mass transfer processes. Laboratory experiments identified Al, Ba, Ti and Zr as relatively immobile during PASS oxidation. Using Al and Ti as the most suitable immobile element pair, isocon analysis confirmed Ba and Zr immobility in both ASS profiles. In stark contrast, Mn, Co, Ni and Zn were lost in significant quantities from the upper parts of the AASS and RAASS profiles, reflecting their pronounced mobility during PASS oxidation. Arsenic, Cu and Pb were enriched in upper parts of both profiles, likely due to limited mobility and subsequent fixation of these elements in topsoils during AASS formation. Iron displayed marked enrichment in the upper part of the AASS profile, but no enrichment was observed in the RAASS profile, suggesting a complex pattern of Fe enrichment during AASS formation and remobilization during reflooding. The results demonstrate that individual elements are largely immobile (Al, Ba, Ti, Zr) or mobile (Co, Cu, Mn, Ni, Pb, Zn) during PASS oxidation and that tidal exchange is associated with limited remobilisation of Fe from AASS. Thus, the applied remediation technique at East Trinity inhibits the release of environmentally significant elements; yet the process partly mobilises Fe in AASS by reductive dissolution of ferric oxides upon tidal flooding.