



# Compendium of Case Studies on Climate and Disaster Resilient Development in the Pacific

2015



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Cover Photo: Ekipe students wait to perform their tsunami haka as part of Christmas Day celebration, Save the Children.

# Compendium of Case Studies on Climate and Disaster Resilient Development in the Pacific

2015

# Preface

This Compendium of Case Studies on Climate and Disaster Resilient Development in the Pacific showcases programmes and projects that address climate and disaster risks, through climate change adaptation, disaster risk management and/or greenhouse gas emissions reduction. This compendium highlights lessons learnt at the programme and project level<sup>1</sup> and may be used as a resource for future initiatives moving forward under the Strategy for Climate and Disaster Resilient Development in the Pacific (SRDP).

This compendium provides a snapshot from initiatives undertaken in recent years, focussing on projects where valuable lessons could be drawn. Organisations, governments, and communities from across the Pacific region provided photographs and contributed to content.

## Acknowledgements

The Compendium of Case Studies on Climate and Disaster Resilient Development in the Pacific was compiled by Clare White of the Secretariat of the Pacific Community's (SPC) Geoscience Division with the support from the Roadmap Technical Working Group, comprising representatives from SPC, Secretariat of the Pacific Regional Environment Programme (SPREP), Pacific Islands Forum Secretariat (PIFS), United Nations Office for Disaster Risk Reduction (UNISDR), United Nations Development Programme (UNDP), and the University of the South Pacific (USP).

Strategic guidance was provided by the Roadmap Steering Committee comprising representatives from governments of Pacific Island countries and territories as well as representatives from civil society and the private sector.

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Organisations, governments, and communities from across the Pacific region provided content and photographs.

## List of Acronyms

CCA	Climate Change Adaptation
DM	Disaster Management
DRR	Disaster Risk Reduction
DRM	Disaster Risk Management
NGO	Non - Government Organisation
PICs	Pacific Island countries
PICTs	Pacific Island countries and territories
RFA	Disaster Risk Reduction and Disaster Management: A Framework for Action 2005 - 2015
PIFACC	Pacific Islands Framework for Action on Climate Change 2006 - 2015
SRDP	Strategy for Climate and Disaster Resilient Development in the Pacific

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# A. Executive Summary

This compendium showcases programmes and projects from across the Pacific region that address climate change and disaster risks, through climate change adaptation (CCA), disaster risk management (DRM) and/or greenhouse gas emissions reduction.

These forty case studies cover different topics across Pacific Island countries and territories (PICTs) and showcase significant work undertaken by the region to address climate and disaster related challenges and to build resilience. These actions have occurred while the regional policy frameworks on climate change (Pacific Islands Framework for Action on Climate Change 2006-2015) and DRM (Disaster Risk Reduction and Disaster Management: A Framework for Action 2005-2015) have been in effect. Both frameworks expire in 2015 and are superseded by the Strategy for Climate and Disaster Resilient Development in the Pacific (SRDP).

Trends, challenges, solutions and lessons are drawn from these case studies, which may serve as a guide for the design of future initiatives to be implemented under the SRDP and provide a reference for the Pacific and other regions of the world.

Below is a summary of key lessons learnt including trends from this compendium:

- Climate change and disasters are complex cross-cutting issues with multidimensional development impacts. Responses at a programme and project level should therefore be multidisciplinary and cross sectoral. The programme, network or consortium approaches can provide a shared framework for multiple agencies and governments working within one location.
- In relation to programme and project development; integrated climate change and DRM objectives can streamline resilience building actions and reduce duplication.
- Actions that address specific issues such as water security, food security, and health, also contribute to increasing the broader resilience of communities to climate and disaster risks.
- It is important for decisions to be evidence based and for responses to be adapted to the local context. Prior to decision-making, assessments should be undertaken to identify the most appropriate and cost effective solution, tailored to the local context. Sound vulnerability assessments of areas and populations, robust scientific assessments and modelling of hazards and risks, and cost benefit and economic analysis of options should be undertaken.
- When countries and communities utilise renewable energy resources, this not only supports increased access to energy services, but also improved energy security, energy independence, and economic resilience, as communities will be less affected by price fluctuations, costs and availability of imported fossil fuel.
- In small countries in the Pacific, almost complete conversion of the whole country to renewable energy can be undertaken.
- To enhance the sustainability of improvements in resilience, it is important to build strategic partnerships and continually engage with stakeholders such as grass root community and women's groups, private sector stakeholders, national and provincial governments, regional technical agencies, non – government organisations (NGOs) and international development partners.
- Applying a gender lens to programmes and projects as well as addressing gender equality will increase the effectiveness and success of these initiatives. For example, gender responsive community facilitation can assist in developing effective community Disaster Risk Reduction (DRR) plans.
- Children and youth can act as positive agents of change for their whole community in relation to building climate and disaster resilience when empowered to take on these roles. They can lead through initiating actions, raising awareness, and planning for resilience. Avenues such as media can also engage youth in climate and disaster issues, as well as raise awareness for the wider community.
- Many case studies demonstrate that participatory and inclusive approaches that factor in the needs and contributions from the most vulnerable, including but not limited to persons with disabilities, children and the elderly, yield more effective and equitable results.
- When communicating about climate change and disasters, information should be provided in simple to understand, non-technical language (preferably in local language), that explains scientific concepts in a local context. When communicating to children, the focus should be on local impacts to which they can relate, rather than complex climate science.

- It is important to understand local social and cultural perceptions and decision-making processes in order to design effective and resilient climate and disaster risk policies, strategies, methods and tools. It is important to note that the perceived level of threat from climate change and disasters is not the same across the Pacific region, and is not always in line with actual threats.
- Public and private partnerships can allow for effective and efficient delivery of services. This approach can lead to ongoing economic outcomes for local communities by creating jobs, developing skills, and building enterprises. For example, creating an enterprise to manufacture products locally for project activities, rather than importing products from overseas.
- Ownership by communities and governments of development outcomes that build climate and disaster resilience can be increased through actions such as training for ongoing maintenance of assets (e.g. early warning systems and solar panels); facilitating local committees' involvement in project planning and implementation; and supporting strong communication and engagement of communities with local, regional and national governments.
- Identifying and enhancing links between national policies and community based actions can improve the effectiveness and sustainability of activities to build climate and disaster resilience.

## B. Introduction

This compendium highlights programmes and projects, and the practices and approaches utilised in addressing climate change and disaster risks, through climate change adaptation (CCA), disaster risk management (DRM) and/or greenhouse gas emissions reduction. The case studies cover one or more Pacific Island countries and territories (PICTs)<sup>2</sup>, including representation from Micronesia, Melanesia, and Polynesia.

The programmes and projects highlighted in this compendium have been developed and implemented in the time period for which two regional frameworks were in effect: Disaster Risk Reduction and Disaster Management: A Framework for Action 2005–2015 (commonly referred to as the RFA) and the Pacific Islands Framework for Action on Climate Change 2006–2015 (PIFACC). As of 2015, a new and integrated strategy superseded these two frameworks: the Strategy for Climate and Disaster Resilient Development in the Pacific (SRDP). This compendium has been developed as a deliverable of the Roadmap process towards the development of the SRDP.

This compendium includes a selection of case studies on a diversity of topics demonstrating the cross cutting nature of climate change and disasters. For example, programmes and projects focus on water security and sanitation, food security, infrastructure development, disaster response simulations, financing, media and communications, hazard risk assessments, and youth and community. A range of implementers and partners are also represented, including national and local PICT governments and administrations, regional organisations, international organisations, civil society, the private sector and communities.

Trends, challenges, solutions and lessons are drawn from these case studies, which may serve as a guide for the design of future initiatives to be implemented under the SRDP and provide a reference for the Pacific and other regions of the world. This compendium refers to lessons learnt as knowledge acquired from observations and experiences. Lessons in this compendium may arise from positive or negative experiences. In both cases, these have led to insights which may benefit the development of future initiatives for climate and disaster resilience.



*Nissan District, Papua New Guinea. Photo: CARE International.*

Many case studies demonstrate a participatory and inclusive approach to the most vulnerable, including but not limited to persons with disabilities, children and the elderly. Many case studies also showcase the value of integrating gender perspectives in project development recognising the different roles, contributions, priorities and needs of women and men.

To develop the compendium, a request for case study proposals was sent through a number of networks such as the Pacific Disaster Net, Pacific Solutions Exchange and Pacific Climate Change Portal mailing lists. Proposals were then selected by the Roadmap Technical Working Group for inclusion in the compendium, while ensuring inclusion of case studies from across the Pacific, across topics and organisations. The process was overseen by the Roadmap Steering Committee.

## C. Regional Policy Frameworks

The Disaster Risk Reduction and Disaster Management: A Framework for Action 2005-2015 (commonly referred to as the RFA) and the Pacific Islands Framework for Action on Climate Change 2006-2015 (PIFACC) are the two regional policy frameworks for climate change and DRM in the Pacific covering the period from 2005 to 2015.

The RFA provided a regional framework with the aim to build capacity of Pacific Island countries (PICs) by accelerating the implementation of Disaster Risk Reduction (DRR) and Disaster Management (DM) policies, planning, and programmes. The framework aimed to address current and emerging challenges through strengthening DRR and DM, integrating these processes into sustainable development planning and decision-making at all levels, and strengthening partnerships of stakeholders in DRR and DM. The framework identifies guiding principles, expected outcomes, and key national and regional activities against six themes. These themes relate to governance and policy, information and education, analysis of hazards, vulnerabilities and risks, effective early warning systems and reduction of underlying risk factors.

The PIFACC aims to ensure that Pacific Island people build their capacity to be resilient to the risks and impacts of climate change. The framework aimed at strengthening climate change actions through raising awareness of climate change issues in the Pacific; guidance on design and implementation of climate change measures; guidance on development of national and regional sustainable development strategies; sector policies and climate change policies; and a framework to measure progress of climate change action in the region. The framework outlines expected outcomes, including national and regional outputs for six themes. These themes include implementing tangible and on-ground adaptation measures, governance and decision making, improving the understanding of climate change, education, mitigation of global greenhouse gas emissions, and partnerships and cooperation.

Progress under the RFA and PIFACC have been regularly reviewed and reported culminating in Regional Synthesis Report that synthesises the progress and implementation of the two frameworks.

These two frameworks are superseded by the Strategy for Climate and Disaster Resilient Development in the Pacific (SRDP). The strategy aims to strengthen the resilience of Pacific Island communities to the impacts of climate change and disasters by developing more effective and integrated ways to address climate and disaster risks, within the context of sustainable development.



*Children playing in the inundated village ground in Solomon Islands, Photo: University of the South Pacific.*





South Choiseul, Solomon Islands. Photo: Roger James, Secretariat of the Pacific Environment Programme (SPREP).

## D. Challenges in the Pacific Context

The Pacific region includes PICTs that are geographically isolated in a vast ocean.

Many are identified as Small Island Developing States (SIDS) by the United Nations<sup>3</sup>. It has been recognised that these islands are a special case both for environment and development. They are ecologically fragile and vulnerable. Their small size, limited resources, geographic dispersion and isolation from markets, place them at a disadvantage economically and prevents economies of scale<sup>4</sup>.

The small size of countries and their government administrations presents challenges in relation to limited natural and financial resources, as well as limited capacity to provide systems to improve the resilience of their residents. Often, there are also limitations in the availability and enforcement of policy frameworks.

Transaction costs in the Pacific are high<sup>5</sup> for example in relation to costs of transport and assets, as well as the limited availability of goods and services.

Working in remote rural communities across the Pacific presents challenges of accessibility and communication, making it difficult to engage and work with communities. Similarly, at a regional level, there are challenges in relation to working across numerous countries and territories with a diversity of languages (several hundred), cultures and social systems. Logistical issues arise such as communications on isolated islands, with limited or no phone and internet services, as well as transport via ocean vessels and aircraft.

Additional time is often required to complete activities, in particular when projects are interrupted and set back by natural hazards such as cyclones and flooding, which often result in a state of emergency or disasters being declared.

PICTs are highly vulnerable to disasters and climate change. They are exposed to geological and hydro-meteorological hazards such as earthquakes, volcanos, tropical cyclones and extreme weather, as several PICTs are located along the 'Pacific Ring of Fire' or in areas of high tropical cyclone activity.

