

## **LakeCast: Enhancing lake ecosystem management with multisource integrated data and ecological forecasts – two PhD positions**

We are seeking *two* enthusiastic and highly motivated students for a fully funded PhD project to develop ecological forecasts to serve as decision support tools as part of our recently funded programme ‘*LakeCast*’ project. Lakes are under increasing pressure from multiple stressors, yet we lack methods pre-emptively identify lake water quality impairments such as algal blooms, often impeding management efforts. By leveraging abundant water-quality data and advances in sensor fusion and ecological forecasting theory, we will develop accurate forecasts and actionable insights for regional councils and iwi.

We are recruiting a cohort of two PhD students who will work closely together on this project, each with a distinct focus. One position will focus largely on developing novel machine learning algorithms using diverse high-frequency sensor datasets, and will be mentored by engineers and computer scientists at the University of Waikato. The second position will be centred on lake ecology, using data science techniques to develop statistical and mechanistic modelling approaches, and will be mentored by freshwater ecologists and computational limnologists. The students will form part of a collaborative team to develop actionable decision-making tools to support freshwater management.

**Background:** Traditionally, lake monitoring has occurred at heterogeneous spatial and temporal scales, hindering data synthesis and ecosystem modelling. This project will integrate machine learning techniques with ecosystem models and rich sensor datasets to develop robust predictive tools for freshwater management of lakes.



**About the project:** The successful candidate(s) will develop predictive models and decision-relevant ecological forecasts to improve understanding of lake ecosystem dynamics and freshwater management in New Zealand. This will involve synthesizing diverse water quality monitoring data including ongoing long-term datasets, community-driven cyanobacteria data, and high-frequency sensor data to build and test ecological forecasts of water quality. The candidate will be expected to participate in field work deploying and maintaining autonomous water quality monitoring buoys and conducted near-shore sampling using handheld sensors.

**About the candidate (PhD in Engineering):** We are looking for a candidate with a background in sensing, measurement, and applied machine learning. The ideal candidate would be proficient in Python and C, and understand sensor data acquisition and preprocessing, and machine learning modelling methods. Candidates must have a relevant Bachelor of Engineering (Honours) or Master by Research degree in Electrical and Electronics, or Electronics, or Software.

**About the candidate (PhD in Science):** We are looking for a candidate with a background in data science and lake ecology. The ideal candidate would also be proficient in R (or comparable software) and understand data manipulation and statistical, process-based, or

machine learning modelling methods. Candidates must have a relevant Bachelor's degree with honours or Master's degree.

**What we offer:** The successful candidates will be under the supervision of Associate Professors Deniz Özkundakci and Melanie Ooi, and Dr. Whitney Woelmer at the University of Waikato and based in Hamilton, New Zealand. They will work closely with Te Ipu o Te Mahara Artificial Intelligence Institute, Te Arawa Lakes Trust, the Bay of Plenty Regional Council, and Toi Te Ora Public Health to develop decision-relevant tools. Precise topics and methods will be determined in collaboration with the successful candidate and a range of stakeholders including regional council, iwi, computer scientists, and freshwater ecologists. You will be supported by the wider team in opportunities to conduct fieldwork, liaise with stakeholders, leverage data science resources at the University of Waikato, and participate in collaborative team meetings.

We offer a competitive stipend and cover all fees (NZ\$35,000 stipend + tuition fees per year for three years). Being based in Hamilton offers a great lifestyle with a diverse range of cultural activities and access to many natural beauties of New Zealand, featuring the Waikato River - the longest river in New Zealand, lush forests, rich farming countryside, black sand beaches, underground caves, world-class surf breaks, and access to mountains.

For any additional information on the technical aspects of these opportunities, please contact Deniz Özkundakci ([deniz.ozkundakci@waikato.ac.nz](mailto:deniz.ozkundakci@waikato.ac.nz)) or Melanie Ooi ([melanie.ooi@waikato.ac.nz](mailto:melanie.ooi@waikato.ac.nz)). Candidates should submit an application to [kim.pritchard@waikato.ac.nz](mailto:kim.pritchard@waikato.ac.nz), indicating which of the two PhD positions you are applying for (specify "engineering" or "lake science"). This must include a complete CV, academic transcripts, and a letter containing the following information - motivation for applying, research interests and experience, and the name and contact details of two or more academic referees is required. Applications received on or before 15 November 2024 will be considered. The successful applicants will be expected to take up the position no later than February 2025.

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