



Pacific Ecosystem-based Adaptation to Climate Change (PEBACC)

WELCOME!

to this second edition of the PEBACC newsletter.

Globally, ecosystem-based adaptation (EbA) is gaining ground as a pragmatic and sustainable development option for building resilience to climate change. It is, however, a relatively new concept in the Pacific (although Pacific Islanders have been practising it for generations) and this newsletter aims to raise awareness and understanding amongst policy makers, practitioners and communities. As EbA is everyone's business, I encourage you to use the newsletter as a forum to showcase work you might be doing in this area.

In this edition we are pleased to share with you articles relating to the ecosystem and socio-economic resilience analysis and mapping (ESRAM) studies that PEBACC commissioned in Fiji, Solomon Islands and Vanuatu. In addition, there are a number of ecosystem-related articles that we hope you will find useful and relevant to your work.

Herman Timmermans
Project Manager
PEBACC Project



COMMUNITY LEADER, TANNA, VANUATU © GRIFFITH UNIVERSITY

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The Pacific Ecosystem-based Adaptation to Climate Change Project is a five year initiative implemented by the Secretariat of the Pacific Regional Environment Programme (SPREP) in partnership with the governments of Fiji, Solomon Islands and Vanuatu.

The project is part of the International Climate Initiative (IKI). The German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) supports this initiative on the basis of a decision adopted by the German Bundestag.

The Project focuses on strengthening and protecting the role of natural ecosystem services to enhance resilience to climate change.



Supported by:



Federal Ministry for the
Environment, Nature Conservation,
Building and Nuclear Safety

based on a decision of the German Bundestag

Potential impacts of proposed mine a concern to communities



WAGINA ISLAND, SOLOMON ISLANDS. © B.TOKI

Wagina Island (also known as Vaghena) lies at the southeastern tip of Choiseul Province in Solomon Islands approximately 166 km from the provincial capital of Taro in the north.

The island is known for its beautiful lagoons, sandy beaches and seaweed farming activities.

But a potential risk to the healthy ecosystems on the island is a process currently under way in the form of a proposed bauxite mine on the island.

The proposed project holds tenements covering some 45 square kilometres on the eastern side of Wagina Island (over half of the total island land mass) (Southwest Pacific Bauxite, 2014).

According to an ecosystem and socio-economic resilience analysis and mapping (ESRAM) of the island, commissioned by the Secretariat of the Pacific Regional Environment Programme (SPREP) through the Pacific Ecosystem-based Adaptation to Climate Change (PEBACC) project from 2016 to early 2017, 'The impacts of the mining on the local population would be significant. The proposed mining activities present a major threat that the province has not previously been exposed to. There is also a mining proposal being developed for nickel mining on the southern end of Choiseul Island.'

The main ecosystems on and around Wagina Island are tropical forest, lowland swamps, mangroves, coastal fringe, and the marine environment (coral reefs and lagoons).

These ecosystems are utilised heavily by local residents and many of them have

These ecosystems are utilised heavily by local residents.

unique and significant biodiversity and existence values.

The ESRAM report states that 'the proposed bauxite mine will present a major threat to mangrove communities on the eastern side of Wagina island, primarily through mechanisms such as clearing and contamination.'

And in terms of the forests, 'The proposed mining development would necessitate the widespread clearing of approximately 25% of the island's terrestrial forest.'

In addition, 'Pollution-related effects may be exacerbated in lagoon areas with higher water residence times.'

The ESRAM report also stressed that 'the proposed mine has the potential to affect the water quality of any river or stream hydrologically connected to the development (i.e. not only those within the direct development footprint) through increased sediment loads and other contaminants associated with both the construction and operation of the mine (including supporting infrastructure, roads and others).'

The assessment team to Wagina was led by BMT WBM, the University of Queensland, Ecological Solutions Solomon Islands, Lauru Land Conference of Tribal Community (LLCTC) and SPREP.