Recent climate change predictions identify changes for the Pacific including an increase in extreme hot days and warm nights, extreme rainfall events<sup>6</sup>, intensity of tropical cyclones (in the South Pacific)<sup>7</sup>, sea level rise<sup>8</sup> and ocean acidification<sup>9</sup>. Climate change is likely to increase the risk of weather related disasters in the Pacific, due to sea-level rise, and associated flood and storm surge hazard; increasing cyclonic wind intensity; coastal erosion; saltwater intrusion; and potentially water scarcity and drought<sup>10</sup>. Climate and disaster risks exacerbate the human, social, economic, cultural and environmental vulnerabilities that Pacific Island communities are already exposed to due to their small size, their geographical specificities and isolation.

In the last decade, some PICTs have experienced disaster losses that in any single year have approached, and in some cases even exceeded their Gross Domestic Product (GDP). Examples include the 2007 earthquake and tsunami on the Solomon Islands, which caused losses of around 90 percent of the 2006 recurrent government budget and the 2004 Cyclone Heta on Niue, where immediate losses amounted to over five times the 2003 GDP<sup>11</sup>.

Addressing climate change and disasters in the Pacific region is therefore a challenging task. The following case studies highlight some examples on how these have been addressed in recent years.

## E. Case Studies of Climate and Disaster Resilient Development in the Pacific



Almost all communities in Choiseul, Solomon Islands, are coastal. From ridge to reef, the terrestrial and marine ecosystems they depend on are closely linked by relatively small catchments. Photo: Carlo Iacovino, Secretariat of the Pacific Environment Programme (SPREP).

# Integrating gender equality in climate change programmes

## Background

There is a growing recognition that gender equality is critical for achieving sustainable development in PICs. Within the context of CCA and mitigation, there is a need to strengthen gender-responsive approaches to facilitate meeting the needs and priorities of both men and women are met and that their respective skills and knowledge are drawn upon to improve outcomes. Effective adaptation and mitigation are processes involving behavioural change. There are many anecdotal examples showing the importance of considering social issues at the beginning of the project, but few case studies documented in the Pacific, that show the difference between men's and women's roles in relation to climate change adaptation and mitigation.

The Pacific Gender and Climate Change Toolkit was developed as a response to needs expressed by colleagues at the national and regional level for simple tools that could help them think about how to integrate gender in their programme.

There are many existing tools relating to climate change and gender that focus on community-level interventions.

This toolkit focuses on programme managers and supporting them in the understanding of the importance of gender and social inclusion to achieve project outcomes.



*Tanna women drying manioc, Vanuatu.*

## Activities and Results

The toolkit consists of modules which outline: key concepts and approaches to applying a gender lens and integrating gender perspectives in programmes and projects; gender and climate change links in specific sectors such as water and food security, disaster risk reduction, energy, gender issues in relation to climate change governance; and key gender indicators to support monitoring and evaluation.

Furthermore, the toolkit provides guidance along with web links to other resources that can help strengthen one's knowledge about gender and climate change. It is also supported by training and technical assistance to further build capacity in the Pacific region to effectively integrate gender in all climate change initiatives.

The toolkit and its training enable participants to practice and strategize ways to enhance and apply their gender analysis skills to climate change initiatives in the region. This should lead to improved project results on the ground that make use of all of the available skills and knowledge of all stakeholders.

At the Training of Trainers, held in 2014, a participant said that the training had opened her eyes to 'the role that women and men play before, during and after disasters, and how policy' and how 'decision-makers need to always take into account gender considerations when formulating policies and action plans at communal, national and regional levels'.

### Pacific Gender and Climate Change Toolkit and associated training programme, 2012 – 2015

#### Pacific Region

Secretariat of the Pacific Community (SPC), Secretariat of the Pacific Regional Environment Programme (SPREP), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), United Nations Development Programme (UNDP), United Nations Entity for Gender Equality and the Empowerment of Women (UNWomen)

Funding: SPC, SPREP, German Federal Ministry of Economic Cooperation and Development (BMZ), UN Women



*Solar Fruit Drying Training, Nguna, Vanuatu.*

The participants from the Training for Trainers, immediately put their skills into practice by running a two-day introductory training course on Gender and Climate Change attended by 32 staff members from SPC, Foundation for the Peoples of the South Pacific (FSPI), Young Women's Christian Association, and Pacific Youth Council.

The toolkit has been used to support gender analysis including development of the Strategy for Climate and Disaster Resilient Development in the Pacific (SRDP). A member of the SRDP technical working group commented, 'the gender analysis workshop provided tangible recommendations on how to meaningfully integrate gender aspects into the draft strategy... the expected outcome is more effective action on the ground to enhance the safety and resilience of all Pacific islanders'. It has also led to the development of a technical working group of climate change practitioners with gender expertise that can support each other to provide gender analysis to colleagues.

## Challenges

Social issues that contribute to vulnerability to climate and disaster risk are often not recognised early in a programme or project design. There is often a reluctance to meaningfully integrate gender considerations as they can be seen as outside the parameters of a project. Integrating gender sessions into existing project meetings is a good way to ensure stakeholders see its relevance as part of their wider work.

There are lots of misconceptions about gender issues. For example, opinions were expressed such as 'that's just about women and women's projects' and 'climate change is a technical issue and gender is not relevant'. These misconceptions had to be understood so that they could be addressed. There is a section dedicated to these in the toolkit.

Promoting more gender responsive approaches requires strong champions. Unless managers are requiring this of their staff, it is very difficult to make progress. We have used champions in each organisation to promote the use of the toolkit.

## Lessons Learnt

Addressing gender inequality will make initiatives to address climate change impacts more effective by drawing on the skills and knowledge of the whole community. It is critical to empower women and engage men in a process where women and men work together as partners and decision makers from the household level to the national level. Gender considerations should be undertaken early in the programme and project design to secure funding and ensure meaningful integration into activities.

Strengthening gender responsiveness of programmes is something that should be done from the outset of projects. This requires managers to be on the look out for areas that might require more attention to ensure everyone is fully engaged in the process and to identify the entry points early.

The toolkit itself was an important product but the process of engaging practitioners to develop it, of listening to their experiences, of hearing from men and women about the differences that can be achieved when socially-inclusive processes are used, was as important as the product itself. It is vital that tools generated are grounded in real case studies and are developed based on real experiences.

Dedicated resources are needed to sustain momentum and support colleagues to use the tools. It is important not to lose momentum once created so having resources in place to support training at the national level and adaptation of resources to suit the country context is important.

<http://pacificclimatechange.net/images/Documents/toolkit%20all%20in%20one%20pdf%20final%20copies.pdf>

# Financial resilience of Pacific Island countries to disasters and climate change

## Background

Disasters can affect the entire economic, human, and physical environment of a country and can adversely impact the long-term development agendas of all PICs. Some PICs could potentially face losses from a single event that would exceed their annual gross domestic product (GDP). For example the World Bank estimates that in the 1990s alone, reported natural disasters cost the Pacific Islands region USD \$2.8 billion in real 2004 value<sup>12</sup>.

The Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI) commenced in 2007 with the aim of providing participating PICs<sup>13</sup> with disaster risk modelling and assessment tools for enhanced disaster risk management. The programme also engages PICs in a dialogue on integrated financial solutions to increase their financial resilience to natural disasters and climate change.

The Pacific Disaster Risk Financing and Insurance (DRFI) program is one of a number of applications of the PCRAFI presently underway. The DRFI commenced in 2011 under the second phase of the PCRAFI. The purpose of the DRFI is to reduce the financial vulnerability of PICs to disasters caused by earthquakes (including tsunamis triggered by earthquakes) and tropical cyclones by improving their financial response capacity following a major catastrophic event, and to provide immediate liquidity in the aftermath of a disaster.

This regional sovereign insurance programme is made possible through the collective efforts of the Government of Japan, the World Bank, the Global Facility for Disaster Reduction and Recovery (GFDRR), and the Secretariat of the Pacific Community (SPC). The third season for the insurance pilot programme (2014 to 2015) covers five countries (Cook Islands, Republic of Marshall Islands, Samoa, Tonga, and Vanuatu).



*Damage after Tropical Cyclone Ian in Tonga, 2014.*

## Activities and Results

The DRFI consists of two main components (i) technical assistance and capacity building on public financial management of natural disasters; and (ii) the Pacific catastrophe risk insurance pilot launched in January 2013. Planned outputs under the DRFI are:

- 1 Developing a public financial management strategy for natural disasters; this aims to assist countries to develop both pre-disaster financial reserves (ex-ante instruments) as well as post-disaster financing instruments and funding sources (ex-post instruments);
- 2 Strengthening post-disaster budget execution processes to ensure that all available funds and financing instruments can be accessed and disbursed easily and effectively post disaster; and

### **Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI), 2007 - ongoing**

Pacific Region

Secretariat of the Pacific Community (SPC)

Funding: World Bank, Asian Development Bank, Government of Japan

- 3 The establishment of a pooled disaster insurance facility which, in the current season, will provide aggregate insurance coverage worth USD \$43 million against tropical cyclones and earthquakes/tsunamis. This represents the first such facility in the Pacific to provide multi-country catastrophe insurance against natural hazards.

While the pilot DRFI exists for the five participating countries, country-specific catastrophe risk models, developed under the PCRAFI, are now available for each of the PICs. These have been accepted for market-based transactions by international reinsurers. The insurance pilot scheme demonstrates that the international reinsurance market is not only willing to supply catastrophe risk insurance to the PICs, but is able to do so at competitive prices.

All participating PICs contributed towards the cost of premiums for the second and third seasons of the pilot scheme. This illustrates the willingness of PICs to use innovative and commercial risk-transfer instruments as a means to access rapid liquidity to finance post disaster relief and early recovery. The Government of Japan helped cover the remaining cost of the premiums.

On 27 January 2014, Tonga became the first PIC to receive a payout from the Pacific Catastrophe Risk Insurance Pilot in less than three weeks after Tropical Cyclone Ian. The pay-out in respect of Cyclone Ian, which devastated the Ha'apai island group, amounted to USD \$1.27 million; equivalent to more than the 2013 contingency budget and half of the reserves of the national Emergency Fund. The pay-out demonstrated the quick, but limited, injection of cash that Governments may receive from the catastrophe risk insurance coverage. This can be used to provide additional finance towards the costs of relief and recovery for large-scale disasters.

## Challenges

Disasters in the Pacific region present challenges to small island developing states that typically have small government administrations and limited resources to finance recovery from large disasters. The small size of these countries exacerbates the impact of disasters on their economies. In addition, the nature of financial instruments available for addressing disaster risks often requires technical expertise, which many PICT governments do not have access to on their own. The PCRAFI initiative provides support to PICTs to finance recovery from the impacts of disasters and make decisions on addressing these risks.

## Lessons Learnt

While the pilot insurance programme provides a cost-effective financial solution for addressing major disasters, it is only intended to provide the financial liquidity for central governments to cover a portion of the losses from major disasters that disrupt their operations and basic public services following events. The programme is not designed to address all the contingent liabilities PIC governments may face from natural disasters. The insurance programme does not obviate the need for Pacific Island governments to continue to invest in mitigation activities and/or strengthening other financing mechanisms, such as building disaster reserves and putting in place contingent credit facilities, to cover the relatively smaller losses that may also occur more frequently, such as from heavy rainfall and flooding, or at the other extreme, from the effects of prolonged droughts. Governments should, therefore, aim to use a combination of the insurance programme with other DRM mechanisms.

As seen from the payout to Tonga following Tropical Cyclone Ian, catastrophe risk insurance can be highly beneficial. However, it requires technical expertise and coordination among participating countries. A challenge for the future is to determine how the insurance coverage might be extended to cover other forms of disaster risks, including the flooding and droughts that periodically impact all PICs, not just those prone to tropical cyclones and tsunamis.



*Damage to along the banks of the Matanikau River, Honiara, Solomon Islands after the 2014 floods.*

<http://pcrafi.spc.int/>

# Training tomorrow's climate leaders through formal and non-formal training

## Background

The Global Climate Change Alliance (GCCA) is an initiative of the European Union, launched in 2007 and coordinated by the European Commission, aimed at strengthening dialogue and cooperation on climate change with developing countries most vulnerable to climate change and supporting their efforts to develop and implement adaptation and mitigation responses. The Pacific component of the project in support of the GCCA is being implemented by the University of the South Pacific (USP) through the Pacific Centre for Environment and Sustainable Development (PaCE-SD).

