Mapping UNSW Impact

Global Development

Primary SDG	**12: RESPONSIBLE CONSUMPTION AND PRODUCTION**
Broad theme	Disaster risk management
Research	Predicting coastal storm risks and mapping hazard areas, investigating wastewater contamination
Impact region	Cook Islands, Pacific Islands
Faculty	Engineering
School/Institute	Water Research Laboratory, School of Civil and Environmental Engineering
Academics	Matt Blacka
Project partners	Mapping storms: Australian Government – $300,000 in funding, Cook Island Government
	Waste management: NZ Government – $200,000 in funding, Cook Island Government
Related SDGs	13: Climate Action
	15: Life On Land

Elevator pitch

Matt has improved the prediction of storm surge and coastal hazard impacts on Pacific Island coasts, helping the Cook Islands to plan better and save houses. He is now evaluating the environmental impacts of wastewater pollution in coastal lagoon areas, helping to sustain tourism as the leading economic sector.

The Challenge: Increasing storm intensity, waste from unsustainable development

Extreme storms and cyclones are becoming more intense due to climate change. With many Pacific Island communities living close to sea level, wave and storm surge hazards from these events have the potential to severely impact houses, infrastructure and lives.

Due to rapid growth in tourism, the natural coastal environment of the Cook Islands is under pressure. The management and disposal of wastewater, as well other catchment activities such as land clearing and agriculture, are damaging water quality in coastal lagoons and the marine ecology. This in turn is impacting local communities who depend on the lagoons for food, income and recreation.

UNSW's solution: Map storm hazard areas, investigate wastewater management and responses

In 2014-15, Matt investigated coastal hazards and the potential risks for different developed areas around the Cook Islands from storm impacts. This included researching storm activity and the potential increase in waves and water levels, surveying developed areas, coastal geomorphology, and coastal processes. Matt also undertook detailed modelling in the wave tanks to simulate storm scenarios, understand climate change impacts and map risk zones to identify at-risk development. This information was provided to various

government agencies through community engagement sessions and continues to inform the government's planning and urban management decisions. Learnings from this project have been embedded in UNSW's engineering research programs, and Matt often shares his knowledge with NGOs and government groups in the Cook Islands.

Since the start of 2018, Matt has been working with the Cook Islands Government to understand environmental impacts and develop improved wastewater management systems in the Muri community on Rarotonga. He is collecting data to understand environmental impacts of existing wastewater disposal systems, and to contribute to the design of improved treatment and disposal options. Most of this field work is helping to build an overall ridge-to-reef picture of how contaminants move from the catchment, through the groundwater system and finally into the lagoon, and the impact this is having on the lagoon's ecosystems. Matt is also investigating the possibility of an ocean outfall for a more sustainable long term disposal of treated wastewater.

The Impact: Assist government to manage disaster risks, preserve environment areas

Matt's work on mapping coastal hazard impacts for the islands informs the day to day planning and development decisions of the Cook Island Government. It also helps the government to better plan for infrastructure long term and reduce the risks of disaster at infrastructure, community and emergency management levels. More broadly his research improves forecasting and prediction methods for the impacts from coastal hazards, such as storm surge.

The work on wastewater management is helping to limit damage to coastal ecosystems and to inform the development of improved wastewater management infrastructure. Eventually this work will support more sustainable tourism and the broader benefits this brings to local communities and the economy.

Researcher

Matt Blacka is a Principal Coastal Engineer at the Water Research Laboratory. He has over 15 years of applied experience leading projects in the fields of coastal processes and hazards, estuary processes, coastal structures and coastal climate change adaptation in Australia, New Zealand and the Pacific Islands. He is a member of the Engineers Australia NSW Coastal, Ocean and Port Engineering Panel (COPEP), a member of the IUCN Commission on Ecosystem Management (Oceania), and a member of the Pacific Islands Science Technology and Resources Network. Matt's background in Civil Engineering combined with his passion for the natural coastal environment allow him to bring a considered but technical approach to his work across the region.

Ben Falkenmire 23.07.18