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Impact Connector #11: Climate Change Mitigation, Adaptation, and Impact Assessment: views from the Pacific

Introduction

Richard Morgan and Greg Barbara

Climate change mitigation and adaptation provide important opportunities for impact assessment (IA) practice. In late November 2019, the New Zealand Association for Impact Assessment (NZAIA), in partnership with the Secretariat for the Pacific Regional Environment Programme (SPREP), held a conference in Auckland under the title *Climate Change Mitigation and Adaptation: assessing the impacts*. The topic recognised the importance of climate change in the political arena in recent years in New Zealand and the wider Pacific region and the opportunity to apply IA to policy and planning. The conference had a significant Pacific island countries and territories (PICTs) component, which is the basis for this issue of NZAIA's *Impact Connector*, produced with the support of SPREP for the Pacific impact assessment and climate change communities. A separate issue of Impact Connector presents a number of articles based on verbal and poster presentations mainly from a New Zealand perspective.

SPREP is an intergovernmental organisation established in 1993 and based in Apia, Samoa. Mandated to ensure the protection and sustainable development of the Pacific region's natural resources, the Secretariat serves 14 Pacific island countries and 7 territories. The organisation actively promotes the understanding of the connection between Pacific island people and their natural environment and the impact that these have on their sustenance and livelihoods. The current principal concern of SPREP's work is climate change adaptation and resilience, driven by the 2017-2026 Strategic Plan developed with its Members who understand that to tackle the climate change challenge, leadership and coordination must work on many fronts of implementation for ecosystem and biodiversity protection, waste management and pollution control, using good environmental governance. Resilience to climate change relies on healthy environments and the use on impact assessments to properly assess and apply mitigation measures. As an accredited implementing agency SPREP also assists Members access the Global Climate Fund and apply impact assessment principles to their projects.

As of 2020, SPREP has also developed Guidelines for Strategic Environmental Assessment (SEA) for use by its Members wishing to ensure that environmental and other sustainability aspects are considered effectively in policy, plan and program making. PICTs recognise the welfare of their people is intrinsically dependent on the natural, biophysical environment, as reflected in many environmental laws which include not only social but all aspects of human activity and culture as part of the environment when undertaking impact assessments. SPREP is also assisting PICTs to update their National Environmental Management Strategies to incorporate SEA for Climate Change adaptation and all national PPP.

Why this conference? What is important about the role of impact assessment in the context of climate change mitigation and adaptation?

There is a tendency for governments, and their science advisors, to adopt a risk assessment approach to climate change: to focus on hazards, such as coastal inundation exacerbated by climate change, and to think about the loss of lives, infrastructure, and livelihoods that may occur from such events. They tend to think in terms of physical measures to reduce the risk of those hazards occurring, or reducing the degree and extent of harm resulting from the events. They see risk assessment as the principal tool for this task.

Risk assessment certainly makes sense in the context of recognising the differential geographical and social effects of climate change across a country or region and identifying priorities for adaptation planning. However, the emphasis on addressing risks in adaptation planning is likely to promote the search for cost effective responses to specific physical impacts (e.g. inundation). It does not in itself encourage more integrated, strategic thinking about possible adaptation responses to the effects of climate change, and the wider implications of those responses for people, communities and the natural environment.

So the key purpose of the conference was to highlight the potential for unintended consequences of both mitigation measures and adaptation plans being overlooked without more explicit recognition of the need to test emerging ideas using impact assessment methods. Adaptation plans should be tested using strategic environmental assessment, and specific projects should be tested by environmental impact assessment including where appropriate, social, cultural, and health aspects as well as biophysical and ecological aspects. To stimulate to stimulate thinking and discussion we posed these broad questions:

- **do our current processes involve consideration of the wider, unintended consequences of mitigation and adaptation measures?**
- **what might some of the important consequences be (both positive and negative)?**
- **how can impact assessment methods contribute to sound decision-making about climate change mitigation and adaptation?**

The articles in this issue of *Impact Connector* provide Pacific-oriented perspectives on these questions. They are also intended to stimulate thinking and discussion among decision-makers, policy analysts and planners involved with climate change responses, and of course the impact assessment community.

The first article draws on the keynote speech presented by the SPREP Director General Mr **Kosi Latu**, in which he paid particular attention to the need to improve the availability of environmental and social data, to inform impact assessments and subsequent decisions about climate change mitigation and adaptation.

This is followed by an overview (written by Richard Morgan and Greg Barbara, based on the presenters' material) of the presentations from three SPREP-supported speakers: first, Mr **Jorg Anson** and Assistant Secretary **Vanessa Fread** use a case study from Federated States of Micronesia to explore the challenges of introducing SEA into Pacific decision-making processes; second, Ms **Naomay Tor** of Vanuatu reminds us of the critical

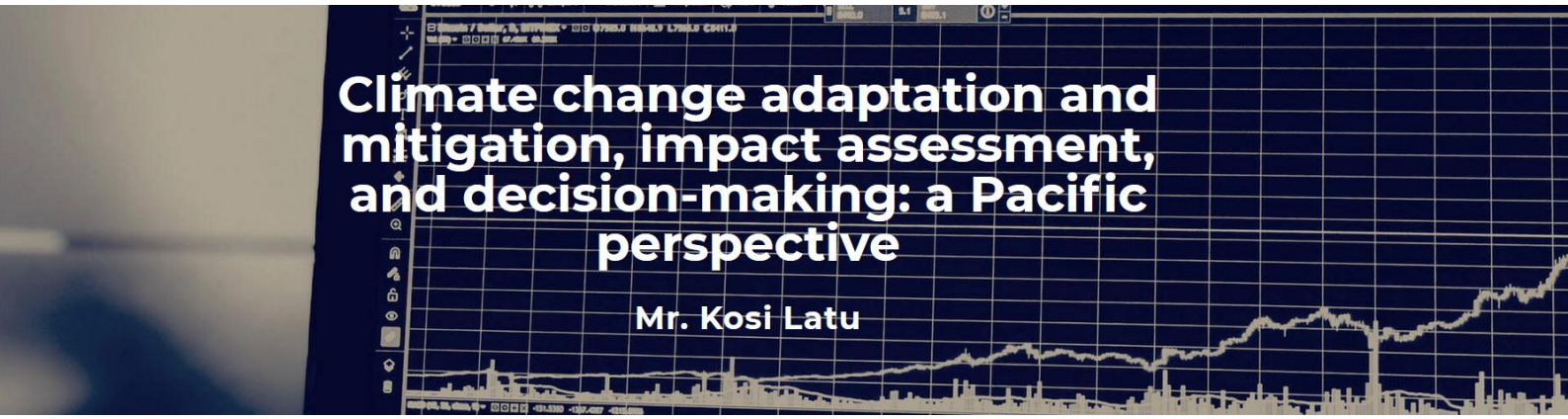
importance of community involvement in impact assessment; and finally Director **Soseala Tinilau** discusses the potential for unintended impacts from coastal adaptation works, based on experiences in Tuvalu.

For low lying nations in the region, one response to sea level rise is to raise elevation through reclamation. **Antony Kubale** outlines an impact assessment carried out to evaluate a potential new urban development in Kiribati, that would be located on 300 ha of reclaimed land in South Tarawa. The assessment was part of a wider engineering feasibility and land use planning exercise and examines the impacts on the natural environment, but also the range of possible social impacts.

The article by **Dorothy Foliaki** is based on, and extends, a poster she presented at the conference. She discusses the potential role of SEA in helping PICTs (and in her research case study, Tonga in particular) incorporate relevant SDGs into their national and sectoral policies and plans.

Coastal adaptation measures will be very important for all the island nations. **Shaw Mead** describes a project carried out on Tongatapu to assess the impact of particular coastal protection solutions on the coastal environment and coastal processes in tropical environments. This is part of a wider programme, the Global Climate Change Alliance: Pacific Small Island States (GCCA: PSIS) project, that was developed to support the governments of nine smaller Pacific Island states develop strategies to deal with the effects of climate change and sea level rise.

An important aspect of climate change in PICTs is the real possibility of people having to re-locate as local conditions make continued settlement unsustainable. **Rajan Ghosh** and **Caroline Orchiston** consider the extent to which this might already be happening across the Pacific, and what it is understood about potential social impacts on receiving communities, using New Zealand as an example.