The main purpose of the USP EU GCCA program is to develop and strengthen the capacity to adapt to the impacts of climate change of countries identified in the African, Caribbean, and Pacific Group of States (ACP). This is achieved through training of national and regional experts on climate change and adaptation, as well as the development and implementation of sustainable strategies for community adaptation to climate change, based on improved understanding of impacts of climate change and variability in the Pacific region.



*Villagers planting mangroves in Ngwawa Village, Solomon Islands, as part of their climate change adaptation activities. Photo: Pacific Centre for Environment and Sustainable Development, USP.*

## Activities and Results

The program has three main components:

- 1 Capacity building with a focus on training and developing a cadre of local skilled professionals to support and guide governments, NGOs and regional development partners in their efforts to adapt to climate change, and to train others in adaptation especially at community level. Courses and scholarships have been offered to regional students to undertake the Postgraduate Diploma, Masters and PhD program in climate change at USP. Local climate change networks will be established to bring together stakeholders and communities to share stories, challenges, lessons learnt in the region. Linked to existing in-country climate change networks.
- 2 Community engagement in adapting to climate change is expected to have a marked increase and an improvement in the resilience of local communities who will be better equipped with the skills to develop, implement and sustain long-term adaptation strategies. There is a seven step process that is carried out prior to, during and after implementation in a particular community including:
  - o National Project Advisory Committee (NPAC) formed
  - o Rapid assessment (PaCE-SD Methodology)
  - o Selection of pilot sites
  - o Vulnerability and adaptation assessments (PaCE-SD Methodology)

### Global Climate Change Alliance, 2011- 2014

Pacific Region, 15 Pacific ACP countries

The University of the South Pacific (USP)

Funding: European Union (EU)

- o Adaptation plan
- o Implementation
- o Monitoring and evaluation

A 'best practice' toolkit in community adaptation projects has been compiled and disseminated to relevant stakeholders.

- 3 Applied research for the development of tools for monitoring and projecting climate change as well as adaptive strategies best suited for the Pacific has been formulated. The project has resulted in a number of successes, for example:

Training tomorrow's climate leaders today through formal and non-formal training. Since the start of the Climate Change program, 84 students have completed Post-Graduate diplomas, 17 completed Masters of Science and 7 students are currently working on completion of their PhD qualifications. Students and graduates of the USP Climate Change program have been active in the UNFCCC negotiations. Through the non-formal training, a total of 681 local trainers have been trained.

Development of community focused toolkits was based on participatory approaches and community ownership. The vulnerability and adaptation methodology toolkits have been used extensively by governments and NGOs in the 15 countries. The participatory approach raises awareness of the impacts of climate change in a user friendly way, by including students, of all levels, for example, the Avatele Community Workshop during the school holidays. In Fiji, the Ministry of iTaukei and Climate Change Division have incorporated this methodology as a self assessment method for all villages in Fiji to understand the vulnerabilities and prioritize communities' impacted.

## Challenges

Recruitment of country level staff for the project proved challenging. There was slow recruitment of officers and coordinators from some of the countries at the initial phase of the project. This was quickly overcome by project management staff getting the proper mechanisms in place. The project's research assistants also played an important role in getting countries up to speed on implementation. This included assistance in carrying out assessments and the set up of the NPACs.

## Lessons Learnt

Collaboration with governments, development partners, NGO's, civil society organisations and other stakeholders in the implementation of activities at the community level proved to be effective in the delivery of the project outcomes. For example, in Korolevu (Fiji), the project co-funded water tanks installation and water system upgrade with Rotary Water for Life. These types of collaborations facilitate more efficient use of resources and partner's efforts to maximise the impacts of the implementation.

The interactive methodology and toolkits allowed for the full participation of each of the communities during implementation of the project. This enabled communities to take ownership of the project, for example, adaptation activities were prioritised according to what the communities deemed as important, based on their observations, experience and research.

Based on experiences from existing 'in-country' local climate change networks, it can be seen that they can improve the sharing of information and best practices amongst Pacific Island communities. Participants of the local climate change networks are motivated to work together because they want to be able to take actions that have a high chance of measurable, long-term success. For example, a network is proposed to create a multiplier effect among communities not covered by the project, which will gain knowledge and skills from their exposure to locally-managed concepts on adaptation to climate change.



King tide flooding the village. Photo: Pacific Centre for Environment and Sustainable Development (PaCE-SD), USP.

<http://eugcca.usp.ac.fj>



# Financing renewable energy and sea water desalination

## Background

The Declaration on Climate Change adopted in Niue in 2008 expressed deep concern by Pacific Island Forum Leaders at the serious and current impacts of, and growing threat posed by climate change to the economic, social, cultural and environmental well-being and security to countries in the region. The Niue Declaration also highlighted that current and anticipated changes in the Pacific climate, coupled with the region's vulnerability, particularly the low-lying atoll States, are expected to exacerbate existing challenges and lead to significant impacts on Pacific Island countries' environments, their sustainable development and future survival.

A significant response to the Declaration was the launch of the Pacific Environment Community (PEC) Fund, under which the Government of Japan provided a JPY \$6.8 billion (approximately USD \$66 million) contribution to Forum Island countries to tackle environmental issues, including climate change.

Each Forum Island country is allocated an indicative amount of USD \$4 million to invest in solar power generation or sea water desalination infrastructure projects, coordinated by the Pacific Islands Forum Secretariat (PIFS). In addition, countries can combine the two technologies through the installation of solar powered sea water desalination plants.



*Commissioning of the Samoa grid connected PC system in Savai'i, Samoa.*

## Activities and Results

An effective and efficient coordination and management system for the PEC Fund has been established by the PIFS and is fully operational. This mechanism coordinates and supports all Forum Island Countries in the proposal development stage to ensure all countries are able to access their USD \$4 million allocations for projects.

A total of 16 projects in 14 Forum Island countries are being implemented. These include nine solar power generation projects, one sea water desalination project and six solar powered sea water desalination projects. These projects provide practical solutions to the impacts of climate change and responding to disasters:

- o Installation of approximately 3,327kWp solar grid connected systems in 10 Forum Island countries, contributing to carbon emission reductions of approximately 4,200 tons equivalent per annum.
- o Installation of sea water desalination providing access to a safe supply of approximately 249 million litres of water per annum to communities in seven Forum Island countries, supplementing current water supply or water to be used during times of disasters, droughts and water shortages.

### **Pacific Environment Community (PEC) Fund, 2010 - ongoing**

Pacific Islands Forum Countries: Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Republic of Marshall Islands, Nauru, Niue, Republic of Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu

Pacific Islands Forum Secretariat (PIFS)

Funding: Government of Japan

It is anticipated that approximately 308,000 people across the Pacific will benefit directly from the PEC Fund. With installation of equipment now completed in eight Forum Island Countries, the tangible benefits of the PEC Fund have resulted in increased access to renewable energy through solar power generation and an alternative source of safe drinking water through sea water desalination.

The PEC Fund has led to collaboration and coordination with development partners, resulting in the leveraging of resources to upscale and increase the outcomes of projects.

## Challenges

In the early stages, the fund lacked clear guidelines and project procedures. To overcome this, the PEC Fund Project Management Unit developed an Operational Manual to outline the internal procedures, processes and timelines required for the efficient processing of proposals and assessing their quality and sustainability, a mechanism for the consideration of proposals by the decision-making body of the PEC Fund, preparation and negotiation of Financing Agreements for approved projects, reporting and monitoring of projects, closing of projects. A records management system was also put in place.

In addition to the above, templates were developed for project and programme reporting, development of a suitable Financing Agreement template, budget amendments and communication templates.

## Lessons Learnt

Country ownership of the projects has been strengthened by using their own internal processes and procedures. Each country develops their own proposals, implements projects and once completed, continues with the ongoing operation and maintenance of the systems.

There is strong integration between practical tailored solutions to mitigate and adapt to the impacts of climate change through the provision of solar power generation systems and sea water desalination plants, and contributions toward DRR and DM. For example, in at least four countries, sea water desalination plants will be utilised to provide access to safe water during times of disasters, periods of droughts and water shortage.

The sustainability of infrastructure projects needs to be considered during the proposal development process as well as during implementation with all the relevant stakeholders to facilitate sufficient planning, commitment of resources and capacity to continue to operate and maintain the systems.



*Students of Rairok Elementary School lining up for water, Republic of Marshall Islands.*

# Explaining climate variability through animation

## Background

The El Niño Southern Oscillation (ENSO) is a naturally occurring phenomenon that involves fluctuating ocean temperatures in the equatorial Pacific. El Niño and La Niña events (the two extremes of ENSO) can produce very wet and very dry conditions. ENSO creates temporary variations not only in rainfall but also sea levels, temperatures, and cyclone risk for PICTs.

Research by the Red Cross Climate Centre found that, globally, there are few simple films on ENSO for use in training and planning. The Pacific Climate Animation Project, funded by the Australian Government Pacific Australia Climate Change Science and Adaptation Planning (PACCSAP) science program, aimed to increase awareness of the science of El Niño and La Niña and their impacts, and encourage discussion about how Pacific nations can access forecast information, communicate and work together to take early action to prepare for future El Niño and La Niña events. Complex concepts, such as ENSO and other climate drivers have been difficult to present to audiences using inanimate descriptions and photographs.



Many of the films' characters were conceptualised by Vanuatu based artist Joseph Siri, based on ideas generated by stakeholder workshops. Photo: Ula Majewski, Red Cross Red Crescent Climate Centre.

## Activities and Results

Two short humorous animation films were produced by an alliance of agencies in the Pacific to explain climate science to assist with decision making and preparedness in the region. The Pacific Adventures of the Climate Crab gives an overview of climate processes, impacts and possible adaptation measures in the wider Pacific region. Klaod Nasara (which means 'cloud meeting place' in Bislama) focuses on similar topics in Vanuatu and has been produced in three languages (Bislama, English and French). Both films are accompanied by resource toolkits which aim to help to facilitate dialogue and action.

The development of the films included a team of three climate scientists, a producer, a communications expert, two climate advisers, an artist, an animator and the project coordinator. The following process was followed:

1. Concept development
2. A 'research to reality' workshop
3. Pre-production
4. Product development and testing
5. Final production
6. Launch, promotion and distribution.

### Pacific Climate Animation Project, 2012- 2013

Pacific region, Vanuatu

Australian Bureau of Meteorology, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Government of Vanuatu, the Australian and Vanuatu Red Cross, Red Cross Red Crescent Climate Centre, the International Federation of the Red Cross and Red Crescent Societies (IFRC), Secretariat of the Pacific Regional Environment Programme (SPREP), Secretariat of Pacific Community (SPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Government of Australia.

Funding: Government of Australia

Both animations have received an overwhelmingly positive response from a diversity of stakeholders in Vanuatu, the Pacific region and beyond. An evaluation has indicated that the colourful and appealing style and user-friendly language has assisted in communicating important concepts in an engaging way to a variety of non-scientific audiences. There is a strong demand for more products that bring science to life.

A total of 9,000 DVDs were distributed across the Pacific region. The animation resources were sent to educational institutions, NGOs, Red Cross, government departments and regional organisations and integrated into the curriculums of schools in five countries. The climate animations have also received over 19,000 views on YouTube.

## Challenges

Developing storylines that were scientifically accurate, culturally relevant and effective in inspiring people to take action presented a challenge. To address this scientists worked with Red Cross staff that had experience working with multiple audiences. Feedback was gathered from across the Pacific to ensure that the film not only portrayed the science but was also something people wanted to watch.

Other challenges included taking on board diverse feedback from across the region about how key concepts could be represented and getting cultural idiosyncrasies correctly portrayed (for example, the string band for Vanuatu, or traditional houses in Kiribati). Feedback was collated and addressed for each scene and people from relevant countries were consulted on cultural aspects.

## Lessons Learnt

When aiming to increase understanding of climate variability and climate change, it is essential to ensure communication is culturally relevant, explains scientific concepts in a local context, and uses local language and expression that is easily understandable by all levels of the community.

These films could only have been achieved through strong collaboration. Pooling of technical and sectoral expertise, knowledge of the Pacific and extended networks enables input from far and wide. No one organisation could have produced the animations in their current form alone and it could never have reached as many people. The partnerships enabled greater accessibility of science in the wider Pacific. Equally pooling human and financial resources enabled the project to happen.

Engagement and consultation with many stakeholders from the start of the project enables wider ownership of the products. Consulting and testing helped give the audience a greater sense of ownership of the end products. Many people had seen elements of the project and commented, so when they saw their suggestions come to life, it made a great difference.

