

Contents

Keynote Papers

- 1 **Fundamental processes within natural and constructed wetland ecosystems: short-term versus long-term objectives** R.G. Wetzel
- 9 **Plants as ecosystem engineers in subsurface-flow treatment wetlands**
C.C. Tanner
- 19 **State of the art for animal wastewater treatment in constructed wetlands**
P.G. Hunt and M.E. Poach,
- 27 **Surface flow (SF) treatment wetlands as a habitat for wildlife and humans**
R.L. Knight, R.A. Clarke, Jr. and R.K. Bastian

Phosphorus removal and transformations

- 39 **The use of macrophyte-based systems for phosphorus removal: an overview of 25 years of research and operational results in Florida** T.A. DeBusk,
F.E. Dierberg and K.R. Reddy
- 47 **Media selection for sustainable phosphorus removal in subsurface flow constructed wetlands** H. Brix, C.A. Arias and M. del Bubba
- 55 **Phosphorus removal from trout farm effluents by constructed wetlands**
Y. Comeau, J. Brisson, J.-P. Réville, C. Forget and A. Drizo
- 61 **The Impact of biomass harvesting on phosphorus uptake by wetland plants**
S.-Y. Kim and P.M. Geary
- 69 **Phosphorus retention capacity of iron-ore and blast furnace slag in subsurface flow constructed wetlands** B. Grüneberg and J. Kern
- 77 **The removal of nutrients from plant nursery irrigation runoff in subsurface horizontal-flow wetlands** T.R. Headley, D.O. Huett and L. Davison
- 85 **Removing filterable reactive phosphorus from highly coloured stormwater using constructed wetlands** M.A. Lund, P.S. Lavery and R.F. Froend
- 93 **Environmental impacts to the Everglades ecosystem: a historical perspective and restoration strategies** M.J. Chimney and G. Goforth
- 101 **Phosphorus removal from Everglades agricultural area runoff by submerged aquatic vegetation/limerock treatment technology: an overview of research** B. Gu,
T.A. Debusk, F.E. Dierberg, M.J. Chimney, K.C. Pietro and T. Aziz
- 109 **Evaluation of phosphorus retention in a South Florida treatment wetland**
M.K. Nungesser and M.J. Chimney
- 117 **The Everglades Nutrient Removal Project Test Cells: STA optimization – status of the research at the north site** J. Majer Newman and T. Lynch
- 123 **Progress in the research and demonstration of Everglades periphyton-based stormwater treatment areas** J.S. Bays, R.L. Knight, L. Wenkert, R. Clarke and S. Gong
- 131 **Performance of a recirculating wetland filter designed to remove particulate phosphorus for restoration of Lake Apopka (Florida, USA)** M.F. Coveney,
E.F. Lowe and L.E. Battoe

Nitrogen removal and transformations

- 137 **Nitrogen removal in a combined system: vertical vegetated bed over horizontal flow sand bed** S. Kantawanichkul, P. Neamkam and R.B.E. Shutes
- 143 **Nitrogen and phosphorus budget in rewetted fens** A. Lenz and U. Wild

- 149 **Nutrient removal in subsurface flow constructed wetlands for application in sensitive regions** H. Rustige and Chr. Platzer
- 157 **Distribution of ammonium-N in the water-soil interface of a surface-flow constructed wetland for swine wastewater treatment** A.A. Szögi and P.G. Hunt
- 163 **Denitrification in free water surface wetlands receiving carbon supplements** P.S. Burgoon
- 171 **Removal of nutrients from combined sewer overflows and lake water in a vertical-flow constructed wetland system** L. Gervin and H. Brix

Pathogen removal

- 177 **Microbial indicator removal in on-site constructed wetlands for wastewater treatment in the southeastern US** E.C. Barrett, M.D. Sobsey, C.H. House and K. D. White
- 183 **Removal of bacterial indicators and pathogens from dairy wastewater by a multi-component treatment system** M.M. Karpiscak, L.R. Sanchez, R.J. Freitas and C.P. Gerba
- 191 **Protozoan predation as a mechanism for the removal of *Cryptosporidium* oocysts from wastewaters in constructed wetlands** R. Stott, E. May, E. Matsushita and A. Warren
- 199 **Distribution and retention of faecal coliforms in the Nakivubo Wetland in Kampala, Uganda** F. Kansiime and J.J.A. van Bruggen
- 207 **Bacterial dynamics in the sub-surface constructed wetland** J. Vymazal, J. Balcarová and H. Doušová
- 211 **Biota participating in wastewater treatment in a horizontal flow constructed wetland** J. Vymazal, V. Sládeček and J. Stach
- 215 **Removal of *Salmonella* and microbial indicators in constructed wetlands treating swine wastewater** V.R. Hill and M. D. Sobsey
- 223 **Occurrence and die-off of indicator organisms in the sediment in two constructed wetlands** T.A. Stenström and A. Carlander

