Ecoadapt Pacific
2019-2020 Annual Report

The Benefits of Ecosystem-based Approaches for Climate Change in Least Developed Countries

Griffith UNIVERSITY

Griffith Climate Change
Response Program
March 2020

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Project Overview

The EcoAdapt project is designed to address three primary research questions, that have been updated over the past 12 months:

1. What constitutes an ecosystem-based approach to climate change adaptation?

2. How do the differing social and economic contexts in the Pacific impact the outcomes for ecosystems when selecting climate change adaptation responses in the coastal zone?

3. What information and decision support processes are required by stakeholders to adopt an ecosystem based approach to adaptation?

To address these questions, our research is organised around five themes, each of which has a set of secondary research questions that they are exploring (Appendix 1). The five themes are: (1) Coastal Process; (2) Risk Assessment of Adaptation Options; (3) Micro-economic Benefit-cost Analysis; (4) Policy & Social Analysis; and (5) Project Integration, Ecosystems and Climate Change Analysis.

The geographic foci of our research is Tanna Island in the Tafea Province of Vanuatu

Case Study Location

Director's Review

As our EcoAdapt project comes to the end of its fourth year, I am pleased to report that our research team has again increased both engagement with stakeholders and research outputs which will improve the prospects for Ecosystem Based Adaptation to be appropriately and effectively used in Vanuatu and elsewhere in the Pacific and globally. As in past years we have continued to involve ourselves in international climate negotiations however this year we have strengthened ties significantly with the Tafea Provincial Government and the Vanuatu National Government in particular the Water Department.

Our research outputs have covered the full range of our interdisciplinary project team. The coastal team has improved knowledge of circulation within coral reef lagoons and in particular the implications for water quality of waste water management a critical threat to coral reef ecosystems. The microeconomics team have applied new techniques to understand community preferences for climate change adaptation projects, the risk and ecosystem team have developed new techniques for understanding how climate change will impact coral reefs with limited data and the social and policy team have developed our understanding of the interactions between tourism and adaptation for coastal communities reliant on ecosystem services.

Over the year our researchers have conducted a range of field work activities in Vanuatu:

- In April 2019 our Microeconomics Team visited Port Resolution and conducted a series of workshops with the community to understand their preferences for the way community resilience projects could be developed.
- May 2019 our Coastal Team visited Port Vila and spent a month collecting dta to support development of coastal process models for the Erakor Lagoon. This work has continued in partnership with the University of South Pacific collecting monthly water samples over the past 12 months.
- In November 2019 our Project team presented progress report to the Tafea Provincial Government. To enable the application of the research outcomes the project team also delivered a training course to government officers on planning for ecosystem based adaptation.

Over the coming 12 months our focus will be on delivering the synthesis research outcomes that will draw together all the work completed to date. We have field work plans and commitments too stakeholder engagement however this will be monitored based on global travel restrictions.

Ecoadapt researchers working with Tanna Communities

Milestones & Research Progress

As noted, EcoAdapt's research is organised around five themes. As per our contractual arrangements, there is an agreed set of milestones for each theme. As we are now some years into the research program, a number of the milestones have been revised in light of (1) research outcomes which point to critical knowledge gaps that need to be addressed and (2) the emerging pressures on Tanna communities and their ecosystems and the changing needs expressed by stakeholders about how the project can benefit them. For example, the original deliverable for the coastal team was a storm surge decision support tool for emergency management. However, following an initial phase of assessment, we concluded that changes in waves climate and erosion hazards are a greater priority than storm surge flooding. This change of direction was confirmed by stakeholder including the Vanuatu climate change department. Table 1 presents the original and revised milestones for each theme and the evidence that the milestone has been in fact achieved. Where the milestone deliverable is a publication, a digital or hard copy of this is available and will be gladly forwarded on request.