The animation project benefitted greatly from a dedicated Australian Red Cross volunteer who worked for 12 months on the project at the Vanuatu Meteorology and Geohazards Department office. The consultation and coordination required were far greater than was ever envisaged, and having a dedicated coordinator meant the project kept to deadlines. For many team members the project was only one of the many projects on their agendas, and it required ongoing commitment and constant input for more than one year.



*Community consultations conducted in Vanuatu. Feedback was incorporated into the final products. Photo: Ula Majewski Red Cross Red Crescent Climate Centre.*

<https://www.youtube.com/watch?v=AMthanwiOWE>

<https://www.youtube.com/watch?v=sIUSWEftN4w>

<http://www.pacificclimatechangescience.org/animations/>

# Showcasing 'voices of youth' through media production

## Background

As youth are the future leaders of PICs, there is a long-term benefit in developing their knowledge and understanding of the climate change issues that will impact future generations. In addition, over half of Pacific Islanders are under the age of 24 and yet they are often not included in the conversations and decisions about climate change responses and solutions. Women and persons with disabilities also represent groups whose voices are not often heard in climate change discourse. The PACMAS Action Against Climate Change (A2C2) initiative targeted youth, women and persons with disabilities to tell their stories on DRR and climate change. The project aimed to increase awareness and knowledge of climate science, impacts and adaptation options, and communicate local home-grown solutions for climate change and DRR to encourage positive influence on policy.



*Students from Loto Taumafai, a school for students with disabilities in Apia Samoa, filming on set.*

## Activities and Results

The principal focus of A2C2 was training, mentorship and media production primarily in the countries of Samoa and Vanuatu. A secondary focus was on the media production for Tuvalu, Kiribati and 'regional' Pacific stories through a partnership with the University of the South Pacific (USP). The initiative partnered directly with various government ministries, NGOs, international agencies and other bodies to set up mentorship programs in the respective countries.

Training to further develop basic climate change knowledge and media communications for high school students was undertaken through a Training Plan and two-day training by PACMAS partner, Apidae, involving locally based trainers. Following the training, the students received 8-10 weeks of ongoing mentorship with climate change and media mentors.

The initiative resulted in the following outcomes:

- 65 youth attended training on climate change and media production.
- Students wrote scripts and went on field trips to get 'hands on' experience on their topic by interviewing community members and seeing first-hand the climate change issues.
- Students created media products including video, radio, online and newspaper stories, that truly exemplify the 'voice of youth' as seen from the variety of media products created (i.e. Flashmob, TV drama, roleplay, etc.). Media products were shown on national TV, radio and online.
- Involvement of Pacific youth in the Pacific Media Summit provided an opportunity to showcase their ability to create compelling stories on local climate change solutions, learn new skills, and work on small projects to bring back to their classrooms.

### Action Against Climate Change (A2C2), 2013

Samoa, Vanuatu, Tuvalu, Kiribati

Apidae Development Innovations

Partner: Pacific Media Assistance Scheme (PACMAS), Australian Broadcasting Corporation (ABC), Government of Australia, the University of South Pacific (USP), Secretariat of the Pacific Regional Environment Programme (SPREP), Secretariat of the Pacific Community (SPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

Funding: Government of Australia

- Meetings organised with policy makers, local media and students to showcase media productions in Samoa, Vanuatu and Fiji.

The initiative encouraged youth to communicate their concerns about climate change, influence other youth to take action and learn new skills. It raised awareness of climate change and brought messages 'back up' to teachers, communities and, ultimately, decision-makers of the future. Several A2C2 youth participants including those who attended the Pacific Media Summit noted that they did not know much about climate change before the initiative but, through their interest in media production, feel that they are now ambassadors for climate change issues. A2C2 also promoted the inclusion of social and environmental issues in the media, such as climate change, gender, health and food security.

## Challenges

A priority focus throughout the initiative was managing local relationships and this proved to be key to the success of the project. One of the challenges faced was successfully running a mentorship program over 8-10 weeks. This required a great deal of time and commitment from local mentors and also coordination and organisation of resources to ensure that the mentorship program did not lose momentum and that milestones were met. In addition, there were some difficulties in delegating contracted work in-country. As a result, the design of the initiative shifted substantially during implementation. This resulted in a stronger direct management approach from the Apidae team with a focus on building capacity where possible. The team spent more time in-country with local partners, for example, in the editing studio with local media producers to refine and ensure that climate change messages and youth voices were effectively captured and communicated.

## Lessons Learnt

Media products produced by youth can raise awareness of climate change issues to other youth, teachers, communities and decision makers.

There is opportunity for future youth engagement through the A2C2 model with recommendations for a shorter 'bootcamp' style training and mentoring program and a focus on fewer or one country at a time to maximise resources and local capacity building.

The initiative highlights the need for new forms of communication on climate change. For example, traditional climate change communications are often dry, full of jargon and difficult for non-specialist audiences to understand. Communication methods that focus on storytelling, as seen through TV drama, role-play and flashmob created by A2C2 youth, and an engaging way of capturing the attention of younger audiences and conveying how climate change issues relate to their lives.

Awards for climate change and journalism/media are a useful mechanism to facilitate exposure to climate change in the university and school curriculum, and encourage youth to explore future careers in climate change and/or media.



*Students from Samoa celebrate the final A2C2 showcase event at the National University of Samoa.*

<http://apidae.com.au/A2C2/>

<http://vimeo.com/user22695507>

<http://www.pacmas.org/profile/action-against-climate-change-samoa/>

<http://www.pacmas.org/profile/action-against-climate-change-vanuatu/>

# Building capacity of youth and community workers for community-based disaster risk reduction

## Background

The growing youth population in the Pacific presents a range of challenges and opportunities. Realising the social and economic potential of young people will be critical to the development of many PICs given their sheer weight of numbers. Conversely, the failure to do so could be a significant source of instability in the region. Therefore, it is essential that Pacific nations develop strategies, which support the integration of young people as well as meeting their educational and employment needs. The Pacific Island Youth Leadership Programme targeted young people in rural areas and settlements and involved them in identifying the needs of their local community and developing practical local responses.



*Youth workers displaying Youth Groups' community hazard and resource maps in Tongatapu, Tonga.*

## Activities and Results

The programme aimed to equip youth and community workers in the Pacific with community-based DRR capacity. This included offering a 15 month Certificate in Pasifika Youth Development, including a community-based DRR component and a Diploma in Youth and Community Services. The programme seeks to develop the competencies of Pacific youth workers so that they can work effectively with young people. It also encourages young people to become agents of change in their own communities.

Ola Fou Diploma students completed a workshop on community-based DRR facilitated by TEAR Fund New Zealand which introduced community mapping as a way of assessing preparedness. The diploma students, in turn, ran workshops with certificate students in a participatory approach. Students then ran community mapping exercises with young people in their respective communities. Youth from the communities undertook community consultation of the map. They actioned at least one response as a result of the mapping, such as getting youth involved in early warning systems, developing a community emergency checklist and setting up plans to assist vulnerable people with evacuation.

A 'map exhibition' was held in each country where students displayed the community maps to assess preparedness and talk about the DRR issues in their community with key stakeholders, such as National Disaster Management Office (NDMO) staff.

The programme has resulted in young people taking an active role as agents of change, improved understanding and implementation of actions to improve disaster preparedness based on specific community contexts, and an improved level of preparedness for vulnerable groups, including the elderly and people with disabilities.

### **Pacific Island Youth Leadership Programme, 2008 - 2018**

Fiji, Papua New Guinea, Tonga, Solomon Islands, Vanuatu

TEAR Fund New Zealand, Ola Fou Pasifika Youth Development, Praxis Pacific

Partners: Local youth-focused agencies where Ola Fou students are employed.

Funding: Government of New Zealand, TEAR Fund, Praxis

## Challenges

'It will never happen to me' was an attitude amongst students that major disasters will never be a problem for them specifically. This was acknowledged by participating students and discussed in the first section of the workshops which was called 'Disasters Happen'.

Gaps between policies and understanding by the communities were identified as a challenge. The NDMO has policies that the community was aware of but were not implemented. Workshops now draw on the National Disaster Management Plans in each country, particularly on sections relating to the role for youth.

Words such as 'threat' and 'hazard' create confusion as to their meaning in the DRR context. To address this, working in local languages would be beneficial. Over the next five years, the programme is working to translate all workshop materials into local language and present workshops in local languages.

## Lessons Learnt

Build in a component for psychosocial support (for students dealing with trauma from previous disasters and how to deal with this after a disaster). A 'trauma safe' workshop session is now conducted for all Diploma students, which gives some tools for dealing with traumatised people in general, but examples are given of post-disaster trauma.

Local youth can act as positive agents of change in their community and engage other young people in community DRR processes. Engagement of youth in relation to DRR both promotes sustainability of the DRR work and also changes the situation for young people as they gain respect in their communities for implementing practical preparedness activities. As a group, youth need to be incorporated into policy development and implementation, as well as be recognised as an important part of DRR.

With youth taking the skills they have learnt back to their own community and actively engaging several young people in the mapping process, it is proven to be an effective method for reaching a large group.

A key method of preparedness is raising awareness around disasters and understanding local strengths and vulnerabilities.



*Hazard vulnerability identification with youth workers from Solomon Islands, Papua New Guinea, Vanuatu, Fiji and Tonga during training in Deuba Fiji.*

<http://www.praxispacific.org/olafoupasifika>

<http://www.tearfund.org.nz/>



# Child centred adaptation actions

## Background

Climate related disasters often have disproportionate impacts on children and serious implications on children's rights. However, very few opportunities are available for them to be involved in planning, decision making and in the design and implementation of adaptation and risk reduction activities.

The Child Centred Climate Change Adaptation Programme (4CA) works with children and their communities that are highly exposed to extreme weather events and where their livelihoods are dependent on natural resources that are also affected by climate variability.

The 4CA model builds on Plan International's child-centred DRR model for communities vulnerable to disaster and climate change. The programme has a focus on vulnerable communities in coastal and remote areas.



*Krangket Elementary School girls, Papua New Guinea.*

## Activities and Results

The programme focused on creating awareness and building capacity amongst children, communities and their agencies. It aimed to develop and implement locally appropriate climate smart solutions and work for the inclusion of good practices and learning in local, district and/or national government processes in order to protect children and communities and fulfil their human rights.

Through implementing awareness raising and capacity building activities, the programme has made significant achievements in enhancing children and their communities' awareness of their vulnerability to disasters. The activities began with the development of locally appropriate DRR and CCA educational materials, such as brochures, pamphlets, story books and training manuals for teachers and community facilitators to roll out training in schools and communities. Community members and school children then participated in 4CA's DRR and CCA awareness raising activities through workshops and trainings, awareness campaigns, radio talk back shows, and oratory and poetry competitions organized in schools. As a result, more than 80 teachers and 50 community facilitators have been trained to become DRR and CCA trainers in schools and communities. In Kiribati, Tonga, and Fiji there is evidence of 4CA approach being embedded into national processes, for example the Tongan government sought children's views during a community consultation on land use planning. The 4CA programme also produced numerous educational materials that have been formally adopted by the national Ministry of Education in Tonga and Kiribati. Teaching manuals were also developed, with positive feedback and uptake from government stakeholders.

Through a participatory method, communities and children undertook community vulnerability analysis to identify solutions and implement measures to reduce risks associated with disasters and climate change. Through the provision of seed funds and in partnership with relevant government stakeholders, children and their communities' undertook locally appropriate risk reduction and adaptation initiatives such as installation of water tanks, mangrove planting, food

### **Child Centred Climate Change Adaptation Programme (4CA), 2011 - 2014**

Fiji, Kiribati, Solomon Islands, Tonga, Tuvalu, Papua New Guinea

Foundation of the Peoples of the South Pacific International (FSPI), Tonga Community Development Trust, Foundation for the People and Community Development PNG, Solomon Island Development Trust, Partners in Community Development Fiji, Tuvalu-Tuvalu Association of NGOs, Foundation for the Peoples of the South Pacific Kiribati

Partner: Plan International Australia

Funding: Government of Australia

gardens, formation of village disaster committees, simulation exercises and establishment of early warning systems. In Papua New Guinea, children and youth trained under 4CA collaborated with village leaders to resubmit a proposal (with clearer demonstration of risks), which was previously rejected several times, for the construction of seawalls due to coastal erosion through sea level rise. The proposal was awarded \$100,000 Kina by local government.

