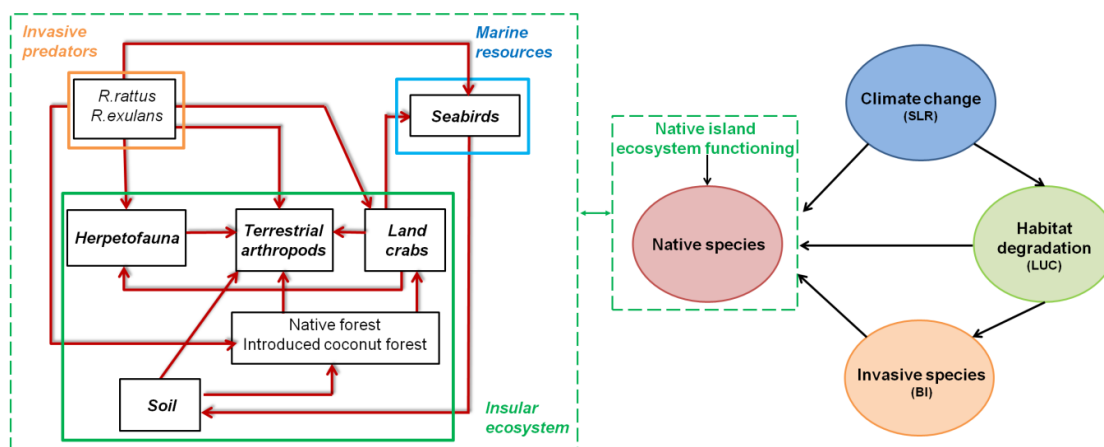


Insular community resilience to global change

Summary: Islands are global hotspots for biodiversity but extremely vulnerable to the combined effects of climate change and species invasions. The small motu of Tetiaroa atoll provide a living laboratory to replicate studies of how native species such as seabirds and crabs will respond to invasions by pest rats and plants. Our project will carry out studies to investigate the most appropriate management actions The Brando can undertake in order to protect the native species of Tetiaroa from further disturbance by invasive species and climate change, culminating in rat eradication from the atoll.

Background: Islands are vulnerable to biological invasions, land use change and sea level rise. Their interaction and cumulative impacts remain uncharacterized, because comparison across islands is difficult. Using motu of Tetiaroa atoll with differing invasive and native keystone species occurrence, we will characterize the trophic levels and interactions to model a generalized archipelago community food-web. This will be achieved by combining field ecology, molecular and isotopic analyses, environmental biogeochemistry and ecological modeling in a multi-disciplinary approach. This will provide a general model of island ecosystem functioning, describing the complexity of biotic and abiotic linkages, ecological processes and causal interaction pathway that assemble the different components of the ecosystem. Then, we will simulate how island ecosystems could respond to the introduction of invasive predators, land use change and sea level rise and predict how the losses of native species and functional groups will directly and indirectly influence ecosystem properties and persistence. This will allow us to test the effect of different conservation managements, and their potential cascading effects on insular ecosystem resilience using a whole ecosystem approach.



Expected interactions between ecosystem compartments (left) and global change drivers (right).

Outcomes: The major outcome of this research will be a road-map for prioritising management interventions to conserve the unique fauna of Tetiaroa. Important management actions include control or eradication of rats from Tetiaroa, management of coconut plantation forest, and coastal protection from projected sea level rise.

Research team: The research team will be led by Tetiaroa Society Scientific Advisory Board and Conservation and Sustainable Use Plan committee member Dr. James Russell. Dr. Russell is a Professor at the University of Auckland, New Zealand and recognised globally for his contributions to terrestrial island conservation. He has worked on Tetiaroa since 2009 studying the terrestrial ecosystem and published a number of important papers addressing the management of pest species on Tetiaroa and the conservation of seabirds on the atoll.

Funding requested: US\$150,000 to cover salary for a scientist based at Tetiaroa eco-station and laboratory analyses (genetics, stable isotopes and soil geochemistry).



Rats are a major threat to seabirds and human health on Tetiaroa atoll.