Value of ecosystem services on Tanna Island is significant

Tanna is a 56,299.74 hectare island, situated in Tafea Province of Vanuatu. The island's well-known feature is the Yasur Volcano: one of the most accessible active volcanoes in the world.

The island was identified as an implementation site for the Pacific Ecosystem-based Adaptation to Climate Change (PEBACC) project by the Secretariat of the Pacific Regional Environment Programme and the Government of Vanuatu. In 2016, PEBACC commissioned Griffith University (Australia) to conduct an ecosystem and social economic resilience analysis and mapping (ESRAM) of the island.

The research included the development of an updated land cover map of the island using a high resolution mosaic of RapidEye satellite imagery.

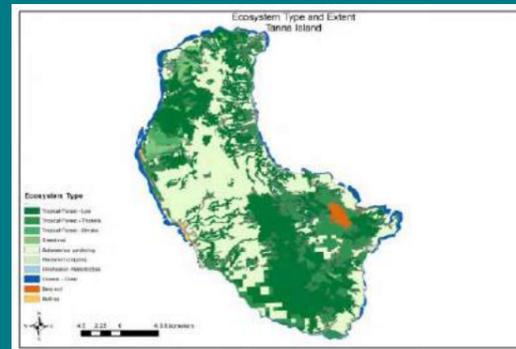
The mapping revealed that the ecosystems with widest coverage on the island are tropical forests (51.3%) and subsistence gardens (39.8%). Coral reefs systems comprise 4.2% by area for Tanna which is comparable to the national average of 5%. Using a benefit transfer methodology it was determined that the majority of Tanna's ecosystem service value is generated by two ecosystem types, coastal coral and subsistence gardens.

The assessment stressed that: 'Certain ecosystem service benefits, including many aspects of *kastom* services – the traditional relationships customary communities have with their land and seas, and the traditional uses they make of their natural resources – are not amenable to monetary valuation, or it would be inappropriate to attempt to view them through an economic lens.'

In terms of the drivers of vulnerability for Tanna, the Yasur volcano has a significant impact both on ecosystem conditions and people's wellbeing and livelihoods. The winds transport the ash from the volcano across the island and it falls on plants and trees, causing reduced plant growth, as well as contamination of water and food resources. The population on Tanna is also growing rapidly which is increasing pressure on



CULTURALSURVEY, TANNA. © GRIFFITH UNIVERSITY



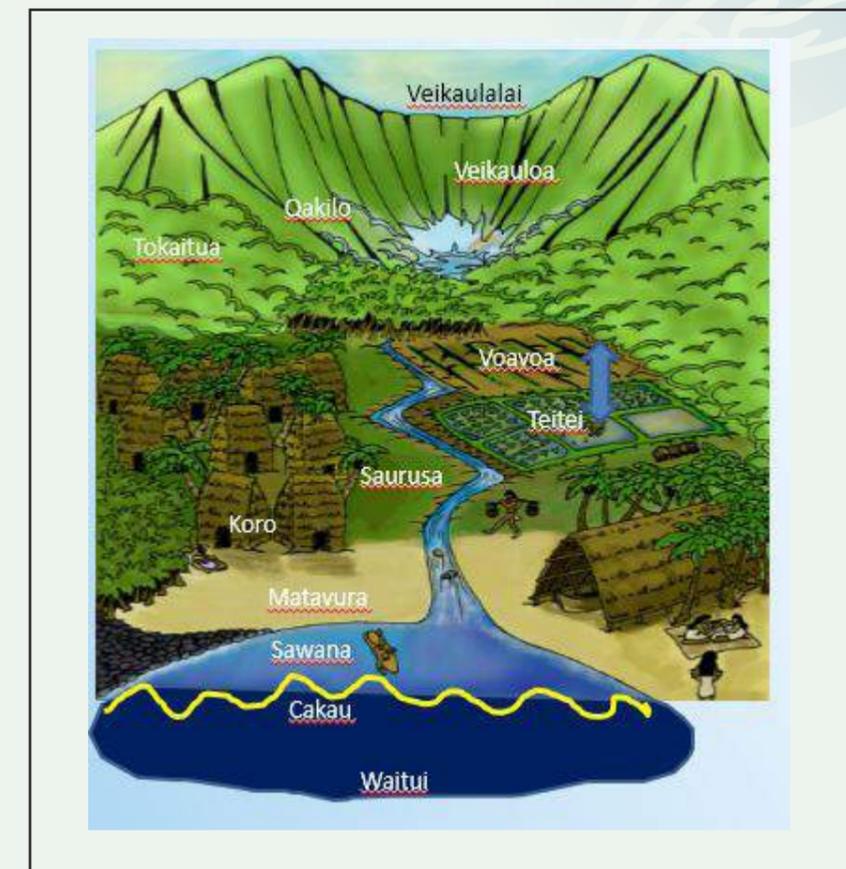
the island's ecosystems.

