LERNZ
Lake Ecosystem Restoration New Zealand

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Lifetime Achievement Award Warwick Silvester

Professor Warwick Silvester, who leads the Catchment Nutrient Load Models component of the LERNZ research, was recently awarded the inaugural Kudos Lifetime Achievement Award for his outstanding lifelong contribution to science.

Warwick is a plant physiologist by training and his research has focused on how the interactions of soil properties, microbes and plant roots influence the availability of nutrients for plant uptake. His pioneering work with stable isotopes, together with the establishment of the Waikato Stable Isotope Laboratory at the University of Waikato, is important to current areas of research within LERNZ. Warwick is also the Chair of the David Johnstone Pukemokemoke Trust, which is setting up a key ecological site in the Waikato and, as a member of the Tongariro/Taupo Conservation Board, chaired the development of the Tongariro National Park Management Plan. Warwick's research background, extensive experience in conservation, and breadth of knowledge provide valuable input to of the LERNZ programme for which he seeks to draw together research on groundwater modelling and climate change with our research partners, Geological & Nuclear Survey at Wairakei (with Paul White) and the International Global Change Institute at Waikato University (with Wei Ye).

Gary's departure

Sadly, we farewell Gary Whitehouse, our LERNZ Research Manager, who is taking some time out to renew his family connections over the next six months. Gary has been an amazing servant of the University of Waikato and the LERNZ team over several years. It is no secret that many University proposals would not have got up, and many projects never completed, without Gary's financial advice and attention to detail.

Gary played an integral role in our successful LERNZ bid with the Foundation of Research, Science and Technology, and his communication skills across researchers, administrators and funding providers will be sorely missed. As the external review groups in LERNZ will attest, the reports to them that Gary coordinates are extremely comprehensive. The LERNZ team wishes Gary all the best for his future endeavours.

Full scale restoration in Lake Okaro

Figure 1: Zeolite application (photo by Deniz Özkundakci)

One-hundred tonnes of zeolite, modified with a process developed by SCION, Rotorua, was applied to Lake Okaro in September. This phosphorus adsorbing material will cap the bottom sediments of the lake to reduce internal phosphorus loading during summer. A comprehensive monitoring program has been carried out by researchers from LERNZ, NIWA, SCION and the regional council, Environment Bay of Plenty. The research will identify the impact of sediment treatment on the lake ecosystem. **Deniz Özkundakci** is investigating the effects of the treatment on water quality as part of his PhD study at Waikato University. Results of this full scale restoration approach are expected by June 2008.

Ditte M. Forsmann (left) and **Anders Nielsen** (middle) are the "strong Vikings" from Denmark. They are studying environmental engineering at Aalborg University and are here for part of their Master's degree as research students under **Prof. David Hamilton**. They are using the DYRESM-CAEDYM model for studying the application of Phoslock™ to Lake Okareka. They are in New Zealand until January 2008. **Bram Mulling** (right) is a master's student in Limnology and Oceanography from the University of Amsterdam. Under the supervision of Prof. Hamilton he will be working on a rapid assessment technique for nutrient limitation of cyanobacteria using confocal microscopy and flow cytometry.

Liancong Luo (Figure 2, overleaf) joins LERNZ having arrived recently from the Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences (NIGLAS). He has a research background in meteorology and numerical modelling. He is currently working with Prof. David Hamilton as a post-doctoral fellow. His main area of work will be in development of DYRESM-CAEDYM and ELCOM-CAEDYM and the application of these models for simulation of water quality in New Zealand lakes with a focus on Lake Rotorua. As part of this work he will be running the models with a number of potential management scenarios, to predict their effect on water quality and to assist with lake management. He is very keen to share the experience of numerical model development and application with other scientists working in this field.

Figure2: From left to right Liancong Luo, Tim Meinke (The University of Wisconsin), Chris McBride and Guangwei Zhu (Tai Lake station).