## Challenges

Traditionally, children in the Pacific do not play a role in decision making, neither are they permitted to speak up in the presence of adults and community elders. 4CA was challenged with introducing an approach that conflicted with tradition. However, all in-country stakeholders, from local to national levels, supported the approach, as 4CA Country Coordinators presented the 4CA programme in culturally sensitive and locally relevant ways.

The 4CA approach was also faced with gender inclusion challenges. Gender inclusion is a complex issue especially in the Melanesian countries where a culture of female submissiveness and obedience exists. Gender inclusion was generally interpreted as equal representation of men, women, boys and girls, and all six countries made worthy efforts to ensure training and workshops included as equal representation of gender as possible. The 4CA programme facilitated working through the local women's groups and having separate conversations with women and girls, and men and boys.

Technical language has been of concern to most of the Country Coordinators, particularly in the areas of disaster risk and climate change. This was countered by the development of effective child and youth communication materials through videography, consultations with education ministries, local language and teacher training to build capacity in CCA and DRR.

## Lessons Learnt

Children can play a key role in community resilience planning and development as they can be agents of change. Design of engagement activities with children should be appropriate to children's learning styles (e.g. hands-on activities that actively demonstrate classroom learning) and are relevant to the local context in order to promote improved awareness of disaster and climate risks.

For children, this programme has found that engagement in relation to local impacts of climate change and disasters rather than the science of climate change is effective. This approach can empower children and communities to identify and map the changes in risks and livelihoods. Don't start by talking about climate change with children. First, talk about how disasters and environmental changes are affecting them now and what is changing in their communities. Building on a basic understanding of how human activities and environment are interlinked, begin introducing the bigger picture of climate change.

Build strategic partnerships through developing a Stakeholder Engagement Plan to ensure primary, secondary and tertiary stakeholders are engaged in appropriate ways, as well as ensuring that mutual benefits are established for strategic, long-term partnerships.

Monitoring and evaluation should not only foster compliance but also support learning.



*Inclusion of young people in DRR and CCA community planning in Tuvalu.*

<http://www.fsfi.org.fj/index.php/cdrm-projects/4ca-project/4caupdates>

<https://plan-international.org/about-plan/resources/publications/emergencies/act-to-adapt-child-centred-climate-change-adaptation-4ca/>

# Surveying and sharing climate change perceptions

## Background

There is limited literature and work on social perceptions and understanding of the local decision-making process relating to climate change and CCA in the Pacific.

Therefore, the Sharing Perceptions of Adaptation, Resilience and Climate Knowledge (SPARK) project aimed to investigate and understand how three different groups (high school teachers, communities living around conservation areas, and media officers) in Fiji, Samoa and Vanuatu perceive climate change, their decision-making processes and adaptive capacities. By exploring local perceptions, the project aspired to create connections, new solutions and build resilience.

The project aimed to contribute to both analytical research and ideas on how key target sectors interact, in addition to provide tangible tools to teachers and communities for facilitating increased interaction through education.



Community survey in Navutulevu, Fiji. Photo: Denis Chang Seng, UNESCO.

## Activities and Results

Phase I focused on data collection with communities, media officers and teachers, using focus groups and a mobile phone survey, the first of its kind for climate change and disaster risk in the Pacific. The focus groups included interactive discussions regarding problems and solutions for climate change and disaster risk, and a unique 'photo sorting' methodology that allowed respondents to answer questions.

The mobile surveys were made up of 11-12 questions and were motivated by three aims:

- To complement the data from the focus groups and, therefore, function as a 'back up' methodology.
- To gain a wider selection of responses and quantitative data on climate change related perceptions than what was possible in the focus group alone.
- To explore the opportunities and barriers in using this form of technology as a new approach to DRR and CCA.

The results from the surveys indicated that:

- Although the self-perceived understanding of climate change as a threat is quite high in communities, there seem to be some inaccurate perceptions about the impacts of climate change and not everyone believes they are experiencing a personal threat from climate change.
- Teachers identified a need for more training on climate change. In all countries, teachers clearly shared the perception that climate change was not yet effectively integrated in the existing curriculum.

### Sharing Perceptions of Adaptation, Resilience and Climate Knowledge (SPARCK), 2013 - 2014

Fiji, Samoa, Vanuatu

Apidae Development Innovations, United Nations Educational, Scientific and Cultural Organisation (UNESCO)

Partners: The University of Melbourne, Government of Samoa, Government of Fiji, Government of Vanuatu

Funding: UNESCO

- Technical terms and the use of acronyms by agencies were identified as key problems in communicating climate change in the media. In all three countries, the media said they often found it difficult to turn press releases about climate change into compelling stories. Suggested solutions included developing local climate change stories.

Phase II consisted of the implementation of the 'classroom to community' activity. This pilot capacity building and training was carried out with the teachers and a community in Samoa. Thus, capacity building focused on providing basic climate change science training and using existing knowledge and resources to equip teachers with ideas and tools to improve climate change teaching. A teacher toolkit was also developed as a way of sharing the learning, tools and resources.

The project showcased positive interaction and benefits that can be generated by connecting teachers and communities through localized climate change education and that takes into account local practices, cultures and technical solutions for CCA.

## Challenges

Although people enjoyed participating in the mobile survey, two major challenges in using the mobile survey as a data collection method were:

- The relatively low number of responses, particularly in remote areas; and
- The loss of data due to responses that did not match questions or were jumbled.

Technical challenges and confusion on how to use the survey also affected the data collection. This was addressed by simplifying the mobile survey questions, and making the survey compatible with, and accessible by any mobile phone. Some participants had smart or web-enabled phones, while most used and were comfortable with old style mobile phones. Involving a local champion in the project was a key component to the success of the mobile survey. For instance, the highest response rates occurred where there was support from a key individual from the Ministry of Education, Sports and Culture (MESC) (Samoa).

## Lessons Learnt

The perceived level of threat from climate change is not the same across the Pacific and not all the countries and groups address climate change and climate change education issues similarly. It is important to understand local perceptions and decision making processes in order to better design effective and resilient climate and disaster risk policies, strategies, tools and methods.

Local responses can be gathered through technologies like mobile phones. However technologies have to be used in conjunction with effective local interaction to align with community needs, for example face-to-face consultation. It is also important to incorporate other approaches for data collection, for example a focus group to mitigate the potential loss of data.

The social perceptions, cultures, norms and environmental conditions of communities should be factored when designing tools, methods and policies for effective adaptation and resilience to climate change.



Community survey in Savai'i, Samoa. Photo: Apidae Development Innovations.

[http://www.unesco.org/new/en/apia/about-this-office/single-view/news/sharing\\_perceptions\\_of\\_adaptation\\_resilience\\_and\\_climate\\_knowledge\\_a\\_unesco\\_project\\_in\\_the\\_pacific#.VlepAzGUd1Y](http://www.unesco.org/new/en/apia/about-this-office/single-view/news/sharing_perceptions_of_adaptation_resilience_and_climate_knowledge_a_unesco_project_in_the_pacific#.VlepAzGUd1Y)

# Media strategies to support rural women during disasters

## Background

Despite the progress made in gender mainstreaming in emergency and disaster management in the Pacific, gaps remain particularly in relation to prevention and mitigation of disaster risks. Though adjustments have occurred to ensure women's participation at all levels of risk management and climate change, such as national guidelines, evidence shows the need for a stronger level of involvement from women in national and local decision-making processes and policy implementation.

Radio is one of the cheapest mass medium, reaching out to large numbers of people in isolated areas. It has been used to disseminate information and early warning messages. Radio, especially community radio, has proven to be an effective tool for disaster management as it is an efficient means to deliver information suited to the needs of the community, packaged in local language.



*Taking the 'suitcase radio' out to women in rural centres brings women together through pre broadcast consultations and on the airways.*

## Activities and Results

Women's Weather Watch provides consistently available community radio reports to remote rural communities in a number of countries, including Fiji, Solomon Islands, Papua New Guinea, and Tonga. These radio reports provide for greater visibility of the specific needs of women during natural disasters within the national media and national government strategies.

A community media workshop was undertaken focusing on enhancing protection in emergencies at FemLINKPACIFIC's Community Media Centre in Suva supported by UNWomen. The workshop aimed to strengthen the capacity of young women community radio volunteers to incorporate gender equality and women in leadership messaging into the Women's Weather Watch community radio programme. This was conducted through an Interactive Learning and Production training session for FemLINKPACIFIC's Young Women Producers and Broadcasters from Tavua, Nadi, Labasa and Suva, and was also conducted in partnership with the UN Gender Group and the Pacific Humanitarian Protection. The action learning informed community radio content development and production to enhance protection in emergencies and assist the team to continue to communicate and promote gender inclusive messages. It was designed to:

- equip the community media network to gather information on protection concerns and to disseminate information. In particular, to disseminate information on prevention/response information and protection advocacy messages first-hand to flood-affected rural communities.
- broaden the application of gender and women's human rights treaties and conventions as the organization convenes rural consultations and broadcasts with women in local communities.
- link women's environmental and personal security to the disaster preparedness and management strategies.

### **Women's Weather Watch: Communicating Gender Equality in Disaster Risk Reduction, Response and Management**

Fiji, Solomon Islands, Papua New Guinea, Tonga

FemLINKPACIFIC

Funding: FemLINKPACIFIC

The FemLINKPACIFIC's rural network supported the development of a series of recommendations following the Nadi, Fiji, floods in 2012 and these were presented to the Divisional Planning Officer Western in an interactive dialogue where the UNWomen scoping study was also presented.

A number of women have been identified as leaders of their community disaster preparedness committees.

One such person is Yasmin Nisha who, following the floods in 2012 became active in her local community. Now she and several women are part of teams of community volunteers who raise the emergency alerts, using loud hailers while driving around the community, although she has said it would also be good if gumboots would be provided.

## Challenges

Resourcing communications, broadcasting systems and personnel in rural areas of the Pacific is challenging. Financial support is essential to develop and maintain community radio stations, which enhance the engagement with national and local government decision makers and address women's access to information, particularly for those in rural communities, who remain even more marginalised from new media content. This was highlighted in the 2006 People's Communication for Development Research report for Fiji<sup>14</sup> that identified that 'some of this technology deprivation may be explained by the absence of necessary infrastructure, such as electricity and networks (especially in rural areas) but also because of low levels of technological literacy amongst the population, high costs of new technology and the depths of poverty amongst our people'.

## Lessons Learnt

There is potential for community radio, as an accessible and inclusive information and communication platform for target groups and local government networks, to be utilised as a DRM tool for adaptation in Pacific Island countries and territories.

Community radio can involve and empower communities, in particular by community media reporters speaking on behalf of marginalized groups like women and disabled people.

Communication strategies are important tools for community radio. They can be utilised to highlight issues related to climate change, disasters and community vulnerability.



*'Radio with Pictures' combined community radio broadcasts with television simulcasts to enable rural women to be seen and heard on key issues such as environmental security.*

<http://www.femlinkpacific.org.fj/>

# Remote communities, planning for resilience

## Background

Two coral atoll islands make up the Nissan District within the Autonomous Region of Bougainville, Papua New Guinea (PNG). Four hours away by boat from the mainland, this community experiences water and food insecurity, and has poor access to services. The community of 7000 people is vulnerable to the impacts of disasters and climate change. Recent drought and flooding events have created severe stress requiring food assistance. Predicted climate change is likely to make extreme weather events more frequent and more intense, compounding challenges of low agricultural capacity, population pressures and environmental degradation.

The Community-Based Adaptation to Climate Change in Nissan District project aimed to increase adaptive capacity and resilience to existing hazards and the impacts of climate change on vulnerable women, men, and young people in the Nissan District through improved food security, nutrition, and DRM capacity. The project also aimed to incorporate CCA and DRM into local level planning and policy development.



World Food Day participants in Nissan District. Photo: Andrea Dekrout, CARE Australia.