Optimization and modeling

- 231 **Performance modeling of subsurface-flow constructed wetland systems** M.F. Dahab, R.Y. Surampalli and W. Liu
- 237 **Modelling nitrogen transformations in surface flow wastewater treatment wetlands in Sweden** S. Kallner and H.B. Wittgren
- 245 **The influence of water table fluctuations on nutrient dynamics in the rhizosphere of Common Reed (*Phragmites australis*)** O. Urbanc-Berčič and A. Gaberščik
- 251 **Thermal environments of subsurface treatment wetlands** R.H. Kadlec
- 259 **Cold climate wetlands: design and performance** S. Wallace, G. Parkin and C. Cross
- 267 **Behavior of organic carbon during subsurface wetland treatment in the Sonoran Desert** D.M. Quanrud, M.M. Karpiscak, K.E. Lansey and R.G. Arnold
- 273 **Development of a conceptual model for vertical flow wetland metabolism** E. Giraldo and E. Zárate
- 281 **Accumulation of organic matter fractions in a gravel-bed constructed wetland** L. Nguyen

Ecological considerations

- 289 **Determining ecologically acceptable nutrient loads to natural wetlands for water quality improvement** L.W. Keenan and E.F. Lowe
- 295 **Surmounting the engineering challenges of Everglades restoration** G.F. Goforth
- 303 **Changes in plant biomass and nutrient removal over 3 years in a constructed wetland in Cairns, Australia** M. Greenway and A. Woolley

- 311 **Performance of two macrophyte species in experimental wetlands receiving variable loads of anaerobically treated municipal wastewater** D.M.L. da Motta Marques, G.R. Leite and S.G.T. Giovannini
- 317 **Ecological characteristics of a natural wetland receiving secondary effluent** J.R. Martin, R.A. Clarke, Jr. and R.L. Knight
- 325 **Protection of surface water against contamination by wetland systems in Poland** H. Obarska-Pempkowiak, T. Ozimek and W. Chmiel
- 331 **Natural wastewater treatment in Hungary** A. Szabó, A. Osztóics and F. Szilágyi
- 339 **Constructed wetlands for wastewater treatment in central Italy** G. Conte, N. Martinuzzi, L. Giovannelli, B. Pucci and F. Masi

Subsurface flow wetland systems

- 345 **Residential subsurface flow treatment wetlands in northern Minnesota** R. Axler, J. Henneck and B. McCarthy
- 353 **On-site domestic wastewater treatment by reed bed in the moist subtropics** L. Davison, T. Headley and M. Edmonds
- 361 **Removal of hydrogen sulphide BOD from brackish water using vertical flow wetlands in a Caribbean environment** E. Giraldo and E. Zárate
- 369 **Constructed wetlands for wastewater treatment in the Czech Republic** J. Vymazal
- 375 **Subsurface-flow constructed wetlands treatment in the plains: five years of experience** M.F. Dahab and R.Y. Surampalli
- 381 **Application of constructed wetlands for wastewater treatment in Nepal** R.R. Shrestha, R. Haberl, J. Laber, R. Manandhar and J. Mader
- 387 **Experimental results on constructed wetland pilot system** J.M. González, G. Ansola and E. Luis
- 393 **Reed beds: constructed wetlands for municipal wastewater treatment plant sludge dewatering** J.S. Begg, R.L. Lavigne and P.L.M. Veneman
- 399 **Reciprocating constructed wetlands for treating industrial, municipal and agricultural wastewater** L. Behrends, L. Houke, E. Bailey, P. Jansen and D. Brown
- 407 **Zero-discharge of nutrients and water in a willow dominated constructed wetland** P. Gregersen and H. Brix