In terms of climate change the report shows that the current 1-in-20-year daily rainfall extreme event will become, on average, a 1-in-5-year event by 2090. Mean air temperature is expected to rise by 0.3 degrees centigrade each decade with ocean temperature rising at a similar rate. Mean sea level is expected to rise by 43 centimetres by 2070 based on a business as usual emissions scenario.

The report also revealed that there is sufficient within-island climatic variability to likely require different adaptation options to be considered between the north and the south of the island, and between the coast and the uplands. The communities of Tanna are well aware of the vagaries of the climate, having endured category 5 Cyclone Pam in 2015.

These expected climate changes, in addition to non-climate factors such as population growth, infrastructure development and volcanic ash, make it important that Tanna's ecosystems are well managed so as to retain the goods and services (including disaster mitigation) that they provide.

A traditional framework for resource management on Taveuni



Traditional leaders on Taveuni Island have been able to revive a culturally embedded ridge-to-reef framework for resource management after workshops and subsequent visits by the Pacific Ecosystem-based Adaptation to Climate Change (PEBACC) since August 2016.

The framework, referred to as the *Tua* framework, aims to integrate some of the "best" elements of land management with the realities of the 21st century, such as economic needs, multiple backgrounds of lessees and landowners, gender inclusion and use of technology.

The framework is made up of a list of areas of the landscape that have a specific purpose, with a general description or indicator of how the land (or sea) is used or managed, and the relative importance of that area (a proxy for the ecosystem services) in an ideal setting.

The *Tua* forms part of the traditional Fijian system of land management. The areas span 12 zones, starting from the waitui (deep sea)

all the way up to the veikaulalai (Ridge top).

Project Manager for the PEBACC Project, Mr Herman Timmermans, said, 'Mapping island resources using this traditional format may have more meaning to communities and help strengthen their engagement in the planning process.'

'The idea is to highlight and enhance methods of natural resource 'management' that have been in effect for centuries, rather than re-create a western-based view of how management 'should' be done.

'The ultimate goal is to retain institutional longevity in a natural resource management design that can be adapted for the 21st century, building on capacity already in place.'

So far, the traditional leaders, each representing their *vanua* among their own chiefly structures, have formed a formal subcommittee to represent the three districts of Taveuni and have begun outreach with a wider audience of landowners and participants.

The value of seagrass habitats



PHOTO: JAMES ST. JOHN

Seagrass beds, like coral reefs and mangroves, are amongst the most productive habitats in the marine environment. Seagrasses provide food, shelter, and essential nursery areas to thousands of marine and estuarine species.

An extension of the important role they play in providing habitat, seagrass beds help support many of the commercially and recreationally important fishery species along the coast. While seagrasses rely on clear water to survive and thrive, they can also play a role in improving water quality and clarity. Seagrasses help trap fine sediments and particles that are suspended in the water column, which increases water clarity.

Seagrasses are also able to filter, to a degree, nutrients that come from land-based pollution and stormwater runoff before these nutrients are washed out to sea and to other sensitive habitats such as coral reefs. However, these natural filtering abilities can be overwhelmed and should not be assumed to be limitless.

