



## **PhD Project in New Zealand: Modelling Coastal Wetland Response to Sea Level Rise**

We are looking for suitable qualified applicants to work on a fully-funded PhD Project in New Zealand. The project is part of the new multi-institutional programme lead by the National Institute of Water and Atmospheric Research (NIWA) called “Future Coasts Aotearoa”. The overall objective of the programme is to identify whole-of-system pathways for adaption of coastal lowlands to sea level rise (SLR) across social and cultural well-beings, economic systems and natural environments. into the future. This PhD project opportunity is associated with projecting coastal wetland habitat evolution and response under a range of SLR scenarios and the influence of other key drivers (e.g., sediment supply, vertical land motion) through observations and modelling. This work will also investigate coastal wetland carbon sequestration to inform opportunities for offsetting adaption costs (lead by Dr Andrew Swales).

**Details on project scope:** There are a number of different models available to model wetland behaviour across various spatiotemporal resolutions. These range from fully-dynamical hydrodynamic and sediment models coupled to complex ecosystem models, to models that simplify the hydrodynamics, simplify the ecosystem models, or simplify both (e.g. bathtub, profile and 0-D models). Although it is well recognised that tidal and surge attenuation, asymmetry and channelization can give quite different results in long term predictions, computational cost means that it is difficult to scale these beyond local settings. Detailed models are also associated with a large parameter space which can make both calibration, sensitivity analysis, and ascertaining uncertainty in model projections difficult. Although quick to run and scalable, simplified models are generally not well cross-validated with more complex models. The PhD project could fill this niche in the coastal wetland modelling field by combining dynamical modelling with our high-quality data sites from around NZ with a focus on discerning a modelling approach management-ready and scalable by exploring which complexities are necessary for the level of accuracy needed for coastal management. The details of the modelling approach are still to be decided, but would probably use a combination of Delft3D and WARMER (Wetland Accretion Rate Model of Ecosystem Resilience developed at USGS).

### **Skills:**

-These is mostly a computer modelling project and so the student must have experience in coding either Matlab or Python, and R would be useful (WARMER is written in R). Our PhDs are only 3 years long and there is not sufficient time to learn these skills.

- a MSc or BSc(Hons) with at research thesis component of 0.5 years or longer in a related field.
- a grade point average of B+ or higher.
- evidence of English language proficiency (IELTS $\geq$ 6.5).
- ability to start in 2022.

### **Proposed Supervisors:**

The supervision panel will be Prof Karin Bryan (University of Waikato), Dr Andrew Swales (NIWA) and Dr Joel Carr (USGS), and there will be plenty of opportunity to interact with the wider team.

Karin: <https://scholar.google.com/citations?user=MaBHbpUAAAAJ>

Andrew: <https://scholar.google.com/citations?user=SfGOso4AAAAJ>

Joel: <https://scholar.google.com/citations?user=KSOM75YAAAAJ>

### **Application:**

Please send CV and a cover letter to: [Karin.bryan@waikato.ac.nz](mailto:Karin.bryan@waikato.ac.nz). The position is open until filled, but we will look at applications at the beginning of April 2022.