Surface flow wetland systems

- 413 **Long-term performance summary for the Boot Wetland Treatment System** J.R. Martin, C.H. Keller, R.A. Clarke, Jr. and R.L. Knight
- 421 **Diel changes in iron concentrations in surface-flow constructed wetlands** R.R. Goulet and F.R. Pick
- 427 **Wastewater treatment by algal turf scrubbing** R. Craggs
- 435 **Retarding capacity of a constructed wetland treatment system** J.A. Jackson and M. Sees

Industrial wastewaters

- 441 **Treatment of a molasses based distillery effluent in a constructed wetland in central India** S.K. Billore, N. Singh, H.K. Ram, J.K. Sharma, V.P. Singh, R.M. Nelson and P. Dass
- 449 **Use of constructed wetlands for acid mine drainage abatement and stream restoration** F.J. Brenner
- 455 **Nutrient and heavy metal uptake and storage in constructed wetland systems in Arizona** M.M. Karpiscak, L.R. Whiteaker, J.F. Artiola and K.E. Foster
- 463 **Retention of selected heavy metals: Cd, Cu, Pb in a hybrid wetland system** H. Obarska-Pempkowiak

- 469 **The integration of constructed wetlands into a treatment system for airport runoff**
D.M. Revitt, P. Worrall and D. Brewer
- 477 **Investigation of copper adsorption to peat using the simple metal sorption model**
S. Dierks
- 485 **Design and performance of experimental constructed wetlands treating coke plant effluents** N. Jardinier, G. Blake, A. Mauchamp and G. Merlin
- 493 **The effect of refinery effluent on the aquatic macrophytes *Scirpus californicus*, *Typha subulata* and *Zizaniopsis bonariensis*** A.R. Campagna and D. da Motta Marques
- 499 **Treatment of laboratory wastewater in a tropical constructed wetlands comparing surface and subsurface flow** A.A. Meutia
- 507 **Heavy metal contents and mobility of artificially inundated grassland along River Weser, Germany** C. Erber and P. Felix-Henningsen
- 515 **Tolerance toward explosives, and explosives removal from groundwater in treatment wetland mesocosms** E.P.H. Best, J.L. Miller and S.L. Larson

Agricultural wastewaters

- 523 **A constructed surface flow wetland for treating agricultural waste waters** M. Borin, G. Bonaiti, G. Santamaria and L. Giardini
- 531 **Treatment of stormwater runoff from row crop farming in Ruskin, Florida**
B.T. Rushton and B.M. Bahk
- 539 **Evaluation of atrazine removal processes in a wetland** C.M. Kao, J.Y. Wang and M.J. Wu
- 545 **Treatment of swine wastewater in marsh-pond-marsh constructed wetlands**
G.B. Reddy, P.G. Hunt, R. Phillips, K. Stone and A. Grubbs
- 551 **Reed bed dewatering of agricultural sludges and slurries** J.K. Edwards, K.R. Gray, D.J. Cooper, A.J. Biddlestone and N. Willoughby
- 559 **Using wetlands for water quality improvement in agricultural watersheds; the importance of a watershed scale approach** W.G. Crumpton

Stormwater

- 565 **Stormwater treatment: do constructed wetlands yield improved pollutant management performance over a detention pond system?** H.J. Bavor, C.M. Davies and K. Sakadevan
- 571 **An experimental constructed wetland system for the treatment of highway runoff in the UK** R.B.E. Shutes, D.M. Revitt, L.N.L. Scholes, M. Forshaw and B. Winter
- 579 **Performance of constructed wetland system for public water supply** J.M. Elias, E. Salati Filho and E. Salati
- 585 **Application of a constructed wetland for non-point source pollution control**
C.M. Kao, J.Y. Wang, H.Y. Lee and C.K. Wen
- 591 **Buffer zones promoting oligotrophication in golf course runoffs: fiddler crabs as estuarine health indicators** R.Y. George, G. Bodnar, S.L. Gerlach and R.M. Nelson
- 599 **River water quality improvement by natural and constructed wetland systems in the tropical semi-arid region of Northeastern Brazil** B.S.O. de Ceballos, H. Oliveira, C.M.B.S. Meira, A. Konig, A.O. Guimarães and J.T. de Souza
- 607 **Metals in combined conventional and vegetated road runoff control systems**
H. Pontier, J.B. Williams and E. May
- 615 **Nitrogen and phosphorus variation in shallow groundwater and assimilation in plants in complex riparian buffer zones** V. Kuusemets, Ü. Mander, K. Lõhmus and M. Ivask