Lake Taihu (China) Monitoring

Chris McBride and **David Hamilton** recently returned from Jiangsu Province, China, where they worked with the Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences (NIGLAS). The purpose of the trip was to install a real-time, web accessible meteorology and water quality monitoring station for Lake Taihu. The lake is four times the size of Lake Taupo and has a mean depth of just 2 m. The station was built in New Zealand by Chris, and successfully installed on a pier at the NIGLAS field station near Wuxi. A buoy was also constructed to enable the station to operate in different regions of the large lake. The Taihu station transmits data via GPRS modem to the same iQuest (NZ) data servers used by Waikato University's Lake Rotorua buoy. The Chinese hospitality was second to none, thanks to hosts **Liancong Luo** and **Guangwei Zhu** (NIGLAS). Thanks also to **Tim Meinke** (University of Wisconsin), who provided technical assistance, and to iQuest staff for their assistance.

Pest Fish Pheromones

Nick Ling attended the 2nd International Conference on Bioactive Water-borne Chemicals: Pheromones and Welfare Indicators in Fish in Faro, Portugal, in September. Several research groups attending this meeting, including the University of Waikato, are investigating the use of pheromones to enhance the capture of a variety of nuisance fish (e.g., lamprey, round goby, and common carp) and crustaceans (mitten crab and signal crayfish). **Emma Joss** is continuing with her MSc research stimulating the release of pheromone by gonadotrophin induction. Induced fish are then restrained in a net to attract other fish. These netting trials have started using catfish and will continue with goldfish, rudd and carp.

The kakahi (freshwater mussel; *Hyridella menziesi*) in a general framework of lake health - Lake Rotokakahi

This study focuses on the mauri (life force), current water quality status and kakahi (*Hyridella menziesi*) population of Lake Rotokakahi, a private lake under guardianship of the Ngati Wahiao and Ngati Tumatawera tribes.

A 12-month water quality monitoring programme was initiated in September 2006 to update previous monitoring by Environment Bay of Plenty, which was discontinued in 1996. As the name suggests, Lake Rotokakahi has abundant supplies of kakahi and once formed an integral part of the diet of tangata whenua who lived around the lake shores. However in the past decade numbers of this taonga species appear to be decline. Kakahi numbers were examined in relation to environmental variables, in order to examine key parameters limiting their distribution. Previous and current data suggests that in late summer the hypolimnion becomes anoxic which could be a major factor limiting kakahi distribution in the lake. Modelling has also been utilised to simulate the interacton between lake ecosystem dynamics and kakahi populations. In addition, various oral histories have been recorded from kaumatua of Ngati Wahiao/Ngati Tumatawera. These histories provide a record of taonga species from the lake including the kakahi, historical sites, and past issues impacting on present water quality conditions. Joseph is supervised by David Hamilton (University of Waikato) and Ngaire Phillips (NIWA).

Selected Publication

Bailey S.A., Duggan, I.C. & MacIsaac, H.J. (2007), Sediments in ships: biota as biological contaminants. Aquatic Ecosystem Health and Management 10: 93-100.

Burger, D.F., Hamilton, D.P., Hall, J.A. and Ryan, E.F., 2007: Phytoplankton nutrient limitation in a polymictic eutrophic lake: community versus species-specific responses. *Archiv für Hydrobiologie* 169(1): 57-68.

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Hamilton, D., Pearson, L., Hendy, C., Burger, D., McCarthy, M. and Healey, T., 2007. Historical and contemporary perspectives on the sediments of Lake Rotorua. *New Zealand Geological Society Newsletter* 143: 7-13.

Hicks, B.J., H.J. Bannon, and R.D.S. Wells. 2006. Fish and macroinvertebrates in lowland drainage canals with and without grass carp. *Journal of Aquatic Plant Management 44*: 89-98.

Tempero, G.W., N. Ling, B.J. Hicks, M.W. Osborne. 2006. Age composition, growth, and reproduction of koi carp (*Cyprinus carpio* L.) in the lower Waikato, New Zealand. *New Zealand Journal of Marine and Freshwater Research 40*: 571-583.

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