

LERNZ Workshops

LERNZ would like to thank all those who took part in the recent workshops over two days in August. Approximately 80 end users attended the workshops. The LERNZ Annual Science Day was held on the first day of the workshop and was followed by a workshop dinner. We were especially pleased with the interest and enthusiasm from the large range of end users, and the feedback received will help to tailor future workshops to end user needs.

Particular thanks go to NIWA and AgResearch who sponsored the event and presented workshops.

Please contact Jo Faber if you would like to receive copies of workshop presentations and/or handouts: j.faber@waikato.ac.nz

Kudos Award

LERNZ would like to congratulate Professor David Hamilton who was presented with the Environmental Science Award at the Kudos Awards ceremony in September. The hallmarks of David Hamilton's scientific contributions over the past 20 years have been in inter-disciplinary understanding of lake water quality enabled by computer models and practical lake management initiatives.

Hamilton holds the inaugural Bay of Plenty Regional Council Chair in Lakes Management and Restoration at Waikato University, NZ. While at the Centre for Water Research, The University of Western Australia, Hamilton was the original architect of the model CAEDYM, which is now recognised around the world as the foremost system-level ecological model for predictions of water quality in lakes and reservoirs.

Welcome

LERNZ would like to welcome two new people.

Sascha Kochendörfer has joined LERNZ for six months as an intern from the Esslingen University of Applied Sciences in Germany. He will be working with Deniz Özkundakci on setting up a water quality model for Lake Rotokakahi.

Jasmine Whanga is conducting a mark recapture study and fish removal at Lake Kuwakatai this summer with the goal of improving water quality. A preliminary fish survey conducted at Lake Kuwakatai in 2011 showed minimal native species remain. The current fish population in lake Kuwakatai is dominated by small rudd, goldfish, koi carp and perch. Lake Kuwakatai is a closed system (dune lake).

that is severely degraded. Jasmine will be using baited traps, minnow traps, gill nets, baited pod traps and the electrofishing boat to remove fish from the lake.



Sascha Kochendörfer and Jasmine Whanga.

Modelling shifts between macrophyte and algal dominance in aquatic systems

Lake restoration modellers at the University of Waikato are working with Environment Southland on a suite of modelling tools to provide quantitative indicators to assess whether various management scenarios will meet goals for sustaining the natural values of the Waituna Lagoon ecosystem, a RAMSAR site in Southland. Ultimately the goal of the modelling is to provide a pathway of management to sustain an abundant and stable *Ruppia* population that supports higher levels of the lagoon's food web.

A process-based hydrodynamic-ecological model, DYRESM-CAEDYM, has been developed to include dynamic feedback between macrophyte biomass and resuspension. In shallow aquatic systems, land-use intensification that results in increased nutrient loading can result in a shift from macrophyte to algal dominance. Nutrient-stimulated increases in epiphytic algae and macroalgae can shade and stress macrophyte populations, and with further increases in nutrient supply, the macroalgae may be replaced by phytoplankton. This succession may be exacerbated by loss of physical stability of the shallower bed sediments as submerged macrophytes disappear, enhancing resuspension of both sediments and phytoplankton. Application of the model to a coastal lagoon elucidates the interactions between primary producers, resuspension, and biogeochemical cycles, and demonstrates that macroalgae are likely an important influence on macrophyte dynamics. Hannah Jones, who in 2011 completed her PhD study on estuarine benthic ecology has been integral to the development and application of the model.



Professor David Hamilton at Waituna Lagoon, Southland

Predicting nutrient excretion, and the development of a toxic bait to target koi carp

Koi carp are a highly invasive pest fish that have been linked to water degradation when they exist at high densities. LERNZ researcher, Dr. Dai Morgan has been working on two koi carp projects that are near completion. First, summer and winter experiments were conducted to determine whole-body and mass-dependent nutrient excretion rates. Furthermore, an allometric scaling model was successfully developed for these data so that excretion rates could be adjusted to account for the effect of water temperature. Accordingly, these results may be incorporated into models to quantify nutrient inputs into water bodies by koi carp, if density and size structure of the populations are known. The second project focuses on development of a bait to target koi carp. A pellet that floats, maintains its structural integrity in water, and is palatable to koi carp has been developed and tested. In addition, this pellet is also made from a high proportion of recycled products, and is relatively inexpensive to produce. Currently, experiments are being conducted to test the efficacy of toxic versions of these pellets to carp.