In terms of hazard reduction, under normal conditions, seagrass meadows are able to slow down water currents and reduce wave energy, reducing the impact of wave action on adjacent shorelines. Additionally, seagrass beds are capable of stabilizing the sea floor with their extensive root systems, keeping sediments from moving and trapping

suspended sediment to maintain the integrity of the local shoreline.

The effectiveness of seagrasses is substantially reduced in major storm events as the relative reductions in wave energy and stabilization can be overwhelmed by larger and more violent storm driven wave action. That said, as with other offshore and coastal habitats, seagrasses provide the most effective protection when working in concert with mangroves, coral reefs, oyster reefs, or coastal marshes.

Water clarity, water quality, and water temperature are the primary determinants of seagrass health. While other threats – such as physical impacts from fishing and boating or the outbreak of disease – can cause significant damage, recent studies have found that the predominant threats to seagrasses comes from land based pollution (run-off, nutrients, sedimentation) and increasing water temperatures.

In addition, excessive nitrogen pollution has come to be known as the killer threat to seagrasses. Increased nitrogen in the water column may lead to other species outcompeting seagrasses while also encouraging the growth of algal blooms which can limit the amount of light that reaches seagrass leaves.

This article was sourced from nrcsolutions.org

CORAL REEF, TANNA, VANUATU
PHOTO: DAN MCARRY

'Mangroves and corals are valuable coastal defences' - World Bank report

Scientific evidence on coral reef and mangrove coastal protection services is growing as well as on-the-ground projects demonstrating the value of these ecosystems for coastal protection.

This was reported by a recent World Bank technical report titled *Managing Coasts with Natural Solutions* (2016).

The report evaluated the coastal defence services provided by mangroves and coral reefs and called for recognition of these ecosystems.

"Coral reefs and mangroves can substantially reduce vulnerability and risk by providing natural protection from flooding and erosion, which is important to hundreds of millions of people globally.

Field measures, models, and demonstration projects provide strong evidence of the coastal protection benefits of mangroves and reefs. Coral reefs and mangrove forests should no longer be considered to be a novel way to defend the coast."

Specifically on mangroves, the report highlighted the capacity of this ecosystem to significantly weaken waves.

"Studies suggest wave height can be reduced by 13 to 66 percent over a 100-meter-wide mangrove belt, while wave height can be reduced by 50 to 100 percent over a 500-meter-wide mangrove belt. Wave height reduction within a mangrove forest depends on the width of the forest, mangrove tree morphology, water depth, topography, and wave height.

"Mangrove species with aerial roots are more effective at attenuating waves in shallow

water, when the waves encounter the roots. Species without aerial roots are better able to attenuate waves when the water level reaches the branches.

"The mangrove vegetation reduces wind speeds over the water surface, lessening the likelihood of waves increasing in height within mangrove areas. Mangroves affect local topography over longer-term scales through their effect on sedimentation, erosion, and the maintenance of tidal creeks and channels."

Coral reefs are reported to protect coasts from erosion and flooding by attenuating wave energy and supplying and trapping sediment found on adjacent beaches.

"Recent meta-analyses by Ferrario et al. (2014) show that coral reefs reduce wave energy by up to 97 percent. Reefs function much like low-crested breakwaters for wave attenuation and their behaviour is well characterized in models and field demonstrations.

"They protect shorelines primarily by dissipating wave energy, mainly by breaking waves at the seaward edge and through bottom friction as the waves move across the reefs. Factors determining coral reef wave attenuation include the following: depth of water above the reef surface; its cross-shore bathymetric profile; and reef rugosity or surface roughness."

In terms of the way forward, the report recommended merging both ecological and engineering schools of thought into more mixed integrated designs to yield multiple benefits. In addition, they are likely to be more cost effective.



WAKATU CHAMPIONS PHOTO: C CHANGE

An initiative of the Ministries of iTaukei Affairs, Forests, Fisheries and Agriculture, *Wakatu* is an environmental campaign focused on caring for the land and forests that have taken care of Fijians for generations.