The Director General of the Secretariat of the Pacific Regional Environment Programme (SPREP), Mr. Kosi Latu, delivered a keynote address to the NZAIA19 conference in Auckland, November 2019. In his opening remarks he said:

“Climate change is the most pressing, single most serious threat to all our survival. Here in the Pacific it impacts us in every way. Imagine having no rivers, having no forests. Most of our culture is related to the ocean, land and the forest. If these things are impacted, then our culture will be gone as well; therefore, it is very important that we understand climate change impacts us in every matter of living. We are already facing problems of access to reliable drinking water, food security and other climate-dependent natural resources, linked to sanitation, poverty and access to financial and technological resources. We need to act, we need to respond to sustain our environment - but all too often we rush to act in small self-centred attempts to preserve what we have without considering the bigger picture. What are the impacts of our choices? We need a coordinated and informed decision making process, we need to assess our plans, be willing to reject detrimental projects and put in place effective mitigation that does not create more problems for the environment we depend on, our neighbours, or ourselves”.

Mr. Latu highlighted the importance of walking the talk and emphasised that people must action what they speak about because it is very common that people speak about an issue, propose solutions, but then do the opposite.

He further reflected on the importance of EIA policies but pointed out that “In the Pacific, we need more than just the policies; we need legislation and the resources as well to back it up. In the region, we have legislation, but they are not being enforced and implemented in a way that they should be because we lack buy-in from decision makers and this is reflected in our poorly supported environmental agencies. And that is one of the many challenges that we in the region face.

[O]ur region is experiencing an unprecedented proliferation of large scale development projects due, in most cases, to well-intentioned efforts to adapt to climate change. For example, solar farm projects; the Pacific as a region leads the world in its commitment to a 100% renewable energy target – but many of our islands are very small and land is a premium. How do we balance the need for energy with the need for land?

One of the ways we can work toward better decisions is to have more informed decisions and this relies on data, specifically environmental data that in many cases already exists but which, for many reasons, is not readily available. Development projects need to collect data to inform their EIAs. All of these projects generate a lot of environmental data which if used correctly and combined with other sources of verified data can inform better decisions for sustainable development. The importance of environmental data in the Pacific is widely acknowledged with many data portals created both within and outside of the Pacific by NGOs, Universities, UN agencies, intergovernmental agencies and the list goes on. It is the matter of then finding and accessing the data in all these portals that becomes another challenge, to reduce the siloing of data and making it easy for decision makers to access the most relevant information.

SPREP recognised this issue and developed an approach to strengthen environmental data collection, monitoring, and analysis and reporting on results, nationally and regionally. The SPREP- and UNEP-funded Inform project (long name: "*Building National and Regional Capacity to Implement Multilateral Environmental Agreements by Strengthening Planning and the State of Environmental Assessment and Reporting in the Pacific*") has established a Pacific Island Country (PIC) network of national and regional databases for monitoring, evaluating, and analysing environmental information to support environmental planning, forecasting, and reporting requirements at all levels. There are already MoUs with SPC (Pacific Data Hub) and government agencies in place not only to store environmental data relevant to each PIC but also actively to harvest data from other data portals to bring Pacific environmental data into a central location. The real benefit of this portal project is that the countries own them and manage them and run them with SPREP’s support; this national buy-in is what is needed to continue to build the knowledge base. The project continues to form MoUs with other portals and harvest their data, as well as data from defunct databases, to make it easier for environmental assessors to locate and use relevant environmental data.

By better understanding our environment through up-to-date data and using robust planning tools such as EIA and SEA we can make better sustainable developments that account for climate change and avoid or mitigate unintended impacts.

It is important we share our lessons and learn from our mistakes.”

Challenges Promoting Strategic Environmental Assessment in Small Island States: Case of Federated States of Micronesia.

Mr Jorg Anson, FSM Ridge to Reef Pohnpei State Coordinator and FSM R&D Assistant Secretary for the Marine Division Vanessa Fread.
Presenting on behalf of both authors, Jorg first gave a short introduction on the Federated States of Micronesia (FSM) a nation of four States in the North Pacific, before moving on to outline a strategic environmental assessment (SEA) linked to the Ridge to Reef (R2R) project. The R2R project seeks to use integrated ecosystems management and rehabilitation on the high islands of FSM in order to enhance ecosystem services, conserve globally important biodiversity and sustain local livelihoods. Funding comes from the GEF, through UNDP, and the project is being driven by the Department of Environment, Climate Change, & Emergency Management (DECEM), and the Department of Resources and Development (R&D), with the assistance of State Governments and local communities.

The SEA described in the presentation was conducted in Pohnpei State, and involved an assessment of four economic growth strategies, that would be used in the development of an Integrated Environmental Management Plan, and inform the review of the Pohnpei Strategic Development Plan. As SEA was new to FSM, Jorg noted some of the challenges that needed to be addressed: with SEA unfamiliar to most people, there is a lack of experience of SEA and no past examples to help guide new practitioners; skills in environmental assessment, especially independent practitioners/consultants, are limited, as is environmental information and data; and while they may be willing, Government officials would be unlikely to be able to devote much time (beyond workshops / providing information).

This project was an opportunity to develop a form of SEA that could be sustained in FSM, in the face of such challenges. It need to do-able by FSM nationals, and not dependent on expensive external consultants. Ideally it would be a modest, low cost approach using available data sources, that could be carried out in a timely fashion, appropriate to local needs and ways of working, and replicable across all FSM states. The case study SEA provided a model that could be used by others; it was developed with guidance from Barry Dalal-Clayton, an internationally SEA expert, but very much designed and carried out by the Pohnpei SEA team.

The four growth scenarios were evaluated in workshops using criteria that represented

environmental and socio-economic objectives that would deliver sustainable outcomes. Included in the environmental objectives was recognition of climate change vulnerability, assuming a 50% loss of coral reefs, but also the linked vulnerability to natural disasters.

SEA Environmental Objectives

1. Improve the status & health of habitats & biodiversity (land and marine)
2. Over-exploitation, encroachment, destruction of mangroves is reduced
3. Ecosystem services are maintained
4. Improve management & enforcement of protected areas
5. Prevent introduction and improve management/control of IAS
6. Minimise waste from piggeries entering water courses
7. Forest clearance for farming is reduced
8. Inappropriate use of fertilisers and pesticides is reduced
9. Solid waste disposal generation and inappropriate disposal is reduced
10. Soil erosion and sedimentation is reduced
11. Minimise climate change vulnerability
12. Minimise natural disaster vulnerability
13. Pollution is reduced
14. Improve sewage treatment

SEA Socio-Economic Objectives

1. Increase uptake of renewable energy
2. Enhance economic development and diversification (particularly for fisheries, agriculture & tourism)
3. Enhance opportunities for employment and new/improved livelihoods
4. Coral dredging is reduced & better regulated
5. Loss of skills and expertise is reduced
6. Increase availability of local food products
7. Conflicts over land use are reduced
8. Threats to traditional culture are reduced
9. Incidences of communicable and non-communicable diseases are reduced
10. Economic losses from IAS are reduced

For each growth scenario (Stagnant/contracting economic growth; Business-as-usual; Moderate growth; High growth, with a major boost to tourism) the criteria listed above were applied to four major economic sectors—Tourism, Agriculture, Fisheries; and Infrastructure—and a score between +5 and -5 allocated to each criterion for each sector. This is an example of the scoring environmental objectives for the Business-as-usual scenario, across the four sectors.

Environmental impacts

Scenario 2 (Business-as-Usual) Comparison of sector impacts

Negative impacts: Very significant and significant negative effects are those scored [illegible] respectively. Very negative effects are scored '-5'.
Moderately and slightly negative effects are those scored '-2' and '-1'.
Positive impacts: Very significant and significant positive effects are those scored [illegible] respectively. Very positive effects are scored '+5'.
Moderately and slightly positive effects are those scored '+2' and '+1'.