Tab1e 1 | Milestones and Evidence of Completion

Original	Revised	Evidence
Coastal Process		
Communication and dissemination of research outcomes via: (a) web-based fact sheets; and (b) training workshop for local stakeholders in the use of Surge-Impact.	Apply coastal process modelling to understanding of water quality within coral reef lagoons	Faivre, G., Vieira da Silva, G., Aimbie, J., Ware, D., Tomlinson, R., Mackey, B.,and Hong, Z.,2020. Coastal processes within a coral reef lagoon system: Erakor lagoon, Efate Island, Vanuatu. Journal of Coastal Research, Special Issue No. 95, pp. 1–5.
Journal paper submitted or conference paper presented on Surge-Impact application.	Develop methodologies for data collection to enable coastal process modelling in remote island locations	Faivre, G., Aimbie, J. and Tomlinson, R., 2020. A month of data collection in Vanuatu: from scientific work to detective work. In: Short, A., and Brander, R.,(eds), Stories from the Field: Fifty Years of Coastal Field-Work. Journal of Coastal Research, Special Issue No. 101
Risk Assessment of Adaptation Responses		
Communication and dissemination of research outcomes through: (a) web-based fact sheets; and (b) workshop to train stakeholders in the approach.	Develop methodologies for projecting climate change impacts on coral reef systems in low data contexts	Hafezi, M., Giffin, A.L., Alipour, M., Sahin, O. & Stewart, R.A. 2020, "Mapping long-term coral reef ecosystems regime shifts: A small island developing state case study", Science of the Total Environment, vol. 716, pp. 137024.
Journal paper submitted on main conclusions of the adaptation risk assessment analyses.	Develop methodologies for ex ante evaluation of climate change adaptation to support design of ecosystem based adaptation projects	Hafezi, M., Sahin, O., Stewart, R.A., Connolly, R.M., Mackey, B. & Ware, D. 2020, "Adaptation strategies for coral reef ecosystems in Small Island Developing States: Integrated modelling of local pressures and long-term climate changes", Journal of Cleaner Production, vol. 253, pp. 119864.
Micro-economic Benefit-costs Analysis		
Final outcomes chapter for project synthesis report	Develop methodologies for establishing business case's for ecosystem based adaptation	Buckwell, A., Ware, D., Fleming, C., Smart, J.C.R., Mackey, B., Nalau, J. & Dan, A. 2019, "Social benefit cost analysis of ecosystem-based climate change adaptations: a community-level case study in Tanna Island, Vanuatu", *Climate and Development,* , pp. 1-16.

Milestones & Research Progress

Tab1e 1 | Milestones and Evidence of Completion (Cont.)

Original	Revised	Evidence
	Policy and Social Analysis	
In-depth analysis of using the tourism industry (and investment) as a tool to enhance the uptake of ecosystem based adaptation. Focus groups completed	No change	Loehr, J. (2020). The Vanuatu Tourism Adaptation System: a holistic approach to reducing climate risk. Journal of Sustainable Tourism, 28(4), 515-534.
Workshop conducted with key stakeholders (including donors) to discuss and review research findings.	No change	In November 2019 the project Team conducted a workshop and delivered training to the Tafea Provincial Government and representatives of Tanna Island Area councils.
Journal article submitted on tourist industry analysis	No change	Loehr, J., Becken, S., Nalau, J. & Mackey, B. (under review). Exploring the multiple benefits of Ecosystem-based Adaptation in tourism for climate risks and destination well-being. Journal of Hospitality & Tourism Research.
	Project integration, Ecosystem & Climate Analysis	
Year 4 project research symposium conducted	No change	Conducted on at Gold Coast Campus Griffith University
Year 4 Project management report that reviews the year's activities, outcomes and issues arising.	No change	This document