Launched in May 2016, the campaign uses local champions who are landowners and conservation officers to spread the word on sustainable land use.

The campaign believes that if change is going to happen in Fijian villages, it should be driven by people from within communities and not outside experts who often are not able to explain the issues in ways that resonate with the people.

Mr. Seci Rakoroi, a Lay Preacher and a great champion for the *Wakatu* campaign is committed to changing mind sets and practices.

"We have to start spreading the word now for our people to realise that we need to change the way we are treating our land." Mr. Rakoroi said.

Mr. Rakoroi and three other *Wakatu* Fiji champions, Mr. Iosefo Jolame, Mr. Ilai Mataraki and Mr. Ulaiasi Salalao, did just that in Delaikoro area in Vanua Levu early this year.

"One of the big problems in the Delaikoro area (in Vanua Levu island) is that farmers keep clearing forest in search of virgin soil. Farming practices, which rely on things such as burning, exhaust the soil and force farmers

on to new land. That means less and less intact forest, which is needed to ensure communities all over Vanua Levu have clean drinking water, and food, medicine and building materials." Mr. Rakoroi said.

The *Wakatu* champions talked about how the land had taken care of people and how no one was really taking care of the land. They shared ways to farm better, to reduce flooding and protect benefits such as drinking water.

The *Wakatu* champions use innovative outreach tools, including illustrated flip charts and inspirational videos, to help individuals and communities to understand the issues and take action to improve the health of the land through sustainable farming and forestry.

The Ministry of iTaukei Affairs has been partnering with cChange, a regional communications non-profit organisation, to offer training to the local champions as communities continue to face more challenges meeting their food and income needs from the land.

cChange founder, Scott Radway, believes that "if the message hits home, they (the people) will take action,"

To join the *Wakatu* Fiji campaign, visit www.facebook.com/wakatufiji.

This article is a modified version of the original article published in the *Fiji Times* here: <http://www.fijitimes.com/story.aspx?id=387538>



Raising chickens, an alternative to fish to conserve reef ecosystems

Dr Austin Bowden Kerby is a marine ecologist whose passion for reef conservation has led him to venture into breeding high productive chickens for local farmers in Fiji as an alternative to reef fish in order to conserve the reef balance.

'I started breeding chickens at my Happy Chickens farm in the Sigatoka valley in Fiji, because what is destroying the reefs is overfishing, among other threats. People are overfishing the reefs and there is a trend in Fiji for coral reefs to be set aside as no-fishing areas or tabu areas but no one is promoting alternative livelihoods.

'So if you're not going to fish from the reefs, where are you going to get your protein from? For this to work, you have to provide an alternative.'

Dr Kerby's Happy Chicken project is his idea of introducing sustainable poultry farming where highly productive free-ranging chickens feed on waste coconut, waste food, worms, moringa leaves and other food sources from the environment.

'We have been able to develop a cross-breed of chickens 'super-jungli' from imported egg-layers crossed with local roosters that is more productive than the local village chook.

'My average chickens are over 12 kg and

are popular amongst the local farmers.

'We also have developed methods to improve local productivity. So far, we have been able to release at cost over twenty thousand baby chicks and over 500 ducklings from our sustainable livelihoods farm in the Sigatoka Valley.

'We have sent chicks to Taveuni by air and chicks to Kadavu and Vanua Levu by sea. We also sent along our special mobile rearing pens with the two seaborne shipments. Our goal is to assist these communities with alternative livelihoods and small-scale free range poultry farming as a sustainable alternative food source.'

Dr Kerby runs a local NGO called the Sustainable Environmental Livelihoods for the Future out of his farm in Sigatoka valley. He is also interested in permaculture and believes in diversity on a farm.

'Chickens complement permaculture by utilising resources that plants and other animals cannot. For example, eating weeds and insects and worms and converting them into high protein food, while producing rich manure for organic gardening and nurseries.