THEME		OBJECTIVES	Tourism Score	Infrastructure Score	Agriculture Score	Fisheries Score		Overall score	
		Environmental							
Protected areas and biodiversity	1	Improve the status and health of habitats & biodiversity (land and marine)	0	-2	-2	-1		-5	
	2	Over-exploitation, encroachment and destruction of mangroves is reduced	0	-2	0	0		-2	
	3	Ecosystem services are maintained	0	-2	-2	-2		-6	
	4	Improve management effectiveness & enforcement of protected areas	0	0	+1	-2		-1	
	5	Prevent introduction and improve management /control spread of invasive alien species (IAS)	-1	0/-1	0	-1		-2	-3
	6	Minimise waste from piggeries entering water courses	0	0	-4	0		-4	
Agriculture	7	Forest clearance for farming is reduced	0	0	-2	0		-2	
	8	Inappropriate use of fertilisers and pesticides is reduced	0	0	-1	0		-1	
Waste management	9	Solid waste disposal generation and inappropriate disposal is reduced	+1	-1	0/-1	-2		-2	-3
Land degradation	10	Soil erosion and sedimentation is reduced	0	-2	-4	0		-6	
Climate change and disasters	11	Minimise climate change vulnerability	0	0	0 / -1	-2		-2	-3
	12	Minimise natural disaster vulnerability	0	0	-1	-2		-3	
	13	Pollution is reduced	0	-1	-4	-2		-7	
	14	Improve sewage treatment	0	+??	0	0		0	

The final step was to aggregate the information for the four growth scenarios into a table of cumulative impacts, to allow for easier comparison of the scenarios; first the environmental objectives, then the socio-economic objectives.

Comparison of cumulative impacts of all scenarios – sosio-economic

Very significant and significant negative effects are those scored '-5' and '-4' respectively. Very negative effects are scored '-3'.
Moderately and slightly negative effects are those scored '-2' and '-1'.
Very significant and significant positive effects are those scored '+5' and '+4' respectively. Very positive effects are scored '+3'.
Moderately and slightly positive effects are those scored '+2' and '+1'.

THEME		OBJECTIVES	Scenario 1 Stagnant/ contracting growth	Scenario 2 Business-as-usual (low growth)	Scenario 3 Moderate growth	Scenario 4 High growth
			Score	Score	Score	Score
Energy	15	Increase uptake of renewable energy	-3	+1	+1	+6
Economic	16	Enhance economic development and diversification (particularly for fisheries, agriculture & tourism)	-9	0	0	+14
Employment and livelihood opportunities	17	Enhance opportunities for employment and new/improved livelihoods	-8	0	+1	+11
Construction	18	Coral dredging is reduced and better regulated	+3 / +4	-2	+1	-2 / -3
Population	19	Loss of skills and expertise from FSM is reduced	-1	-1	+2	+4
Food	20	Increase availability of local food products	+1	-6 / -7	+2	-1
Land	21	Conflicts over land/marine use are reduced	-2	-5	-7	-12
Cultural heritage	22	Threats to traditional culture are eliminated	-3	-1 / -2	-3	-10
Health	23	Incidences of communicable and non-communicable diseases are reduced	-3 / -4	-9	-3	-12
Invasive alien species	24	Economic losses from invasive alien species (IAS) are reduced	-5	-3 / -4	-8	-18

Comparison of cumulative impacts of all scenarios - environment

Very significant and significant negative effects are those scored '-5' and '-4' respectively. Very negative effects are scored '-3'.
Moderately and slightly negative effects are those scored '-2' and '-1'.
Very significant and significant positive effects are those scored '+5' and '+4' respectively. Very positive effects are scored '+3'.
Moderately and slightly positive effects are those scored '+2' and '+1'.

THEME		OBJECTIVES	Scenario 1 Stagnant/ contracting growth	Scenario 2 Business-as-usual (low growth)	Scenario 3 Moderate growth	Scenario 4 High growth
			Score	Score	Score	Score
Protected areas and biodiversity	1	Improve the status and health of habitats & biodiversity (land and marine)	-6	-5	-5	-19
	2	Over-exploitation, encroachment and destruction of mangroves is reduced	-7	-2	-3	-15
	3	Ecosystem services are maintained	-8	-6	-5	-16
	4	Improve management effectiveness & enforcement of protected areas	-8	-1	+2	-13/-14
	5	Prevent introduction and improve management /control spread of invasive alien species (IAS)	-7	-2 / -3	-1	-18
	6	Minimise waste from piggeries entering water courses	-6	-4	-2	+3
Agriculture	7	Forest clearance for farming is reduced	-5	-2	-3	-7
	8	Inappropriate use of fertilisers and pesticides is reduced	0	-1	-1	-3
Waste management	9	Solid waste disposal generation and inappropriate disposal is reduced	-6	-2 / -3	+1	-8
Land degradation	10	Soil erosion and sedimentation is reduced	-5	-6	-5	-10
Climate change and disasters	11	Minimise climate change vulnerability	-5 / -6	-2 / -3	0 / +1	0
	12	Minimise natural disaster vulnerability	-6	-3	0	0
	13	Pollution is reduced	-12	-7	-2 / -3	-10
	14	Improve sewage treatment	-4	0	+3	+1

The recommendation from the SEA was that the Moderate growth scenario would be the best option for meeting the environmental and socio-economic objectives.

Community Involvement for EIA in the Pacific.

Ms Naomay Jibe Tor, Vanuatu Government Principal Officer - Environmental Impact Assessment (EIA), Department of Environmental Protection and Conservation.
Naomay reminded the conference of the importance applying good impact assessment practices, through the crucial engagement of community for Pacific projects, by understanding correct cultural protocols in order to get meaningful effective engagement.

In Vanuatu, as in all island states across the region, local communities have a wealth of traditional knowledge about the natural environment (e.g. the behaviour and cycles of marine organisms, the interdependencies of flowering plants and weather patterns, etc.). In many cases the Pacific this knowledge is not held anywhere on record and therefore it is vital for assessing potential impacts however there are protocols that need to be understood and observed in approaching communities to seek their involvement, especially when wanting to benefit from traditional knowledge: some types of information cannot be shared with other genders, outside a family or clan, or community. Other information is more readily available. Understanding the demographics of stake holder's interconnectivity of traditional values, gender roles, religion and use of resources in an area is also critical for assessing and mitigating impact to communities. So it is important that appropriate customs and traditions underpin community involvement processes to avoid misunderstandings.

Involving local communities is an important moral issue: to customary owners, land is life and the spiritual home of their ancestor, so any proposals to affect that land have direct implications for those communities. Their approval should be the first step in any process to consider development options for land and associated resources. Moreover, it needs to be a continuing process of engagement, so the community is aware of what is happening throughout decision-making process.

The nature of involvement needs to be carefully thought out. Communities may have had poor experiences in the past with developments and/or distrust the process. These communities need special attention to build rapport and even for those with no experience in developments there is a need to raise awareness of the EIA process among members of the community to familiarise them with the nature, purpose and value of such involvement. If

necessary the role of EIA in supporting good decision-making may need explaining, and that should emphasise the importance of community involvement to ensure decisions are accepted by potentially affected individuals and groups in the community. Sharing of stories from other communities and similar developments can help in opening dialogues. Engaging with the community would typically take place using workshops or similar group events sometimes consisting of only one demographic at a time as customary protocols may require; the methods used must be selected carefully, as the process will only yield results if the engagement is effective.

Naomay shared her experience in how for highland communities in Vanuatu a traditional token offering by any approaching party at the boundary marker is needed to be placed and accepted by the community before engagement can commence. This simple gesture is essential to establish respect and trust for these communities and without it she has seen proposals stall indefinitely or derail later in the process.

There is a tendency to think of community involvement as only occurring before decisions are made, but that is not the case. Communities are often the first to feel the impacts of project changes so can also be involved in monitoring processes, following implementation of works. Such involvement can dramatically extend the number of eyes and ears that are able to pick up early signs of change in the environment so appropriate steps can be taken to safeguard community and environmental wellbeing. Community networks help build and maintain goodwill between the project and the community, build social capital, within and between communities, and contribute to ensuring long term sustainability of projects.

The trade-offs of adaptation and response in coastal settlements of Tuvalu and other atoll nations.

Director Soseala Tinilau, Department of Environment, Tuvalu.

Director Soseala began his presentation with a brief introduction to Tuvalu, which is situated east of Australia and north of Fiji. It is made up of nine low lying atolls of which Funafuti is the capital. Tuvalu has a land area of approximately 26 km2 with an EEZ of 900,000 km2. The population as of 2018 was around 11,500, of which more than 59% resided in the capital that also has the nation's only airport.