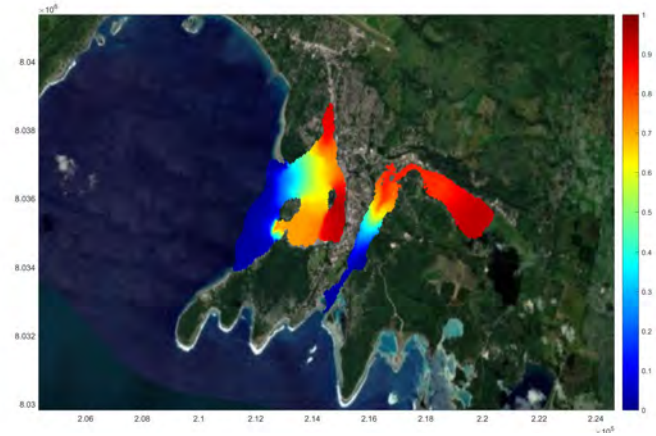
Coastal Processes

The coastal process team has had great success over the past 12 months developing a significant collaboration with the Vanuatu Water Department. The basis of the collaboration is work by PhD Scholar Gaelle Faivre to develop a detailed coastal process model for the coastal lagoon system s of Port Vila. A critical challenge for the health of coral reef ecosystems is water quality issues inside lagoons particularly those adjacent to major settlements such as Port Vila. The establishment of coastal process models can support water resources management activities of government, in particular planning for waste water treatment.

For Vanuatu the health of coral reefs is a significant issue given the scale of tourism activities so the Ecoadapt project team is working to enhance the understanding of the connections between waste water treatment and coral reef health. Over time this collaboration will enable the government to reduce the stress on coral reefs and increase their resilience to climate change pressures.

Other members of the coastal team have continued assessment of climate change impacts on coastal hazards; inundation and erosion for the Port Resolution community on Tanna Island Vanuatu. This work has involved development of coastal process models including a model of waves and a model of water flows. The wave model has been completed and the tea is currently continuing to develop the flow model. Together these models will enable the team to build a picture of how climate change will interact with coastal processes.

Model outputs of time to flush pollutants within Erakor Lagoon



The team is also working at the regional scale and has completed development of a regional ocean model. This model will now be able to provide insights on how warming and rising oceans will impact regionally. This work will be very useful to support our knowledge of how climate change will impact on coastal ecosystems

Theme leader

Professor Rodger Tomlinson
Director
Griffith Centre for Coastal Management

Theme members

Dr Serena Lee
Research Fellow
Griffith Centre for Coastal Management

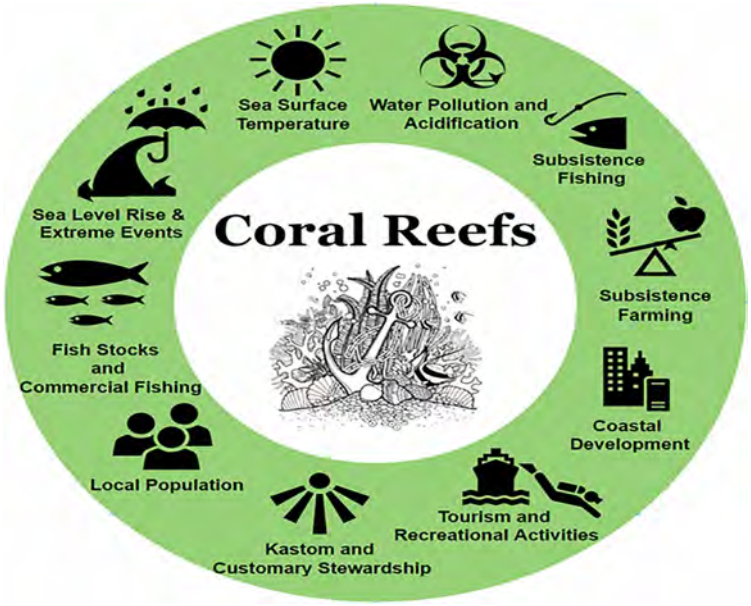
Gaëlle Faivre
PhD researcher
Griffith Centre for Coastal Management

Risk Assessment of Adaptation Responses

Over the past 12 months the risk team has continued research on the how we can develop an understanding of climate change impacts and adaptation options by taking a systems perspective. This work is implement through the use of systems modelling techniques primarily Bayesian Networks and Systems Dynamics. Through the past year the team have applied systems modelling to improve understanding of climate change risks on coral reef ecosystems, clearing of tropical forest, productivity of subsistence gardening and tourism development.

The team is now turning its attention to how systems models can inform the design of ecosystem based adaptation projects. This work is building on the established systems models and connecting them to adaptation projects identified by other project themes. In doing this it is possible to understand the wider consequences of these projects beyond the ecosystem they are targeting as well as understanding how successful the project is likely to be under a range of socioeconomic scenarios in addition to the climate change scenarios.

1.