## Activities and Results

Utilising community led participatory approaches, the project provided training and ongoing mentoring to women centered farmer to farmer extension core groups and youth centered DRR core groups in every village. The project resulted in the following outcomes:

- Establishment of six community nurseries and demonstration plots for improved agricultural practices that will act as seed banks, as well as a venue for learning and seed exchanges. Composting, new crops and seed exchange systems have been established at the nurseries driven by core group members.
- Training of core groups on soil conservation, climate resilient crop varieties, intercropping and nutrition in times of food security and disaster. The PNG National Agricultural Research Institute provided seedlings of more resilient varieties of traditional staples (Sweet potato and African yam), as well as nutritious crops that can be stored (soy beans) or rapidly produce yields (mung beans).
- Over one hundred and forty (140+) kitchen gardens have been established independently by the core groups, built to suit the needs of people with poor mobility.
- Nine gender sensitive community DRR Action Plans have been developed that represent 21 Nissan District villages, following training of 231 participants on hazard – based action planning. DRR core groups are leading the implementation with support and leadership from the Nissan District Administration. The DRR groups have jointly agreed with the Nissan District Administration on island-wide hazard reduction activities, including management of feral pigs and planting of fenced emergency food gardens.

### Community Based Adaptation to Climate Change in Nissan District, 2012 - 2015

Papua New Guinea

CARE International

Partner: PNG National Agricultural Research Institute

Funding: Government of Australia

Through all activities, the project ensured gender responsive approaches that facilitate critical dialogue between men and women in communities, and addressed the differentiated impacts of climate change and disasters on different groups.

## Challenges

Working in remote communities such as the Nissan District presents a number of challenges. Bad weather creates delays in transportation and storms create setbacks for community projects. This was addressed through strong local ownership of the project, detailed forward planning, and a degree of flexibility to accommodate community priorities.

Land tenure in the Nissan District is complex and it took longer than anticipated for communities to agree on locations for key project activities. This was addressed through leadership by core groups and community discussion to identify land for activities.

Conflict during the Bougainville Crisis created long lasting challenges in relation to government capacity at the Bougainville regional and district level, weakening planning processes.

Obtaining local weather and climate records and forecasts for use in community planning was challenging. This was addressed by engaging multiple communities in discussions about observed climate and environmental change.

## Lessons Learnt

Strong gender responsive community facilitation is a key to project success and training. This approach has demonstrated a shift in community attitudes around gendered dimensions of food security and environmental change and created a space for discussion about underlying causes of vulnerability, including population pressure.

Engaging with local government representatives has proven to be an effective way to ensure the project is sustainable in the long term. It also helps to develop dialogue and working relationships between local level government and community groups.

Bottom-up planning introduced by the community DRR action planning processes has been a highly effective way of identifying risks that may not have been identified using a top-down approach. For example, this process identified the increasing rarity of traditional medicinal plants, which led to collaboration with the Bougainville Traditional Health Project to promote the establishment of traditional medicinal plants in project supported nurseries to ensure they are available for future generations.



*Building a verticle vegetable garden in Nissan District. Photo: Ian Dau, CARE Papua New Guinea.*



# Youth volunteers motivate community to build resilience

## Background

The community of Kindau in the Western Highlands of Papua New Guinea has a population of almost 800 people who live a rural agrarian lifestyle. Decision-making processes allowed only low levels of influence from women and youth. Kindau is exposed to hazards, such as flooding and water-borne disease outbreak. Kindau had two water sources. Firstly, a nearby creek from which people collected water daily for drinking and cooking but which was contaminated by livestock and animals, and laundry washing. It was also located only 300 meters from the community's pit toilets. Secondly, an unfenced mountain spring located around 900 meters from the village that could be reached only after a long walk usually undertaken by village women, girls and boys.

The people of the coastal and highland provinces that flank Kindau's province to the north and east suffered a triple disease outbreak of cholera, dysentery and influenza, which started in September 2009. The Government of Papua New Guinea National Health Plan 2011-2020 explains that lack of access to dependable clean water sources and toilets, particularly in rural areas, creates a situation where diarrhoea and enteric diseases may easily spread. The emergence of cholera, not seen in the country for nearly 50 years, is indicative of the risks when safe water and sanitation are not available and basic hygiene, such as hand-washing, is neglected.

The Papua New Guinea Red Cross Society uses an inclusive, participatory approach called the Community Resilience Participatory Approach, where Red Cross volunteers are trained to identify and develop community and individual strengths and then stimulate the community to take action using these existing local resources. Papua New Guinea Red Cross Society has been developing this approach over, at least, the last five years with support from the International Red Cross and Red Crescent Movement.

Alex Dui, a Red Cross youth volunteer with the Western Highlands Province Branch of the Papua New Guinea Red Cross Society worked with a diverse group of village members to build on traditional leadership processes and facilitate the development of community projects, including building a water supply system and then re-building it to improve access to a cleaner water source. Alex's initiative as a Red Cross volunteer set off a chain reaction of inclusive participation and vulnerability reduction that has become a part of the culture of Kindau.



Youth volunteers construct bamboo aqueduct, March 2010. Photo: Waqaniburotu, IFRC.

## Activities and Results

In 2010, Alex, the Red Cross volunteer practiced Support, Appreciate, Learn and Transfer (SALT) techniques for community engagement to stimulate the community to take action from strength. Recognizing the need to tackle issues relating to accessing clean water in his community, he used an annual World Water Day celebration to ask other

### Disaster Risk Reduction Program, Papua New Guinea Red Cross Society, Western Highlands Province Branch, 2009 - ongoing

Papua New Guinea

Papua New Guinea Red Cross Society

Partners: International Federation of the Red Cross and Red Crescent Societies (IFRC)

Funding: European Commission, Humanitarian Aid and Civil Protection (ECHO)

youths in Kindau what they could do for their own community. This group of youth volunteers worked together to build a solution that brings water down from the mountain spring to the community using a bamboo aqueduct and the natural elevation of the mountain. The plumbing work of the solution drew on the technical skills and perseverance of the youth volunteers. Collecting cleaner water became significantly less time and energy consuming. People still used the creek for laundry but their drinking and cooking water was less exposed to contaminants. Once the system was built, the Kindau committee made a rule that no one could walk up to the spring to collect water directly, further reducing the likelihood of contamination by human activity.

In 2013, Alex, the Red Cross volunteer facilitated activities, including vulnerability and capacity assessments (VCAs), community mapping, information dissemination, volunteer mobilisation, some first aid training, a communal work day each week to clean up the village and waterway, and meetings of the Kindau committee. The Kindau committee emulated the Community Resilience Participatory Approach in its decision-making processes. The design of the process was inclusive, providing an opportunity for the increased participation of women and youth. People became excited about making improvements in the village. The committee identified water-borne disease from poor quality water supply as their main concern and understood that inadequate hygiene practices meant that children were more vulnerable than most. With technical training and some material support from partners, the youth volunteers replaced the bamboo with polyurethane piping and installed a filtration system and storage tank with support from the International Red Cross and Red Crescent Movement.

With reliable access to water and storage capacity, village women, girls and boys are spending more time in other family and community activities. Water use and hygiene practice are changing in Kindau. After Alex, the Red Cross volunteer brought back lessons from Participatory Hygiene and Sanitation Training in June 2013. He has since noticed that women in every house have soap so that the household can practice handwashing after coming in from the toilet.

## Challenges

Papua New Guinea faces some of the most daunting humanitarian and development challenges in the region. Thirty three (33) percent of people living in rural areas were using an improved drinking water source in 2012 and only 13 percent of people living in rural areas were using improved sanitation facilities. The diverse geography of Papua New Guinea can be a challenge for development, particularly with 87 percent of the country's population living in rural areas that are often not accessible by road.

Although pre-existing community decision-making processes were on a consensus basis, the consensus often came from long, aggressive discussions mostly by influential men with good standing in the community. As Alex, the Red Cross volunteer noted, '...everybody went their own ways', and he addressed this by introducing the Community Resilience Participatory Approach and supporting the committee to adopt this approach to decision-making processes.

## Lessons Learnt

A volunteer can be the agent of change in his or her community to stimulate action to improve climate and disaster resilience. Training, technical advice, and regular activities are required to recruit and retain skilled volunteers. The community-based approach is a long-term process. Papua New Guinea Red Cross Society undertook these activities, as well as branch development over at least five years with support from the International Red Cross and Red Crescent Movement.

It is important for community decision-making processes to be inclusive, particularly to women, special needs groups and youth. Through this improved decision-making process, the Kindau community is continuing to build its own resilience and reduce risk to future disasters.

Communal investments into water supply systems can develop mutual confidence and confidence in relationships with neighbouring communities. Conflict management techniques have been developed and exercised by the community to ensure that development does not exacerbate or cause issues within or between villages.

<http://redcross.org.pg/index.html>

# Water safety planning for resilience

## Background

New Caledonia experiences periodic epidemic outbreaks caused by the contamination of drinking water. They have the potential to significantly impact the health and economy of affected populations. In New Caledonia, the provision of drinking water is the responsibility of municipalities with the national government in charge of public health. However, the capacity of mayors and their teams to assess water quality and make improvements is limited. This activity sought to enhance the safety of drinking water by supporting municipalities to assess the risks and apply corrective measures.

The premise of water safety planning, based on World Health Organisation methodology, is that by identifying entry points for the contamination of drinking water and systematically addressing these deficiencies, water-borne diseases should be significantly reduced.

The Reducing Public Health Risk in New Caledonia through Water Safety Planning Project aimed to enhance country capacity to reduce drinking water sanitary risk and work with municipalities to be more attuned to sanitary risk with tools and support to reinforce the safety of their drinking water.



*Monitoring the water supply system in New Caledonia.*

## Activities and Results

The project was led by the Department of Health and Social Action, Government of New Caledonia (DASS), resulting in four municipalities receiving support to develop their water safety plans: Voh, Koné, Pouembout, and Lifou. This involved the initial collection of baseline water quality data, the assessment of contamination risks from catchment to distribution, and the identification of risk-mitigation measures, including their cost and implementation timeline. Municipal teams were highly involved in the risk identification and remedial process, thereby building their capacity to address issues of drinking water quality and ensuring ownership in their water safety plan.

Ten municipalities (already having water safety plans) received technical and financial support to implement corrective measures and contamination-proof their water infrastructure: La Foa, Farino, Sarraméa, Moindou, Touho, Hienghène, Poupou, Ouvéa, Ouégoa and Bourail. Improvements were based on the needs of each municipality as they were identified in their respective water safety plan and included a wide range of measures:

- Systematic surveillance of water quality (with data recorded and analysed).
- Monitoring the performance of the water supply system (and remedial action to reduce wastage).
- Development of awareness materials on water usage and safety.
- Additional water storage and treatment facilities and protection of these structures (fences, locks).
- Improvements to rainwater harvesting.

### **Reducing Public Health Risk in New Caledonia Through Water Safety Planning, Supporting Disaster Risk Reduction in Pacific Overseas Countries and Territories, 2011- 2013**

New Caledonia

Secretariat of the Pacific Community (SPC)

Partners: Government of New Caledonia

Funding: European Union (EU)

- Cleaning of water reservoirs.
- Maintenance of water infrastructure (incl. catchment equipment, reservoirs, pipes).
- New regulations prohibiting access to water catchments and improved signage in sensitive areas.
- Introduction of new water treatment techniques (chlorination, diverter, first flush).
- Training of technicians and volunteers to assess water quality and infrastructure maintenance needs.
- Review of payment options for drinking water.
- Installation of individual water meters to prevent wastage.

## Challenges

Municipalities faced several challenges during implementation, including the unavailability of technically-qualified personnel at local level, understaffed municipal teams, concurrent priorities for public action, and length of the process from plan development to implementation of corrective measures. To assist municipalities and keep them on track, DASS put in place a team of roving consultants and support staff who acted as 'champions' and kept the motivation alive at municipality level. This approach proved effective and continues to be used.

Outlying towns suffered from limited choice in service providers and higher costs of services including the transport of equipment. These factors need to be taken into account in future projects involving remote municipalities.

It was feared that staff turn-over at DASS may affect the successful completion of the project but disruption was minimal thanks to a committed and empowered team.

## Lessons Learnt

Understanding the local context is crucial to the success of water safety planning both at plan development and implementation stage. It is important to refrain from a 'cut-and-paste' approach as the local context determines the types of risks faced and the specific corrective measures to be applied.

Increasing local capacity is essential for the sustainability of objectives. In this project, municipal teams were trained and experienced in rolling out the water safety planning approach prior to the finalisation of the project.

The water safety planning approach develops a culture to ensure monitoring of water quality, maintaining infrastructure, and reducing wastage. This reduces public health issues building the resilience of communities.