Being a nation of atolls, an understanding of the nature of atoll processes is important when looking to respond to environmental changes, such as those caused by climate change. Director Soseala outlined the key features of atolls: they are ring-shaped coral reefs that partly or wholly surround a lagoon, many exhibiting arcuate 'bight-like' structures. They vary a great deal in morphology (including circle and irregular forms), but are generally small, and have low elevation (<4m above Sea Level)
Given their limited land area and very low elevation, atolls are vulnerable to natural hazards, such as cyclones. The remote nature of Tuvalu's atolls and dependency on fisheries for food, inter-atoll sea travel to transport supplies and respond to emergencies make the people highly vulnerable to impacts to the ocean.

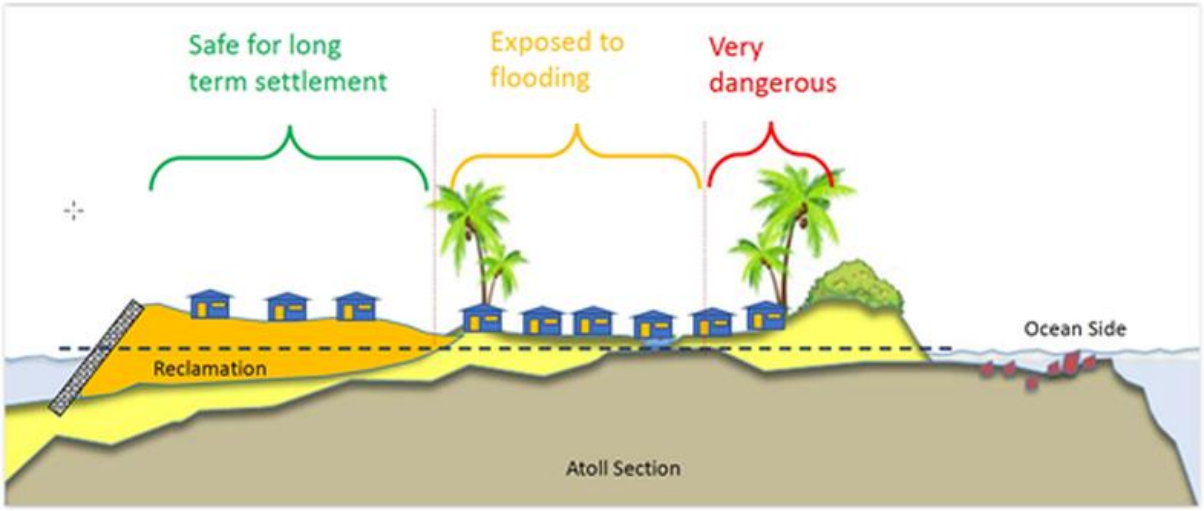
While humans continue to emit large amounts of CO2 into the atmosphere, more CO2 will end up in the ocean which increases the acidity of the ocean and reduces the oceans ability to adsorb heat and further CO2. Also, the Earths' temperature increases which triggers melting of polar ice and leading to sea level rise (SLR). Increased temperatures are also

increasing the frequency and intensity of cyclones. The consequences of climate change for coastal impacts, Director Soseala observed, are well understood by many in the Pacific. He noted the major ones:

- Sea level rise – marine flooding/ wave incursion,
- Change to coral reef productivity and structure – atoll shores are living-reef mediated shores. Ocean acidity and heat stress impact reef productivity, structure and composition. These stresses contribute to shoreline vulnerability.
- Change in tropical storm frequency/intensity

The IPCC has generally projected that climate change may lead to fewer tropical storms overall in the Pacific, however the worst category storms will become more frequent.

Director Soseala cautioned that how we respond to these increasing threats requires careful evaluation, to avoid creating further problems.



Source: Arthur Webb (TCAP). This schematic diagram shows the model of coastal adaptation, with particular emphasis on coastal reclamation, being used in Tuvalu as a way to counter future Sea Level Rise.

This is the basis of a number of coastal adaptation projects that have been implemented and more that are about to go ahead, under the Tuvalu Coastal Adaptation Project (TCAP). True coastal adaptation in the atolls, raising the central zone with further reclamation, will require very large scale works, some brave forward thinking, for example through the use of Strategic Environmental Assessment (SEA) and a lot of money.

The Tuvalu Government has an ambitious project in mind to build artificial islands and the current Prime Minister is looking to Japan for help. The artificial islands in Dubai have stood the test of time, being well thought and planned. Another model is the Maldives, which has built artificial islands to expand land area for adaptation purposes; but as Director Soseala pointed out “they do this on covering existing coral reef, so is it really a success story?” Perhaps so for a politician, but not for a conservationist concerned with the protection of important coral reef ecosystems or the peoples dependent on that reef for their livelihood. This is an example of some of the trade-offs that have to be faced when working in this area.

But of equal concern is the effect of poor planning and insufficient studies, resulting in projects that create more problems. For example, Tuvalu's Nukufetau seawall project has resulted in significant changes to the environment (beaches and coastal functions) and to people accessing the channel/shipping. The new seawall has changed the coastal sand deposition environment with infilling of the harbour channel to make it impassable and scouring of the foreshore now needing remedial action. The Director asked "Even with world class modelling do we truly know what will happen to lagoons, currents, coral, fish, etc. with reclamation and dredging?"

He drew upon other examples from Tuvalu of rehabilitation of borrow pits (dating from World War 2 when sand was excavated for airstrips), and the Funafuti Recreation Area (FRA) project, both of which were a big success socially as they created more beach area for local people to use. But the impacts on the lagoon due to extensive dredging to provide the sand for these projects are unknown as they also removed corals without any baseline data. We don't have money and staff to operate long term monitoring of our atoll ecosystems. The longevity of the FRA project will be tested with evidence of reclamation slumping after "normal" tidal cycles; it is not known how the facility will be affected by cyclones or other large wave events.

Will coastal adaptation do more harm than good in the long run? Will this new reclaimed land really keep us safe and healthy?
How do we weigh up social v environmental factors? Perhaps losing beaches but gaining more land, giving us more land but possibly harming our fish habitats (and therefore primary food source and livelihoods). What is the point of building more land to stay on your island if you have lost all the fish your people used to live on? And then there is the questions of deciding ownership of the new land (a scarce resource in atolls) and what it will be used for, is it the developers land, governments or the people whose land used to extend to the sea who now don't have direct access to launch their boats – change of land ownership and resource access could create social problems.

Beyond coastal adaptation, the Tuvalu Government's other ambitious plan is to build a new airstrip in the lagoon near Funafuti, leaving the existing one for people to retreat from the coast and build further inland. Such a project will challenge our ability to anticipate the impacts of such a development and prevent damaging important environmental systems, such as reefs, fisheries and social dynamics.

We can sustain atoll islands provided they are surrounded by healthy and productive reefs, and sediment pathways are not obstructed. Healthy reefs naturally accrete to attenuate waves and replenish beaches and atolls overtime they adapt to sea level rise. We need to support beneficial natural processes, our adaptations must be well planned, using proven technologies. With the proliferation of adaptation projects being undertaken in Tuvalu, there are many Universities and NGOs in the region that can contribute, through research and capacity development. And the assistance of SPREP in developing EIA and SEA guidance and resources for the region is acknowledged and appreciated.

But if we do not slow global warming then what next - do we just continue to reclaim to counter the rising tides until we have no sand left in the lagoon and no fish?

Background

Kiribati, an island republic in the Central Pacific, is one of the world's most economically and physically vulnerable countries, consisting of 33 low lying coral atolls scattered over 3.5 million km2. At their highest elevation, the atolls average 1.8 metres above sea level. Of its 110,000 inhabitants, half live on the capital island of South Tarawa making it one of the most densely populated areas in terms of number of persons per km2. Tarawa's land and people are increasingly impacted by sea level rise and the frequency of storm surge and king tide inundation. Its population is rapidly growing due to migration from the outer islands, placing pressure on natural resources, infrastructure and essential services. Other climate change induced effects such as increased rainfall, droughts and ocean acidification are also contributing factors making Kiribati highly vulnerable.

Over the next eight decades, the United Nations Intergovernmental Panel on Climate Change (IPPC) projects a 0.9 metre increase in global sea levels. Kiribati's surrounding sea levels are predicted to rise by up to 0.17 metres by 2030.