Dr. Morgan has recently had a motorcycle accident and aims to be back in the field around November, LERNZ wishes Dai a full recovery.

Conferences

Deniz Özkundakci attended the 2nd Lake Ecosystem Modelling Workshop at the Helmholtz Centre for Environmental Research in Leipzig, Germany, in June and presented a paper on integrating in-situ high frequency monitoring and remote sensing data in aquatic ecosystem modelling. He also attended the 11th International Conference on Modelling, Monitoring and Management of Water Pollution in New Forest, UK and presented a paper on parameterisation of sediment geochemistry for simulating water quality responses to long-term catchment and climate changes.

David Hamilton and **Kohji Muraoka** attended the 2012 Association for the Sciences of Limnology and Oceanography (ASLO) Aquatic Sciences Meeting (Lake Biwa, Otsu, Shiga, Japan) in July 2012. David presented a paper titled 'high-

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frequency phycocyanin measurements reveal inter-dependences of temperature stratification and cyanobacteria blooms'. Kohji presented as a co-author in a public symposium, the "World Water Crisis", and also presented a paper titled "coherence of lake thermal stability and net surface heat fluxes analysis supported by an integrated analysis software". Kohji also co-organized student activities at ASLO as well as a student workshop entitled "GLEON-PRAGMA Joint Workshop – Multidisciplinary Network Science Using Cutting Edge Technologies".

In July, **Dai Morgan** attended the Australian Society for Fish Biology meeting in Adelaide, Australia which was held as a joint meeting with the Oceana Chondrichthyan Society. Dai presented a poster on determining and testing the optimal pure-tone frequency for use in acoustic conditioning of common carp.

Kohji Muraoka attended a number of conferences recently including the 4th World Lake Student Meeting (Lake Biwa, Otsu, Shiga, Japan) in July 2012 where he presented a talk titled "Quantification of the retrospective stability variation using Symbolic Representation". Kohji co-organized a Global Lake Ecological Observatory Network (GLEON) Graduate Student Association (GSA) Cyber-Enabled Science Workshop (Trout Lake Station, Wisconsin, USA) in August 2012 and presented a session "systematic plotting using Matlab".

Recent Publications

Abell, J. M., Özkundakci, D., Hamilton, D. P and Jones, J. R. 2012. Latitudinal variation in nutrient stoichiometry and chlorophyll-nutrient relationships in lakes: A global study. *Fundamental and Applied Limnology* 181, 1-14.

http://www.schweizerbart.de/papers/fal/detail/181/78401/Latitudinal_variation_in_nutrient_stoichiometry_an

Hamilton, D. P., McBride, C.G., Özkundakci, D. Schallenberg, M., Verburg, P., de Winton, M., Kelly, D, Hendy, C., and Ye, W., 2012. Climate Change and Inland Waters: Impacts and Mitigation for Ecosystems and Societies. Goldman, C. R., Kumagai, M. and Robarts, R. D. (Eds.).

ISBN: 978-1-1199-6866-5

www.wiley.com/buy/1119968666

Oliver, R., Hamilton, D. P., Brookes, J. and Ganf, G. G., 2012. Physiology, blooms and prediction of planktonic cyanobacteria. In: Chapter 6, *Ecology of Cyanobacteria II: Their Diversity in Space and Time*. Whitton, Brian A. (Ed.). Springer, 760 pp.

<http://www.springer.com/life+sciences/ecology/book/978-94-007-3854-6>

In conjunction with Kohji Muraoka's involvement in the Global Lake Ecological Observatory Network (GLEON) Graduate Student Association (GSA), the 2nd issue of GLEON GSA newsletter was recently published: http://www.gleonrcn.org/media/GLEON_GSA_Newsletter_Isue_2_Sept_2012_final.pdf