'It is important to understand the different ecosystems on the farm and how they



DR KERBY AT HIS FARM IN SIGATOKA VALLEY, FIJI

support each other and nurture the various systems.'

Apart from farming chickens, Dr Kerby also has a few geese and ducks, does honey farming and has an orchard of fruit trees.

With funding support from Global Giving, Dr Kerby and his team have been able to support workshops at the farm as well as in other parts of Fiji and the Pacific.

'So far I've done more than six workshops here, where I trained women from Koro Island, Moutiki Island, people from a community in Lautoka, NGO groups and we are now getting requests from the Peace Corps. We also did workshops on Christmas Island and were able to bring in two farmers from Vanuatu for training at our farm in Sigatoka.'

For more information, contact Dr Kerby via email on: abowdenkerby@gmail.com



Environmental resources aim to inspire better decision-making

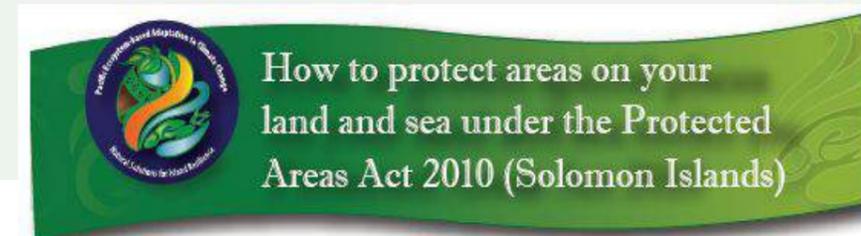
A series of environmental fact sheets were released this quarter by the Solomon Islands Ministry of Environment, Climate Change, Disaster Management and Meteorology with support from the Pacific Ecosystem-based Adaptation to Climate Change (PEBACC) project.

The fact sheets are aimed at educating and empowering Solomon Islanders to make informed decisions about their environmental resources.

The fact sheets cover:

- environmental impact assessment for landowners;
- organising your community for conservation;
- timber rights acquisition process for landowners;
- mineral rights acquisition process for landowners;
- how to protect areas on your land and sea under the Protected Areas Act 2010; and
- a summary of the Code of Logging Practice.

For copies of the fact sheets, please contact the ministry on phone +677 23031 or email pebacc@sprep.org



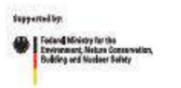
What are protected areas?

Protected areas are mainly set up to conserve nature and wildlife. They can also help support the sustainable use of resources to meet the livelihood needs of local communities and customary owners. Legally protected areas can help to support the traditional system, especially for serious infringements (when people break the rules of a protected area), and can provide a tool to formalise and enforce rules and community rights.

A protected area is one way communities can manage their land and sea for food and livelihoods. To create a larger protected area under national law, communities can network with their neighbouring communities to secure a bigger area to be protected. Another way to formally protect community areas is through the Fisheries Act or Provincial Ordinance.