*Newly installed water residential water system, New Caledonia.*

[http://www.wsportal.org/templates/ld\\_templates/layout\\_1367.aspx?ObjectId=33420&lang=eng](http://www.wsportal.org/templates/ld_templates/layout_1367.aspx?ObjectId=33420&lang=eng)

# Simulations for disaster response and community-based disaster risk management

## Background

Malaita, the most populous province in Solomon Islands, faces natural hazards, like tsunamis, earthquakes, cyclones, and flash flooding, as well as damaging human activities, such as deforestation. Rural Malaitan communities have an increased vulnerability to natural and man-made hazards, due to their isolation, poor access to health and educational services and high rates of poverty. More than 85% of the population is dependent on subsistence fishing and agriculture. A report by the University of the South Pacific (USP) states that Malaita has the highest proportion (35%) of impoverished households in the country.

The Malaita Community Resilience and Livelihoods (CRL) Project was developed with a primary focus to enhance community resilience in the face of climate change. The project works with residents to improve their resilience through better knowledge, self-organisation, networks and community plans to drive community disaster preparedness; the adoption of sustainable and profitable livelihood practices; and adoption of improved financial management skills at household and collective levels.



Participants learn about climate-smart vegetable production. Photo: World Vision Solomon Islands.

## Activities and Results

The goal of this project is to mitigate climate change effects, surrounding food and livelihood security for communities in South Malaita. This is being achieved through improved community-based DRM practices, strengthened rural livelihoods (agriculture and fishing) and the adoption of improved financial planning at the family and community level. The project has resulted in:

- 14 communities supported to design and implement their own Community Preparedness Plans (CPPs) and integrate them into community annual work plans. These plans identify important processes such as evacuation routes to community evacuation centres during hazards like tsunami or cyclones, and having basic disaster kits ready in households. These plans also helped establish early warning systems in every community for various high-risk hazards. Each of the 14 communities has already implemented at least two collective actions, including protective tree-planting and building evacuation houses.
- Community simulation exercises conducted on tsunami responses and management in 12 communities.
- Trainings on Community-Based DRM (CBDRM) for 15 active Community Disaster Management Committees (CDMC), which covered topics of CCA, DRR, DM, and community and provincial level operational procedures in times of hazards.

### Malaita Community Resilience and Livelihoods Project, 2010 - 2014

Solomon Islands

World Vision Solomon Islands

Partners: Government of Solomon Islands, Malaita Provincial Government, Kastom Garden Association, World Fish Centre

Funding: Government of Australia, private donations

- The formation of 26 savings groups, with 520 members (with more being added still). Savings can be drawn on in times of need and each group established a social fund as a form of insurance.
- Four Zone Ward Disaster Management Committees (WDMC) established and trained on CBDRM approaches, where participants completed activities such as hazard mapping, community profiling, and devised disaster response plans for all stages of a hazard. Women were represented in all WDMCs and incorporated disability needs in community disaster action plans. Each of the four WDMCs developed WDMC plans, which have been successfully submitted to Malaita Provincial Disaster Management Office (PDMO) and established links with the National Disaster Management Office (NDMO) through regular meetings.

## Challenges

It is challenging to convey new concepts of DRR and DRM to community members with low levels of literacy in Pidgin and English. The project team used visual images, such as pictures, to explore the concepts to the community members. Community chairpersons were engaged to explain these concepts in local language.

Unreliable mobile phone coverage presented a challenge in communication for staff and community members. The project minimised this challenge through providing a two-way radio to two key communities, which helped staff to connect and communicate with key partners in the communities.

Many community members showed a reluctance to train and prepare for risks that are not affecting them at present or in the recent past. This mindset has reduced disaster mitigation modifications and preparedness around homes and at community level. The project has addressed this by combining awareness-raising, knowledge-building and disaster risk management training alongside more tangible and practical livelihood activities, and emphasising the advantages of being prepared when, eventually, a hazard strikes.

## Lessons Learnt

As DRR and CCA share similar goals, it is important for DRR projects to incorporate and address elements of CCA. This project commenced primarily as a DRR project. However, the project team came across climate change vulnerabilities in the partner communities, but, they did not have the sufficient project scope to fully address these issues. Particularly in Solomon Islands, where communities have very real experiences of natural disasters, it is also important to assist communities to adapt to future impacts of climate change as well as prepare for cyclical disasters. Thus, all DRR projects need to have a CCA element as an integrated component to projects.

Child representatives are very effective in educating their families, and passing on key knowledge to parents and communities about DRR and DRM. In particular, children aged 10-15 years of age should be included in all DRR meetings and trainings, and utilised as representatives and leaders in awareness-raising activities.



*The first stage of the gabion wall to minimise storm surge impacts on the coastline. Photo: World Vision Solomon Islands.*

<http://www.wvi.org/solomon-islands>

# 'Whole-of-island' and ridge-to-reef approach to address climate change

## Background

The response to climate change by agencies and government in the Solomon Islands, as in many other Pacific Island countries, is frequently uncoordinated given multiple players working in isolation or having limited connectivity. The limited coordination traverses not only the policy arena, but also that of resource mobilisation, planning, implementation, monitoring, evaluation and learning.

In 2012, the Government of the Solomon Islands proposed to adopt a more integrated and holistic approach to CCA and mitigation at the province-wide level to help improve coordination and alignment of support, as well as the impact of planned development interventions. An integrated, programmatic ridge-to-reef approach was envisaged where government agencies, development partners and non-government organisations work in a multi-sectoral 'programme' in one province to strengthen the resilience of the local population against climate change. Choiseul Province was selected for trialling this new approach.



Vulnerability assessment in Choiseul. Photo: Paul Donohoe, SPREP

The former Deputy Prime Minister of the Solomon Islands, Hon. Manasseh Maelanga, has spoken of a partnership as 'a bold step away from the usual approach' and 'a success story in its own right'. The former Deputy Prime Minister also highlighted that without this type of partnership, 'agencies will lend themselves to working separately, and in isolation'.

## Activities and Results

In 2012, a vulnerability and adaptation assessment was carried out by a multi-sectoral team in 27 communities across 14 wards in Choiseul Province. The results from the assessments were then used to develop a multi-year implementation plan, which is linked to the provincial and national development plans. This plan has been endorsed by the communities, provincial and national governments, and development partners implementing projects in Choiseul.

Programme activities can be classified as provincial and national level activities. At the national level, government officers have been trained on GIS and cost benefit analysis tools to inform adaptation planning and decision-making. Trainings on food security, CCA, livestock (biogas training), Ecosystem-based Adaptation (EbA) and cost benefit analysis have been delivered to support officers in implementing adaptation projects. Participatory community-based trainings included agroforestry, nursery management, contour farming and livestock management.

Results to date include:

- Multiple partners with diverse projects and experiences agreeing to work together from the outset of the programme.

### Choiseul Integrated Climate Change Programme (CHICCHAP), 2012 - ongoing

Solomon Islands

Provincial Government of Choiseul, Government of Solomon Islands, Secretariat of the Pacific Community (SPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Secretariat of the Pacific Regional Environment Programme (SPREP), United Nations Development Programme (UNDP), The Nature Conservancy (TNC)

Partners: Government of Australia, British High Commission – Honiara, German Federal Ministry for Economic Cooperation and Development (BMZ), United States Agency for International Development (USAID)

- Commitment from the national and provincial governments, local communities and development partners to deliver programme results over an agreed time period of three years and to seek funds and resources to continue implementation beyond this time frame.
- Establishment of mechanisms and processes to address programme sustainability.
- Political support and ownership at the national, provincial, tribal council and community levels.
- Sharing of resources (financial, human and technical) with development partners and national ministries to implement activities under the programme, which has provided an avenue to strengthen coordination across national ministries and with development partners.
- Establishment of a model approach that can be used in other provinces of the Solomon Islands and in other PICs.

## Challenges

The remoteness of the programme site is a logistical challenge, which can be costly, onerous to coordinate and may result in implementation delays. This has been addressed through establishing steering committees at the provincial and national levels to support coordination, monitoring and implementation of activities at the provincial and national level. In addition regular meetings, an endorsed multi-year programme implementation plan to inform decision-making, and a shared travel schedule ensures significant costs are associated with establishing and implementing this programme. Well designed consultation and participation processes are essential to facilitate that all key stakeholders participate in planning, implementing, monitoring, evaluation and learning.

Limited management capacity to oversee and monitor the programme at the provincial level has proved challenging. This is addressed through including provincially based officers in planning workshops and trainings.

## Lessons Learnt

Climate change and disasters are complex issues, which have multi-dimensional development impacts. The crosscutting nature of these challenges requires multidisciplinary, cross-sectoral and integrated approaches. The ridge-to-reef approach addresses the multidimensional challenges and can bring together a range of development and natural resource management objectives. The approach facilitates multi sectoral coordination across agencies which can result in activities complementing each other, strengthened collaboration and enabling conditions for monitoring, evaluation and learning for sustainable development.

‘Climate change is an issue that affects many different sectors of community life, including our agricultural systems, fisheries, water supply, culture and also the local, national and global economies,’ said the Premier of Choiseul Province, Hon. Jackson Kiloe. ‘It is therefore important to include all the different levels of community, including men and women, young and old people, different sectors and levels of government, agriculture, fisheries, forestry, planning, development agencies, church groups and the private sector to address this issue’.

Ensuring capacity at the provincial level for coordinating, financial management and planning is essential for programme sustainability.

Programmes must coordinate exit strategies with national and provincial stakeholders to facilitate successful approaches and adaptation interventions that are sustained and up-scaled.



*Nuatabu Village identified as suffering from coastal erosion issues by Province -wide Vulnerability and Adaptation Assessment. Photo: Paul Donohoe, SPREP.*

<http://www.spc.int/en/component/content/article/216-about-spc-news/1099-development-partners-agree-on-collaboration-in-choiseul-province.html>

[www.sprep.org/climate-change/signing-a-new-partnership-for-climate-change-adaptation-in-the-solomon-islands](http://www.sprep.org/climate-change/signing-a-new-partnership-for-climate-change-adaptation-in-the-solomon-islands)



# Simulations for disaster response and disaster risk reduction strategies

## Background

The impact of hazards can often result in emergency situations, which can create chaos, uncertainty and confusion. To minimize the human and economic cost of disasters, simulations can be used, prior to disasters, to prepare communities for a more streamlined and effective response. Simulation exercises can test plans and procedures that would be used during a real emergency.

The Enhancing Emergency Preparedness and Disaster Risk Reduction Strategies in Fiji, Tonga and Vanuatu project aimed to reduce the loss of life and economic impact of disasters through the strengthening of disaster preparedness and response plans in advance of disaster events. The project supported the running of disaster preparedness and response simulation exercises.



*School children undertaking evacuation exercise.*

## Activities and Results

In order to enhance the capacity for coordinated inter-agency disaster response, targeted training and disaster response simulation exercises (SimEx) were run in all three countries.

Partners in each country actively participated in the:

- development of an MOU between consortium partners and the National Disaster Management Office (NDMO), clarifying the relationships, roles and responsibilities of the local partners in each country;
- detailed design of the simulation programme appropriate for their country and the participating communities;
- implementation of the exercise programme including a training workshop; and
- debriefing and evaluation of the simulation, contributing to lessons learnt, confirmation of best practices, recommendations for the review and update of plans and a report documenting these findings.

Each simulation exercise ran over a 48-hour period. The scenarios included a flood in Fiji, a tsunami in Tonga and a cyclone in Vanuatu. The varied and changing vulnerabilities of a community over the course of a 24-hour period, which are often gender-related, were identified and response mechanisms tested.

Participants discussed the impact of increasing incidence of natural and climate-related hazards and ways in which these can be mitigated through good environmental management, such as reducing land clearance, planting shelter belts, and well-developed and maintained drainage canals. The simulations adhered to Sphere's humanitarian charter, that all people affected by disaster have the right to receive protection and assistance to ensure the basic conditions for life with dignity.

### **Enhancing Emergency Preparedness and Disaster Risk Reduction Strategies in Fiji, Tonga and Vanuatu, 2013 – 2014**

Vanuatu, Fiji, Tonga

Adventist Development and Relief Agency New Zealand (ADRA NZ), Caritas, Christian World Service, Oxfam, Rotary, Tear Fund, United Nations Children's Fund (UNICEF)

Funding: Government of New Zealand

Simulation exercises were run in the three countries, resulting in opportunities to identify successes and gaps in disaster preparedness and response that could be used to create improvements across the country. Key learnings in a final report are applicable across the Pacific region. The project assisted the NDMO in each country to strengthen links and relationships with key stakeholders prior to a disaster event. One NDMO remarked that the programme was the best thing that had happened as it had enabled the NDMO to effectively engage with communities.