Jacobs New Zealand Limited (Jacobs) was commissioned by the New Zealand Government Ministry of Foreign Affairs and Trade (MFAT), on behalf of the Government of Kiribati (GoK), to assess the feasibility of reclaiming 300 hectares (Ha) of inhabitable land on the Temaiku Bight in the Kiribati capital, Tarawa. The reclamation will increase the height of the land by approximately two metres above the highest measured sea level, allowing for an urban development for up to 35,000 people, resilient to predicted 2200 sea levels.

The vision for GoK across Kiribati is to strive "towards a better educated, healthier, more prosperous nation with a higher quality of life".

Project Overview

Our approach was to develop a deep understanding of the island of South Tarawa as a whole. While the project is primarily driven by a need to create new, higher, habitable land at the Temaiku Bight. It also seeks to address other key issues that affect the GoK and the daily lives of its people. The opportunity to establish a new urban development unlocks potential for GoK to address overarching environmental, social and economic issues.

The team used a triple bottom line sustainability approach to explore integrated engineering and infrastructure outcomes. The investigations comprised coastal engineering, urban and landscape design and environmental and social impact assessment. A series of strategies were formed during multi-disciplinary design workshops, drawing upon Jacobs architecture, environmental, social planning and engineering disciplines to address the key issues facing Tarawa, and to enhance the project's feasibility.

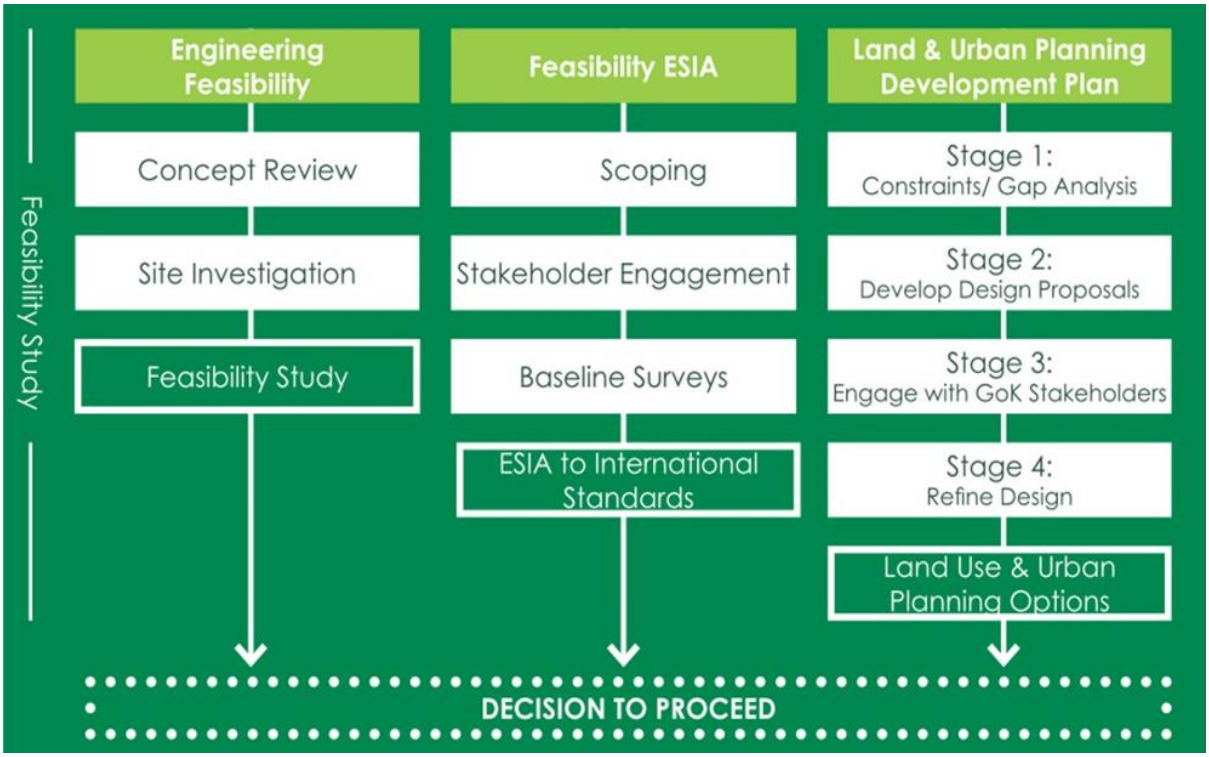
In addition to the feasibility study, the team developed an accompanying conceptual land use master plan that addresses resilience issues impacting the atoll, including rapid urbanization, limited water supply, ecosystem services and an increasing risk of land inundation from king tides.

The project is the first large scale climate change adaptation project of its kind for a small island developing state and culminated in the President of Kiribati presenting the Project at the 2017 UN World Climate Change Forum, CoP23 in Bonn, Germany.

Impact Assessment Approach

The project comprised three key streams of work, as outlined in the figure below, which ran in parallel. Together they were to provide an understanding of the feasibility of the project and inform the decision of whether to proceed.

The impact assessment approach was critical in understanding the existing environment and social context, identifying the key environmental and social impacts, identifying solutions to minimise impacts through informing design and mitigation measures, and promoting environmental and social benefits. A key component was stakeholder engagement with local communities across all three streams of the feasibility study and throughout the ESIA. Ensuring the local communities were informed about the project and were able to provide input to the feasibility study process was critical in ensuring a successful outcome that reflected the vision of the Kiribati people.



It is important to recognise at this point the role that the Secretariat of the Pacific Regional Environment Programme (SPREP) has in providing EIA capacity building across the Pacific region. SPREP has produced guidelines for conducting environmental impact assessment for Pacific Island Countries and Territories and is an important source of information for SIDS conducting EIA.

The ESIA process for this project was undertaken in accordance with the World Bank Environmental and Social Framework and comprised a number of key stages as outlined in the Figure above. The ESIA comprised a series of Volumes: Introduction, EIA (Terrestrial), EIA (Marine), Social Impact Assessment, Environmental and Social Management Plan (ESMP) and Technical Appendices.

In the ESIA process for this feasibility project, the ‘Scoping Stage’ was key in ‘scoping in’ those environmental and social impacts that would need to be considered going forward whilst ‘scoping out’ any elements not considered to be impacted by the project. During the Scoping Stage a Stakeholder Engagement Plan was also produced which captured the approach for engaging with all project stakeholders throughout the ESIA process.

Whilst utilisation of existing data from historical studies was used as far as possible, the Baseline Stage was necessary to fill any gaps in knowledge and provide an update to date picture of the existing environment. To do this, a number of in-country surveys were undertaken including for example air quality monitoring, terrestrial and ecological surveys, potable groundwater monitoring, noise monitoring etc.

Data collected from the Baseline Stage along with historical information was taken forward into the ESIA Stage. In order to determine the relative significance of impacts, a bespoke impact matrix was developed that considers sensitivity/vulnerability versus magnitude of impact. Impact matrices form a core component of assessing impacts utilising qualitative and quantitative information.

For any negative impacts identified during the assessment process, suitable mitigation measures were recommended to minimise these impacts to acceptable levels. Recommendations for monitoring was also made to be able to track changes to the environment and determine the success of the mitigation measures. The mitigation measures and monitoring recommendations were captured in the Environmental and Social Management Plan (ESMP). A framework Environmental and Social Management System (ESMS) was also produced which provided the means by which to implement the ESMP effectively.

Finally, a Non-Technical Summary was produced which captured the entire ESIA process and outputs in a concise summary written in lay terms for ease of reading for the general public.

The Future?

The project in its essence is transformative to improve quality of life and climate change resilience in South Tarawa and Kiribati as a whole. The desire of the project team was to be able to provide a potential blueprint for large scale climate change adaptation across SIDS in the Pacific.

The project was found to be feasible from an engineering, environmental and social perspective, however, the costs for undertaking a project of this scale are significant and where this finance would come from is a key question. If the Project is to go ahead further investigations would be required to further understand the potential environmental and social impacts. A final remark is that Community Engagement is the key to success for impact assessments in general but particularly for a project such as this.

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I would like to acknowledge both the New Zealand Ministry of Foreign Affairs and Trade and the Government of Kiribati.