Pressures on Coral Reef Ecosystems Identified through Systems Modelling

Theme leader

Prof Rodney Stewart
Griffith School of Engineering

Theme members

Dr Oz Sahin
Research Fellow
Mehdi Hafezi
PhD researcher

Micro-economic Benefit-cost Analysis

Through 2018-19, the research team undertook a study to reveal the principle discourses within a rural, subsistence-based community in Vanuatu and among stakeholders in an effort to understand constraints and enabling conditions for implementation of ecosystem-based adaptations, in a time of environmental and socio-economic change. Further, we analysed the stakeholders to determine whether particularly-held discourses correlate with demographic attributes.

Substantive data collection was undertaken in April 2019 and included numerous interviews and card sorting exercises with community members of Port Resolution and additional interviews and sorts with policymakers, NGOs and development organisations in Port Vila. The data collection was successful, with 55 cards sorts and interviews completed for analysis and write-up. The Port Resolution community completed the task with both rigour and good humour.

Ecoadapt researchers working with Port Resolution Community to understand preferences for Ecosystem Based Adaptation

Theme leader

Assoc Prof Chris Fleming
Griffith Business School
Assoc Prof Jim Smart
School of Environment and Science

Theme members

Dr Syezlin Hasan
Australian Rivers Institute
Andrew Buckwell
Griffith Business School

Our research revealed three principle discourses we called Strong Kastom, Kastom + Health and Tentative Modernity. Perspectives from each discourse need to be taken into account when identifying and evaluating adaptation options. Our results suggest adaptation interventions are more likely to resonate with the community if they support customary natural resource management, reflect traditional knowledge, provide opportunities for generating income, and promote gender equity in decision-making. Our results also suggest external practitioners do not necessarily consider income generation as being important to community livelihoods. Ignoring a community's perspectives, values, and priorities risks undermining the viability of EbA projects.

Policy & Social Analysis

In the past 12 months the theme has focused on conceptual thinking around Ecosystem-based Adaptation (EbA). Specifically, literature review work has sought to explore the differences in human-focused and ecosystem/conservation-focused approaches to adaptation. This work has supported the collective view within the EcoAdapt team that EbA should be viewed as an approach to climate change rather an option. This significant shift in perspective more explicitly links our holistic understanding of land and sea resources and the underlying philosophy of traditional knowledge and practice that enables sustainable resource use. Work is currently underway to articulate the view that EbA could greatly benefit this re-framing as an adaptation approach. This work links with previous research in the Policy and Social Analysis theme revolving around the constraints to EbA and the recognition that a significant constraint lies with the view that EbA is an option rather than an approach through which a series of options may be considered.

Contributions from the team towards the holistic BBN model, being developed across all thematic areas of work, has enabled a revision of ecosystem services being provided in Port Resolution, with inclusion of freshwater resources as an important component influencing human health and well-being within the community. Current planning is underway to further explore the interaction between water use and growing demand, stimulated by both population growth and a growing tourism sector, to investigate the degree to which climate-sensitive policies are needed to support constant access to safe drinking water for all. Furthermore, the team will explore how sanitation and waste management practices may influence the ecosystem integrity of forest and reef ecosystems in the context of developing a sustainable industry that does not negatively impact on the areas natural capital.

Tafea Provincial Government officers providing input into Area Council Boundary Maps

Theme leader

Professor Susanne Becken
Director,
Griffith Institute of Tourism

Theme members

Dr Wade Hadwen
Griffith Institute of Tourism
Johanna Schliephack
PhD researcher

Project Integration, Ecosystem & Climate Analysis

This year our project integration team have worked towards preparing key stakeholders for the research outputs the project will deliver in the final year. Through engagement with project stakeholders in Vanuatu we identified that in order to improve the way climate and ecosystems were considered within planning decisions governments need the capacity to use of Geographic Information Systems (GIS). Over the course of the year we worked with the Tafea provincial government to develop and deliver a training course and support the establishment of a GIS system capable of using the outputs of the project and improving the outcomes for ecosystems in planning decision making.

Ecoadapt researchers and Tafea Provincial Government officers following completion of GIS Training

Theme leader

Professor Brendan Mackey
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Griffith Climate Change Response Program

Theme members

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