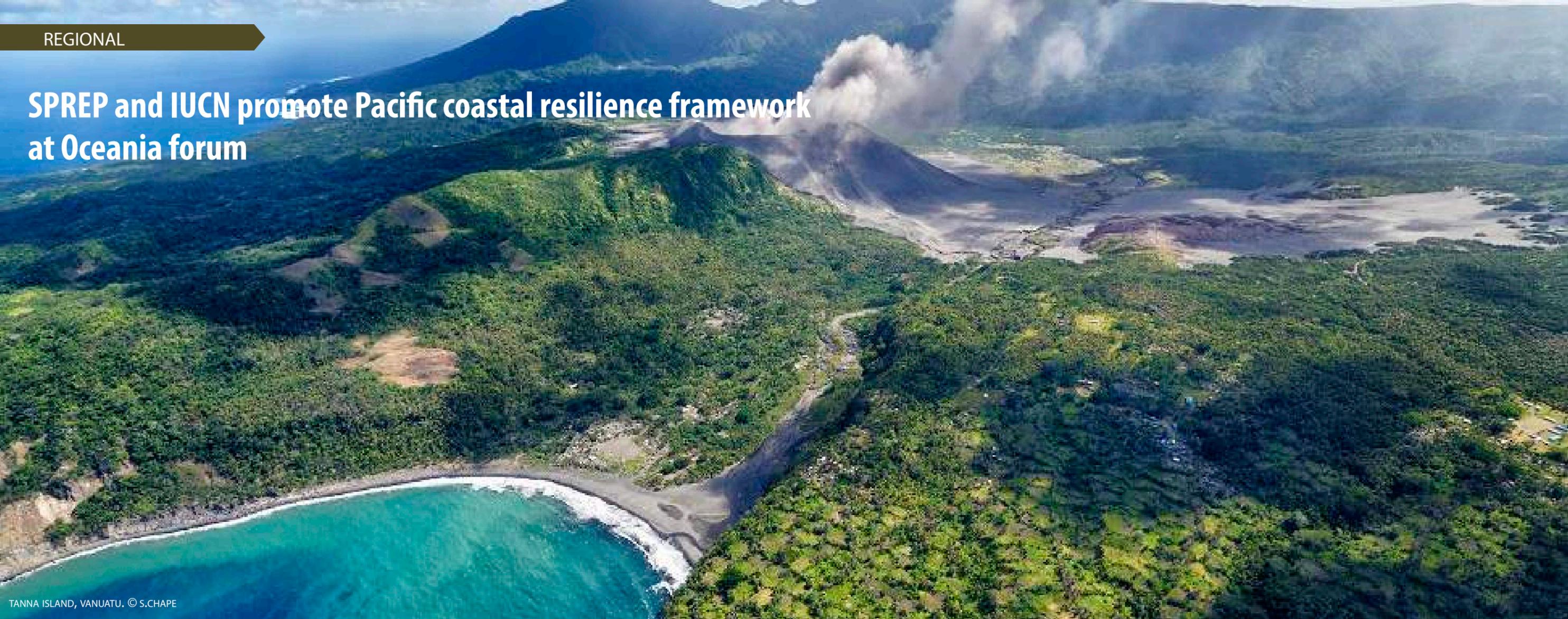
How will my community benefit from a protected area?

Establishing a legal Protected Area can help a community protect areas of their land and sea, for current and future generations:



based on a decision of the Customs Resolving

SPREP and IUCN promote Pacific coastal resilience framework at Oceania forum



TANNA ISLAND, VANUATU. © S.CHAPE

At the first Oceania Ecosystem Services Forum in Brisbane Australia from 27-31 March 2017, the Secretariat of the Pacific Regional Environment Programme (SPREP) and the International Union for the Conservation of Nature (IUCN) presented a framework for addressing coastal resilience in the Pacific islands.

IUCN Oceania's Strategic Partnerships Adviser, Ms. Solstice Middleby highlighted that the new framework will underpin the design of a full programme proposal for support through the Green Climate Fund (GCF).

"The extensive services and benefits our marine and coastal ecosystems provide to our people and nations cannot be overstated, nor can the risks they face. We need to focus on every opportunity we have to use our ecosystems for climate change adaptation.

"IUCN and SPREP are working with seven Pacific islands countries to use the new

framework to take ecosystem-based adaptation approaches to scale in the region.

"The Pacific is a resilient region and we believe a well-designed intervention at scale could ensure that coastal and marine ecosystems can be maintained and continue to provide livelihood, cultural and economic services but contribute significantly, along-side other adaptation investments, to increased climate resilience for our people."

In highlighting the value of ecosystem services in the region, SPREP's Director of Biodiversity and Ecosystem Management, Mr. Stuart Chape said "Ecosystem services are vitally important for resilience and sustainable development across a whole suite of economic and social agendas in Pacific island countries and territories."

