MSc Scholarship Available

Climate Change Impacts on Heavy Metal Mobilisation in Lake Sediments

Te Arawa Lakes Trust alongside NIWA and the University of Waikato are seeking applicants for the Whakahohetia Ngā Wai Kāinga focus study as part of the Toitū Ngā Taonga Waimāori research programme.

Whakahohetia Ngā Wai Kāinga is a focus study that aims to support Te Arawa's place-based prioritisation and implementation of adaptation interventions that will support the resilience of taonga species and iwi/hapū communities under a changing climate.

Project Overview

This MSc study will focus on how climate change-driven shifts in lake thermal structure and oxygen dynamics influence the mobilisation of heavy metals from lake sediments. The study will focus on two contrasting lakes—Lake Rotorua and Lake Ōkaro—which differ in their mixing regime and sediment composition.

Using benthic chamber experiments (Figure 2), the project will measure heavy metal fluxes under anoxic (low to no oxygen) conditions and provide data to establish relationships between bottom-water temperature, pH, oxygen concentration, and metal mobilisation. The results will be integrated into existing lake ecosystem models to simulate climate change effects on metal cycling and potential toxicity risks for people and mahinga kai.

Figure 2: example of benthic chamber set up for measuring fluxes across the sediment-water interface

Key research objectives

1. **Quantification of heavy metal fluxes from sediments**
    - Deploy benthic chambers in Lakes Rotorua and Ōkaro to capture sediment-water fluxes of key heavy metals (e.g., arsenic, lead, cadmium, mercury).
    - Conduct in situ measurements under varying oxygen conditions, focusing on anoxic and hypoxic events that are expected to become more frequent with climate change.
    - Analyse heavy metal concentrations in bottom water samples over time to determine sediment release dynamics.
2. **Metal speciation and toxicity assessment**
    - Perform detailed chemical analysis of heavy metals, including speciation (e.g., free ions, organic complexes, oxidised vs. reduced forms) to better understand bioavailability and toxicity.
    - Assess the influence of changing pH, redox potential, and dissolved organic matter on metal speciation.
3. **Integration of findings into lake ecosystem models**
    - Implement empirical relationships into existing lake ecosystem models to simulate climate change-driven changes in metal cycling.
    - Model future climate scenarios to assess risks of increased metal mobilisation under warming and more prolonged stratification.

About this MSc opportunity

Our team is seeking a highly motivated and skilled MSc candidate to work on this collaborative project with the University of Waikato and Te Arawa Lakes Trust.

The successful candidate will have an undergraduate degree in ecology or environmental science. Good written communication skills are desired. You will be conscientious, detail oriented, hard-working, eager to do field work, and have a positive attitude.

MSc supervision will be provided by Associate Professor Deniz Ozkundakci, with support from Te Arawa Lakes Trust where needed.

Entry Requirements

To be eligible, you need to meet the enrolment requirements of the University of Waikato. Ideally you will be ready to commence study as soon as possible. At Te Whare Wānanga o Waikato, the University of Waikato, we embrace equity and diversity; therefore, we strongly encourage applicants with the relevant capabilities from all backgrounds to apply.

Scholarship details

Value & direction

To provide financial support throughout this MSc journey the successful candidate will receive a stipend of NZ$20,000 per year (over 2 years), plus tuition fees fully covered.

Te Whare Wānanga o Waikato will provide access to world-class research facilities and opportunities for professional development.

Location

The successful candidate will be based at Te Whare Wānanga o Waikato in Hamilton.

Application process

To apply for this opportunity, please submit the following documents to Deniz Ozkundakci (deniz.ozkundakci@waikato.ac.nz):

- A letter outlining your motivation for applying for this MSc opportunity (maximum 2 pages).
- Your comprehensive CV, highlighting your achievements and relevant experience.
- Contact details for at least two referees.
- Academic transcripts may be requested to demonstrate your educational background and eligibility for this opportunity.

Review of applicants begins as soon as possible and will continue until the vacancy is filled. Deniz Ozkundakci will let you know whether you have been shortlisted for this vacancy and will advise you of the next steps.

Interviews will be conducted either in person or via video conferencing from a selection committee. The successful applicant will be guided through the full Masters enrolment application at the University of Waikato.

Key contacts

Deniz Ozkundakci – deniz.ozkundakci@waikato.ac.nz