Introduction

Decision makers in Pacific Island Countries (PICs) are constantly making decisions that affect the environment and wellbeing of their communities. However, the consequences of their decisions on the environment, people and economy are often overlooked. The Sustainable Development Goals (SDGs) provide a global framework for inclusiveness and partnerships to steer PICs closer to sustainable pathways. However, they are a set of 17 ambitious goals with trade-offs and synergies that may compromise or duplicate efforts for effectively achieving the SDG targets (Moyer and Bohl, 2019). Five years since the launch of the SDGs, Pacific Island countries (PICs) have integrated them into their national policy and planning processes to contribute to the vision for a more sustainable world. SDG 13 in particular, calling for climate action, has provided the impetus behind policies and plans for mitigating and adapting to climate change impacts. With so many policies, plans and programmes addressing the climate change agenda, is there a way that we can assess the sustainability impacts of such policies and plans and evaluate if they are in fact solving the climate problem?

Strategic environmental assessment is a process that integrates sustainability considerations into policy and planning development but has had limited application in PICs (Levett and McNally, 2003; Morgan and Onorio, 1996). It seems logical that SEA, if effectively utilized, could support more coherent planning for sustainable development. In the past, PICs have adopted new processes, such as EIA into their national planning processes without fully understanding its implications on their institutional organisations. Cumulative impacts are not well articulated and can generate delays in project development as they become apparent (Runhaar and Driessen, 2007). Consequently, some of the decisions and precautions regarding environmental and social safeguards, are not adequately addressed and, in many cases, important issues are considered too late in the process. SEA can help to identify cumulative impacts and guide project design and development to avoid irreversible impacts that may have major repercussions on the environment, social and economic aspects of sustainable planning and development.

With recognition of SEA as a useful tool to strengthen sustainability considerations in policy and plan making (Polido et al. 2018), the Secretariat for the Pacific Regional Environmental Programme (SPREP) has undertaken a series of consultations to develop SEA Guidelines and to assist PICs to adopt this process. However, an understanding of current planning and decision-making processes is important to understand how the SEA process can be

effectively adapted to suit national contexts. As such, my research looked into the current planning process of a case study, Tonga, to determine if the SEA process would be helpful in streamlining and coordinating national planning and policy making for achieving SDGs with the research question: ***"Is there a role for SEA to improve current planning and policy making processes towards achieving SDGs in Tonga?***" (Foliaki, 2020).

SEA and Policy Planning Development in Tonga

The research comprised a literature review of SEA and SDGs and found a plethora of SEA research spanning across multiple facets of sustainable development. What originated as a mechanism to identify impacts of development from a science perspective in the planning phases, has now evolved into a more inclusive and consultative process that emphasizes the importance of social and cultural sensitivities pertaining to decision making (Bina, 2008).

An analysis of the institutional and planning and policy making processes in Tonga pertaining to SDGs 13, 14 and 15, found that one of the major challenges is fragmentation of decision-making entities and stakeholders. There is a lack of coherence and accountability towards sustainability planning processes. Short-sighted planning, limited human resources and institutional capacities are also factors that challenge sustainable development in Tonga. Culture and power relations play a big role in decision making and policy planning as they can influence and create communication barriers that may impede effective planning and stakeholder consultations. The inclusive nature of the SDGs framework suggests that SEA could be the missing puzzle that can help to 'glue' everything together. However, there are layers of 'checks' that need to be made in policy and plan making processes, if SEA can prove useful to decision making processes in Tonga or other Pacific Island countries.

Way Forward

Planning and decision-making processes in Tonga are predominantly centralized and government led. While government recognizes the importance of inclusiveness and understanding people's values to guide development and decision-making processes, current public participatory practices are not effective and often rushed to meet deadlines for mobilizing resources and implementing activities to meet SDG targets. In particular, the involvement of the business or private sector needs to be strengthened in Tonga. There are current mechanisms in place to monitor and evaluate progress and manage risks of policies, plans and programmes, but overall, these could be strengthened through a more coordinated approach that could be possible through SEA.

The SEA process has potential to help in the policy and planning processes of Pacific Island countries. Firstly, SEA could help to identify cumulative impacts at the remedial level before they reach the project level phase. Secondly, it could raise decision maker's awareness of sustainability principles and help them consider the major impacts of their policies and plans. Finally, the strong public participatory approach of SEA should ensure that no one is left behind. Accordingly, the following recommendations are considered in support of SEA uptake:

1. Given that SEA is a relatively new process that has no mandatory application in PICs, SPREP and other international agencies such as the World Bank have an opportunity to introduce the SEA process in a context that suits the unique cultural,

political and geographical attributes of Pacific island countries and support sustainable development strategies.

2. PICs should evaluate the implications of the SEA tool based on their current policy and planning processes and how to adapt it to suit them. However, without considering the social and cultural interplays, power relations and political status in their own countries, SEA will not be effective (Bina, 2007).

Conclusion

SEA has potential to strengthen coherence and provide for more remedial planning and policy making with checks and balances for sustainability. Its connective role can assist in consolidating policies, plans and programmes as well as analysing the sustainability impacts of PPPs aimed to address the climate problem in Pacific Island Countries. The interconnections and complexities of the SDGs with synergies and trade-offs among goals provides the impetus and opportunity for SEA to live up to its potential for enhancing stakeholder engagement to 'leave no one behind' when meeting their SDG targets. Tonga and other Pacific Island countries, may want to determine their need for SEA and be willing to learn and integrate the SEA process into planning and decision making processes, as it could expedite efforts for achieving SDG targets by 2030 and beyond.

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Coastal Engineering for Climate Change Resilience in Eastern Tongatapu, Tonga

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Increasingly large amounts of funding are becoming available for climate change (CC) adaptation projects throughout the Small Island Developing States (SIDS), which is due to the recognition that these nations contribute <1% of CO2 emissions that are driving CC, although are some of the planet's most vulnerable areas. The Global Climate Change Alliance: Pacific Small Island States (GCCA: PSIS) project is funded by the European Union and managed by Secretariat of the Pacific Community (SPC). The project was developed to support the governments of nine smaller Pacific Island states, namely Cook Islands, Federated States of Micronesia, Kiribati, Marshall Islands, Nauru, Niue, Palau, Tonga and Tuvalu, in their efforts to tackle the adverse effects of CC and sea level rise (SLR). In this project, the environmental impact assessment was from the perspective of what impact are the coastal protection solutions having on the coastal environment and coastal processes in order gain better understanding of the performance of such structures in tropical island locations.

The purpose of the GCCA: PSIS project was to promote long-term strategies and approaches to adaptation planning and pave the way for more effective and coordinated aid delivery to address CC at national and regional levels. A range of national CC adaptation projects were undertaken within the nine Pacific Island locations. Projects ranged from increased water security through to building capacity to address coastal protection. eCoast developed strategies in the Marshall Islands and Tonga that were focused on 'buying-time' through managed advance, with the impact assessment considering how well these strategies perform. The former was based on developing methodologies that remote atoll island villages (which comprise much of the outer Marshall Islands) could apply to construct suitably robust causeways that will maintain connection between parts of the atoll islands that are breaking down/apart due to the impacts of SLR. The Tongan project is described below.

Two trial projects were developed for north eastern Tongatapu (Figure 1), which combined hard and soft engineering (i.e. 'hybrid' solutions) to provide climate change resilience. The projects focused on investigating the efficacy of their application in different physical environments and comparing the design parameters in a temperate context versus a tropical coral sand coast, as well as assessing the impacts of these solutions in terms of their performance in 'buying time'. Coastal engineering has been developed for temperate coastlines in Europe, America and Australasia, which are significantly different than coral coastlines in terms of their range of physical processes and parameters. As a result, the application of temperate engineering on coral coasts has often resulted in failure and/or knock-on effects to the adjacent coast. Through varying physical parameters of the prescribed interventions for each site, and monitoring the results through time, the

impacts/responses can determine the efficacy of the interventions and develop design parameters that are suitable for similar tropical locations in other areas of the Pacific Islands.