"While most Pacific islands are implementing climate change adaptation programmes, only a limited number

explicitly address ecosystem approaches and their implementation, including the assessment of ecosystem services as a basis for long term resilience to climate change impacts.

"It is now time for a paradigm shift in the way Pacific island governments and communities value and use ecosystem services as a key response to climate change adaptation. It is time to scale up the ecosystem approach and integrate it into landscape scale and whole of country implementation, which is a critical part of the design of the coastal resilience framework developed by SPREP and its partners." Mr. Chape added.

Pacific island people rely heavily on ecosystem services and natural resources to support their national economies and community livelihoods. Today, these same ecosystems are under threat from climate change and other stressors such as population growth, natural disasters,

deforestation, pollution, and unsustainable management of natural resources.

It is therefore important for the Pacific to adequately recognise and value the opportunities and resilience provided by protecting and restoring natural ecosystems and the services they provide.

The goal of the enhancing coastal resilience programme is to help Pacific island governments and communities to strategically and practically address the critical challenges posed by climate change to the social and ecological systems that are the foundations for resilience and adaptation.

It will facilitate a paradigm shift by Pacific island governments to move from current disjunct and reactionary approaches to dealing with climate change and other anthropogenic stressors, which tend to focus on sectors, development agendas and thematic responses separately, to integrated holistic approaches within comprehensive analytical frameworks and scenario planning appropriate to the dimensions of predicted climate change impacts and the scale of countries or islands.

The coastal resilience framework comprises a four-step process:

1. Assess and map current critical ecosystem services and socio-economic relationships, and governance functions and relationships.
2. Assess ecological and socio-economic vulnerabilities and opportunities



Mr. Chape presenting the framework at the Oceania Ecosystem Services Forum

3. Evaluate future resilience scenarios
4. Design and implement resilience and adaptation responses

The forum provided an opportunity to share the concept with a broader audience of policy makers, planners and practitioners.



ECOSYSTEM-BASED ADAPTATION

PROMOTING NATURAL SOLUTIONS TO CLIMATE CHANGE

MANGROVE FOREST, VANUATU
PHOTO: DAN LAFFOLEY

WHAT IS ECOSYSTEM-BASED ADAPTATION (EbA)?

“Ecosystem-based Adaptation is the use of biodiversity and ecosystem services, as part of an overall adaptation strategy, to help people to adapt to the adverse effects of climate change...it aims to maintain and increase the resilience and reduce the vulnerability of ecosystems and people in the face of adverse effects of climate change.” CBD 2009

What are the benefits of EbA?

Having a healthy environment around us secures our supply of freshwater and other natural resources. These are called ‘ecosystem services’ and are the added benefits that do not come when ‘hard’ engineered adaptation solutions, such as when seawalls are built.

But what is adaptation?

Adaptation is making changes in order to reduce the vulnerability of a community, society or system to the negative effects of climate change.

When is EbA the best adaptation option?

There are many different approaches to adaptation. The best option will reduce the vulnerability of a group of people in the most cost effective way over the long term. This could be through conventional adaptation, EbA or a combination of both.

The ability to compare EbA with conventional solutions will need to be built through effective monitoring of and evaluation of current EbA projects and by building the capacity of local decision-makers to select the best adaptation options available.

In the Pacific, how can EbA help us adapt?

By protecting intact ecosystems, managing natural resources and

restoring degraded ecosystems.

For example, steep slopes in our region are often stabilised by deep rooted vegetation. As rainfall is expected to be more intense in the future, this natural buffer protects communities from flooding and landslides and also ensures that reefs are healthy by reducing the impact of sediment flows from erosion.

Keeping forests intact, or replanting them, also provides a source of building materials, crops and firewood.

Water catchments are also protected and in the sea, healthy reefs can then support greater fish populations.

Where can I get more information?

For further information about EbA and the PEBACC Project, visit www.sprep.org/pebacc.

About SPREP

SPREP is the primary intergovernmental environmental organisation working in the Pacific. Visit www.sprep.org for more information about the work of SPREP in the region.