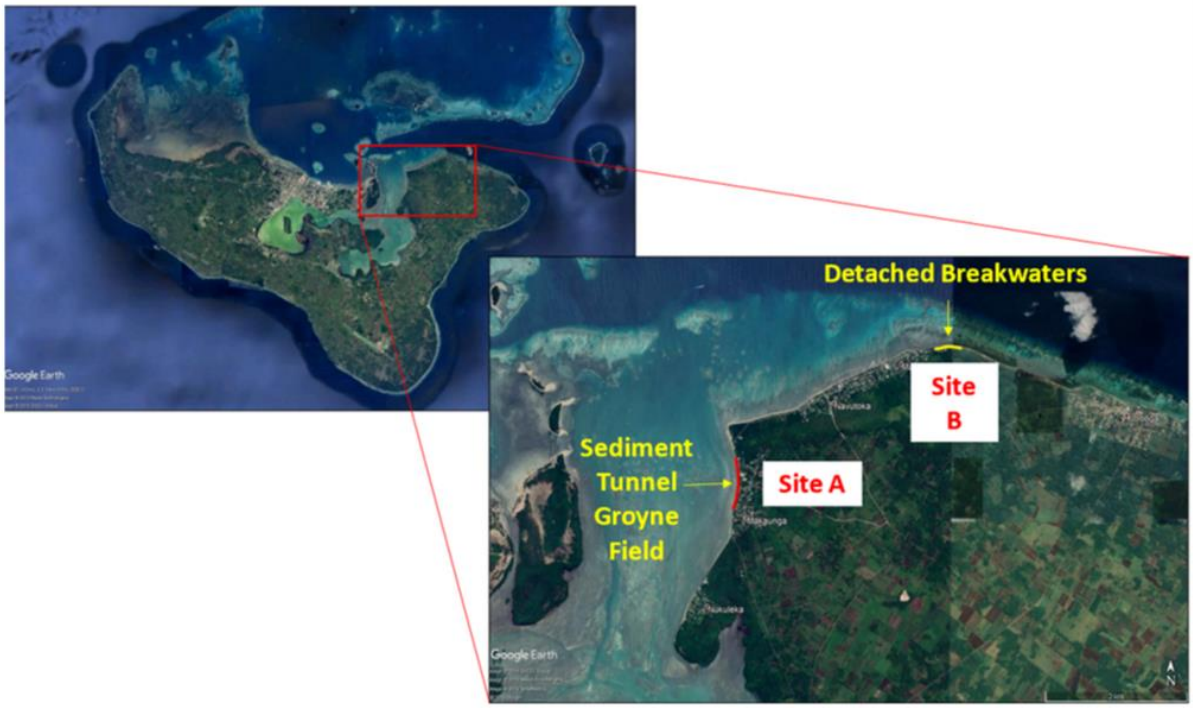


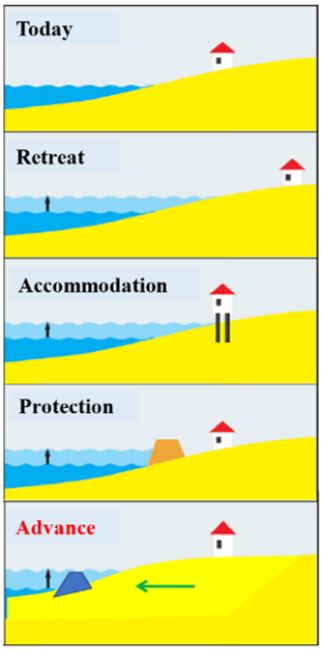
Figure 1: Locality map of 2 sites in north eastern Tongatapu

Both sites A and B are subject to erosion and inundation which is due to a combination of:

- historical sand-mining;
- removal of mangroves;
- damage to the fringing reef ecology (by humans and pigs) – coral beach sand is biogenic and created by the fringing coral reefs and the organisms that consume the coral. Over-fishing, pollution and other forms of damage break the 'sand-engine' that naturally nourishes the beaches with sand; and
- SLR.

Together, these factors have resulted in reduced beach height and width (some 20 – 30 metres of retreat since 1967 from aerial image analysis) and removed sediment from the system faster than it can be replenished.

An important aim/factor associated with the project was the recognition of the inevitability of a need to retreat from these coastal sites due to their low-lying nature. The works were developed to 'Buy Time', 20-30 years, in order to plan for the retreat and relocation of the villages.



Responses to SLR – including managed advance to 'Buy Time':

- The responses required to protect human life and property fall broadly into three categories: retreat, accommodation, and protection. However, managed advance is being applied more and more often in some cases.
- Retreat involves no effort to protect the land from the sea. The coastal zone is abandoned and ecosystems shift landward. This choice can be motivated by excessive economic or environmental impacts of protection. In the extreme case, an entire area may be abandoned.
- Accommodation implies that people continue to use the land at risk but do not attempt to prevent the land from being flooded. This option includes erecting emergency food shelters, elevating buildings on piles, converting agriculture to fish farming, or growing flood or salt tolerant crops.
- Protection involves hard structures such as sea walls and dikes, as well as soft solutions such as dunes and vegetation, to protect the land from the sea so that existing land uses can continue.
- Managed Advance Response. The application of 'Buying-Time' in order to prepare for the inevitable managed retreat for low-lying coastal areas.

The options at the two sites were developed in conjunction with the communities in a similar manner set out in the MfE (2017) *Coastal Hazards and Climate Change: Guidance for Local Government*, which included multiple public meetings and workshops to determine what was happening and what was valued by the local community.

At the tidally dominated site (Site A - Makaunga and Talafo'ou), groynes with varying permeability placed at varying intervals along the beach were trialled, while detached breakwaters of varying lengths at varying intervals were trialled at a more exposed wave-dominated site. Both trials included beach re-nourishment, sand retention structures and planting of coastal species ('hybrid' solutions), as well as a detailed monitoring programme.

Five years after implementation, several important findings have emerged at the tidally-dominated site of the groynes:

- the 95% permeable groynes and 45% permeable groynes are working well in the northern part of the site without causing downcoast 'groyne-effects';
- the southern groynes where there is less wave energy are more suited to fully closed groynes;
- *semi-permeable* groynes with a spacing that agrees with temperate design parameters (i.e. groynes should be spaced at ~3x their across-shore length) were found to be very effective at retaining re-nourished sand and widening the beach; and
- the groynes and associated beaches are being utilised by the local people, especially since there is now no scarp and rocks in these areas as they have been covered by the accumulated sand.

The results of the monitoring have led to the following adaptive management actions (Figure 2):

- addition of eight 50% closed groynes in the 60 metre gaps;
- rotating half of the open units on the six groynes in the southern area to make them fully closed;
- bringing in 2,000 m3 of sand for the southern groynes (not previously nourished); and
- continued enforcement of pig penning.

Figure 2: The groynes spaced along the beach with varying degrees of permeability (i.e. impermeable, 45% permeable, and 90% permeable).

The detached breakwaters at the wave-dominated site (Site B - Manuka) have also proven to be very effective at sand retention and the creation of a buffer zone, as well as being very cost effective and allowing for better coastal access and amenity (Figure 3). No concrete conclusions were drawn with respect to the location and spacing of the detached breakwaters since they 'over-performed', and all created large tombolos and associated beach compartments. This indicates that the smallest along-shore distances and the largest gaps between breakwaters are likely at the lower end of the design parameter scale and that in this kind of tropical environment they are significantly more efficient than in temperate coastal environments.

Figure 3: The detached breakwaters at Manuka, which have been extremely effective at widening the beach to provide a buffer zone and stop over-topping onto the road. There is now 10 – 30 metre of buffer zone and a series of crescent shaped beaches.

The GCCA: PSIS project was the proud recipient of the 2019 Energy Globe Award, recognised for its outstanding work and contribution towards advancing peer to peer learning in CC adaptation among Pacific communities, specifically the Tongatapu and Palau components of the project. The project won the Energy Globe Award for the project's approach to sharing coastal management experiences through a learning exchange between Tonga and Palau. The SPC, eCoast and counterparts from the Kingdom of Tonga's Ministry for Climate Change hosted representatives from Palau, including planners, engineers and state legislators, and reviewed and discussed first-hand possible coastal

planning, management and protection solutions during a visit to Tonga. Developing sustainable coastal protection options for the Tongan sites, presenting the innovative concept of 'buying time', and application of similar measures at Rock Island in Palau all contributed towards receiving the award.

During the monitoring programme, a second international aid-funded coastal protection project was undertaken along the coastline adjacent to the detached breakwaters. This provided an interesting contrast to CC resilience and the recognition of the inevitable requirement to retreat/relocate, which is a reality in many Pacific Island locations.

The usual response to coastal erosion in Tongatapu has been the construction of revetments, partly due to the construction of revetments along the Nuku'alofa foreshore more than 20 years ago. In 2018, a 2km long revetment was built adjacent to the Manuka detached breakwater trial site (Site B), with the design replicating the Nuku'alofa revetment. Part of the drive of the GCCA: PSIS managed advanced projects in north eastern Tongatapu was to look at tourism opportunities for this part of Tongatapu. The construction of the revetment negated this possibility, which was constructed with a single access along its length. However, of more interest, with respect to public attitude and associated costs, is the implication of such structures where retreat is inevitable due to low-lying land.

In terms of the best utilization of funds and implementing the most appropriate solution for a site, the revetment at this location is not a Managed Advance Response and does not address the cause of beach loss, quite the opposite; the revetment results in loss of beach access and amenity and exacerbates loss of beach sand. In addition, while the revetment does provide land resilience, it raises the question as to what is the cost to the community and how will it affect their response to inevitable retreat? The perceived 'safety' of this kind of structure is also known to encourage more housing development, rather than planning a retreat. Furthermore, the detached breakwaters (including sand transfer and planting) at Manuka were four times more cost-effective than the 2km of revetment (Figure 4). For instance, 8km of coast could have been protected and enhanced with the available funds using more appropriate measures (i.e. a hybrid solution), or most of the funds could have been directed to other projects to increase Tonga's CC resilience.

Figure 4: The 2km revetment adjacent to the detached breakwaters at Manuka is inappropriate for an area where retreat is inevitable.

This raised issues of the need for an integrated coastal management plan for Tongatapu to provide a consistent and holistic approach to CC resilience. The GCCA: PSIS project is currently in its second phase, known as the Global Climate Change Alliance + Scaling Up Pacific Adaptation (GCCA+ SUPA), and the Government of Tonga has selected coastal protection as the focus sector for its regional project. eCoast is currently developing a coastal resilience strategy for the entire northern coastline of Tongatapu, which is significantly biophysically different from the rest of the island, and includes 10 additional pilot/trial sites. It is scheduled to be completed in early 2021, and similar to the project

presented here, the pilot/trail sites will be monitored to determine their impacts and efficacy for consideration in other similar locations (in terms of coastal processes) in the Pacific Islands.

Climate change is now a reality and is one of the most rapidly evolving issues for the 21st century. The link between climate change and human mobility is complex as it is aligned with different social, environmental, economic, cultural and political factors. The adverse impacts associated with climate change, such as sea-level rise, floods, drought and storms, are displacing millions of people every year across the globe. These displacements create multifaceted impacts on people and their livelihoods by changing their way of living, causing stress, uncertainty and, in the worse cases, loss of lives and property.

Although there are no comprehensive global statistics of climate-induced human migration (IOM, 2020), the global displacement data by the Internal Displacement Monitoring Centre (IDMC) shows that approximately 255.6 million people were displaced internally between the years 2008 and 2019 because of climatic disasters worldwide (IDMC, 2020a). In addition, human displacement is likely to increase in future (Wilkinson et al., 2016).

If global temperatures continue to rise at predicted rates, and slow and/or sudden onset hazards increase, these will result in mass displacement of human populations. Therefore, climate-induced migration is considered as a significant global challenge, and is recognized as a considerable threat (Apap, 2019; Ionesco et al., 2017).

In 2019, 23.9 million people from 140 countries and territories were displaced due to climatic disasters, and the Pacific was one of the most significantly affected areas globally. Although some people are forced to move to other countries, the majority of mobility occurs within the borders of countries (IOM, 2020). In many cases, people attempt to settle in new places after losing their home, and these new locations are also highly exposed to future hazards, but they have no choice. It is predicted that at least 50,000 Pasifika people could lose their homes each year due to the increasing frequency and severity of climate-related extreme hazards (IDMC, 2020b).

In the context of Pacific nations, small island countries like Fiji, Kiribati, Marshall Islands, Solomon Islands, Tonga, Tuvalu, and Vanuatu are highly susceptible to climate-induced displacement (Burkett, 2011; IDMC, 2020b). This is because of their low-lying nature and lack of available land for habitation and agriculture compared to larger countries like Australia and New Zealand. In such a situation, the climate-vulnerable island people tend to migrate to a safer location within their own countries or across borders. It is evident that

within the last decade, one in ten people in Kiribati, Nauru, and Tuvalu have already migrated due to worsening climatic conditions (Apap, 2019; Kawajiri, 2018).

There are limitations to cross-border migration for climate-vulnerable people, including, state sovereignty of other countries, and lack of international law, policy and legislative action (Apap, 2019; IOM, 2020; Ionesco et al., 2017; Murray, 2010). Climate-induced migrants are not covered by the 1951 Geneva Convention, which provides grounds for refugee status (Apap, 2019). This means that, unlike those with refugee status, climate-vulnerable people cannot easily migrate to overseas countries. In some situations, relocation offers with humanitarian visas are made, but this is rare; for example, the United States, Brazil and Argentina offered visas for Haitians following the earthquake in 2010 (IOM, 2020).

Climate-induced displacement has fallen into gaps in the current global policies for migration (Wilkinson et al., 2016), and appropriate management of climate migration is rapidly becoming a national and international policy issue (Boncour & Burson, 2009). Moreover, many scholars are calling for regional and international frameworks for climate-induced migration (Kawajiri, 2018). For example, the African Union initiated the 'Kampala Convention' in 2009, which is the first legally binding regional instrument to protect and assist internally displaced persons (IDPs) in Africa. In 2012, Norway and Switzerland introduced the 'Nansen Initiative' to address the potential legal and protection gaps for people in cross border migration induced by environmental change and extreme weather conditions.

International organizations are also trying to deal with current policy failings to address the climate migration challenge. As a result, the United Nations launched the 'Global Compact for Safe, Orderly and Regular Migration' in 2018 that covers all dimensions of international migration in a holistic and comprehensive manner considering the risks and challenges for individuals and communities in countries of origin, transit, and destination.

Aligned with the collective global responsibility to respond to climate change and its impacts, the Government of New Zealand is committed to contributing internationally along with strong domestic action on climate change. Accordingly, in November 2019 New Zealand passed a Zero Carbon Act to help reduce global warming and lessen the impacts of climate change on vulnerable communities.

New Zealand has been also playing a leading role in the Pacific in response to climate-induced displacement for many years, by providing adaptation and mitigation programmes such as installing renewable energy supplies, protecting fishing resources, conducting different aid and research projects on disaster relief, ocean acidification and resilience building (Ardern, 2018).

Remarkably, in 2017, New Zealand introduced an "experimental humanitarian visa" for people who were being displaced from Pacific Island countries due to the adverse effects of climate change. However, the initiative was not continued, and New Zealand dropped the plan for issuing "climate refugee" visas. Pasifika people wanted to stay in their home countries to preserve their society and culture, and the term "climate refugee" was problematic on many levels as they think it does not reflect the actual dimensions of their

problem (ABC News, 2014).

The New Zealand government provides legal migration pathways, offering specific access category visas for Pasifika people at risk of climate displacement. For example, New Zealand accepts 250 people from Fiji, 75 from Kiribati, 250 from Tonga and 75 from Tuvalu every year through the Pacific Access Category (PAC) visa and provides them residency (Kawajiri, 2018). In addition to this, the Seasonal Worker visa scheme in New Zealand is another door that is always open for the Pasifika people (although the scheme has been temporarily suspended in 2020 due to travel restrictions following the Covid-19 pandemic). The most recent initiative by the New Zealand Government is developing an action plan to build a greater evidence base of the social and economic impacts of climate-induced migration on New Zealand and Pacific Island nations (MoFA, 2018), suggesting that New Zealand is growing increasingly concerned about the climate-migration issues in New Zealand and the Pacific region as a whole.

Climate-induced migration is not hypothetical—it is happening in different parts of the world right now. A recent systematic review by the author identifies the Pacific region as one of the global hotspots of climate-induced displacement. Many Pasifika people are seeking help to navigate a future that may lead to climate displacement. Providing better livelihood opportunities for them is now a global responsibility.

In response to this, New Zealand must work towards improving current migration policies to account for increasing climate migration trends, particularly in the Pacific. But to do this, there is a pressing need for an evidence base to support decision-making. Addressing the future needs of climate-induced migrants who come to New Zealand, and assessing their socio-economic, environmental, and cultural impacts on a broader scale is the first step. Impact assessment is a vital tool for identifying the potential future impacts of climate migrants in New Zealand and Pacific.

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