In all countries, key technologies were tested for the first time prior to and during the event, including mobile HF radios, an SMS code system, part of disaster response plans and early warning systems.

Community emergency committees were strengthened and there was increased awareness of disaster response procedures among community members. Schools and communities were able to test their evacuation plans.

## Challenges

Disaster preparedness and response requires coordination of a large number of stakeholders in a single event, often in circumstances of constrained resources and capacity. This presents significant challenges to effective coordination mechanisms and translates into simulation exercises as well.

When undertaking simulation exercises, it is necessary to ensure community buy-in and participation. This requires significant community engagement well in advance of the exercise.

## Lessons Learnt

Simulation exercises facilitate the end-to-end testing of early warning systems and inform people about the early warning system. This improves community preparedness and response to hazards, therefore improving resilience to climate and disaster risks.

Regular simulation exercises in a realistic testing environment allows for training and identification for improvements in disaster preparedness and response based on gaps identified at national, provincial and community levels prior to a disaster event. In particular, improvements can be identified in relation to institutional and governance arrangements, equipment and infrastructure, planning, and skills for disaster preparedness and response.

It is effective to include actions relating to DRR in projects related to disaster response and emergency simulations.

Focus on clarifying roles and responsibilities and strengthening communication channels at all levels for strengthened disaster preparedness and response.

Simulation scenarios should be developed in consultation with the community well in advance of the exercise with regular meetings and ideally be based on a real event experienced by the community. This ensures the scenario is realistic and, as the community will be able to identify with the scenario, will facilitate their involvement, especially with role playing. Through this experience the community is better prepared for the next disaster event.



*Simulation exercise 2013.*

# Solar food dryer to improve community resilience

## Background

Climate change and disasters affect the food security in the Pacific through droughts, floods, and cyclone damage. In addition, food insecurity can substantially increase the vulnerability of a community to the impacts of climate change and disasters. The Secretariat of the Pacific Community (SPC) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) climate change program has been working alongside the Government of Vanuatu since 2009 to identify and implement practical adaptation solutions.

The Solar Fruit Drying initiative aims to enable women and communities to engage in an innovative, inexpensive and locally appropriate CCA strategy based on the existing gender-specific knowledge and set of skills. For example, the program allows women to further exploit and utilize the knowledge and techniques of food preservation they traditionally and culturally possess. The initiative also aims at empowering women financially, by providing a source of revenue-generating value-added dried products. Fresh produce is nearly impossible to market from many remote isolated islands, while dried products can be stored and sold whenever a ship reaches these women.



*Tana community building fruit dryer, Vanuatu.*

## Activities and Results

The Solar Fruit Dryer is technology that allows communities to dry their agricultural products (i.e. fruits, vegetables, fish, meat and nuts), to preserve and store them for future use. The dryer allows opportunities for vulnerable women, and their communities, to increase their resilience to climate change and disasters.

The Solar Fruit Dryer activity was initiated in 2011 with the private sector leader of food drying, the Kava Store, government and regional development partners. A group of Ni-Vanuatu women drying experts have facilitated in-village dryer training, implementation, management and monitoring. The program has recently benefited from a partnership with the Vanuatu Government's Department of Trade and Industry to roll out the dryer to its provincial income development officers. A Bislama-language drying manual has been created for all types of locally available produce, as well as a cooking-show style instructional DVD, which is accessible even to women without formal schooling or low literacy rates.

This multi-partner consortium has been working to perfect Vanuatu's first low-cost, climate adaptive, greenhouse gas mitigating and rural-appropriate technology for fruit, vegetable, nut and fish preservation. The collaborative entrepreneurial partnership has sought to enhance knowledge and practice related to preservation, value-adding and agricultural processing for CCA. This approach is unique in that this technology uses no fuel and gives off no harmful emissions, radically changing the way in which food may be cooked in Vanuatu (wood burning stoves). The program

### **Vanuatu Women's Solar Food Preservation Climate Adaptation Initiative, Coping with Climate Change in the Pacific Island Region Program (CCCP-IR), 2011 - ongoing**

Vanuatu

Government of Vanuatu, Secretariat of the Pacific Community (SPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

Funding: German Federal Ministry for Economic Cooperation and Development (BMZ)

supports vulnerable stakeholders to earn value-added income, minimize input costs and make efficient use of resources. The technology was successfully disseminated due to it being a low cost investment opportunity.

With 15 islands covered with targeted dryer demonstrations, now thousands of rural residents understand the importance of solar drying and food preservation processes for DRR and CCA.

In all, over 500 women have directly been trained in the dryers on many major islands (Malekula, Tanna, Efate, Pele, Nguna, Emae, Buninga, and Makira, amongst others) by conducting trainings in the local Bislama language. Women are trained in dryer construction, drying processes for vegetables, fruits, nuts and meat/fish, as well as marketing, financial management, packaging and nutrition.

On the island of Pele, one of the first solar dryer sites, an area of forest, which was previously used for firewood cooking wood collection, has now been protected due to the reduced demand for fuel wood for the solar dryers. The solar drying process has reduced greenhouse gas emission. It also has long term recover benefits of stored food supply after natural disasters.

## Challenges

While this program was originally intended to be a community enterprise, the 'tragedy of the commons' approach used by several communities caused overuse and little maintenance effort, leading to a breakdown of the dryer. In these cases, the issue was resolved by privatizing the dryers so that each interested woman could run her own preservation enterprise rather than share a community dryer.

Obtaining materials to build the original dryer designs was difficult, but after modifications, the cost of the dryer was brought down (by using locally available materials) to around USD \$250 per dryer. Small solar panels now readily available and used to charge mobile phones, and second hand computer fans are accessible, cheap and now used in the dryer construction.

## Lessons Learnt

Low technology solutions are critical in rural communities where electricity, fuel and cash economies are limited. Initiatives to support vulnerable communities to earn added income, minimize input costs and make efficient use of resources increasing their resilience to climate change and disasters.

The most effective way to up scale the enterprise is to establish demonstration units, and run associated trainings, in strategic locations so that stakeholders are to visit and experience the technology, which often results in motivation to adopt the technology in their own households.

Producing training materials in local language (Bislama-language both written and DVD) can enable technology upscaling in many cases without expensive face-to-face trainings.

Working in partnership, including grass roots women's groups and communities, including private sector experts, national and provincial government, regional technical agencies and international development partners can add value and provide insight towards successful outcomes.



Solar panel for the dryer. Photo: UN Women.

<http://www.nab.vu/projects/coping-climate-change-pacific-island-region-spc-giz>

<http://www.spc.int/lrd/spcgiz-coping-with-climate-change-in-the-pacific-island-region>

# Strengthening the education sector for disaster management

## Background

While both the National Disaster Management Organization (NDMO) and the Ministry of Education in Vanuatu are well aware of the need, resources have not permitted them to tackle and begin introducing school disaster management in a systematic way. The Ministry of Education has requested School Disaster Management Plans from each provincial office, but guidance and support for the school level has been minimal. The only current model for the plans is based on 'before, during, and after' lists related to each of several hazards. It is repetitive and lacking in specific guidance for how to assess and plan for school DM, identify feasible risk reduction measures, develop response skills, and conduct and learn from drills. Furthermore, this approach does not take into account the parallel needs for Safe School Facilities and for inclusion of DRR materials within the curriculum.

The project leveraged the interest of school principals and teachers as well as the energy and enthusiasm of children and youth to address these issues. Rather than focussing on the production of planning documents, the strategy focuses on good guidance and a series of all-school activities designed to produce a plan-in action.



*Simulation exercise with staff and students of Erakor Bilingual School.*

## Activities and Results

The project aimed to develop and strengthen capacity for school DM in the education sector at national, provincial and local levels to support community risk reduction, preparedness and resilience.

To achieve this specific objective, the project trained a number of school disaster management champions across various levels of the education sector. These 'champions' were equipped with knowledge, skills and tools to enable them to increase the awareness and participation levels of students in disaster management within schools.

The following information, education and communication materials were developed:

- A reference document that provides government departments, NGOs, communities and schools with action-oriented and evidence-based messages for natural hazard preparedness. (Public awareness and education for disaster risk reduction: key messages for Vanuatu - [http://www.pacificdisaster.net/pdnadmin/data/original/VUT\\_SaveTheChildren\\_2014\\_awareness\\_education\\_DRR\\_EN.pdf](http://www.pacificdisaster.net/pdnadmin/data/original/VUT_SaveTheChildren_2014_awareness_education_DRR_EN.pdf))
- The Participatory School Disaster Management Handbook with a guidance framework for implementers with detailed information of the Comprehensive School Safety Framework and the five themes of school disaster management.

### Education Sector Disaster Management for School Community Risk Reduction and Preparedness, 2013- 2014

Vanuatu

Save the Children

Partners: Government of Vanuatu

Funding: European Commission

- The Participatory School Disaster Management Planning Toolkit– the plan-in-action comprising a range of participatory activities that can be run by schools throughout the year to promote awareness, reduce risks, increase capacity and share knowledge.
- School Disaster Management: A child-centred approach to School Disaster Management activities in Vanuatu schools (Flipchart) – a collection of nine activities set out with easy-to-follow, step-by-step instructions for teachers or facilitators and commissioned illustrations for students.
- Standard Operating Procedures: a 15-minute video providing a brief introduction to School Disaster Management and demonstrating the proper way for schools to conduct a number of different drills. This resource is very important as most rural schools will never have previously had the opportunity to see an effective earthquake or tsunami drill despite living with this risk every day.

Through the project, approximately 80 schools were directly involved with more than 18,000 students and teaching staff.

During Tropical Cyclone Lusi (2014), the Zonal Curriculum Advisers of Penama province managed to provide the Provincial Education Office with assessments of 54 out of 77 schools from within all 10 zones inside of seven days. A neighbouring province that suffered similar levels of damage, which had not undergone school disaster management training, did not provide any assessments.

Numerous schools and zones have organised 'Disaster Days' that have meant whole-school and community participation in disaster awareness and preparedness activities.

## Challenges

Accessibility to workshops for participants from remote locations was one of the major obstacles as travel often involved multiple boat rides, 4WD travel via bush tracks and short flights. Unpredictable weather, limited to no internet access and unreliable mobile phone reception adds to this challenge. Provincial Education Offices were used as remote coordination centres, with Zone Curriculum Advisers undertaking organisation of participants in their areas.

It is challenging working in a sector where limited activities have occurred in relation to managing and mitigating risk from natural hazards. Near constant advocacy across all levels of the education sector was required to ensure that school disaster management remained a priority for all participants involved.

Even when it was clear that participants saw value in the process and understood the benefits, teaching staff especially, often reported that existing demands on their time for achieving academic goals left little time or resources with which to tackle disaster preparedness aims.

## Lessons Learnt

Not only do schools need to consider and plan for climate and natural hazards and risks for their staff, students, communities and assets, education materials should provide integration information in relation to climate change and DRM.

Internationally accepted standards and approaches for information, education and communication materials cater for schools in metropolitan centres and cannot be simply transplanted to Pacific Island schools, many of which may not exceed 50 students, are in rural locations and have extremely limited resources and capacity. In order to provide materials that are readily accepted, well understood and enjoyed, care should be taken to provide guidance that is accurate yet simple and not burdensome because of seemingly never-ending checklists and responsibilities.

Highlighting examples of schools performing particularly well, emphasising how easy the school found it to undertake this work and how much the children enjoyed and benefitted from their inclusion proved a successful approach to encouraging schools that were having difficulties.

The extent to which teachers and Principals feel that they do not have the capacity or resources for achieving any extra responsibilities within their roles should not be underestimated. Somewhat fairly, there is a sense that providing a reasonable quality of education is challenge enough with the facilities and training they have available. Most participants found they could implement some activities due to the participatory approach of the project and because they are motivated by the safety of the children under their care.

<http://www.savethechildren.org.au/our-work/where-we-work/pacific-islands/vanuatu>

# Effective risk governance to improve resilience

## Background

The concept of 'risk governance' is emerging as part of a fundamental approach to climate and disaster resilience in the region. This can be described as 'a system of organisational structures, mechanisms and processes, strategies, policies, laws and regulations, resources and procedures, at all levels of administration, governing how a country manages disasters and climate change risks'.

The Pacific Risk Resilience Programme (PRRP) aims to address underlying causes of vulnerability and integrate Climate Change and Disaster Risk Management (CCDRM) into socio-economic development (the 'resilience' agenda), as part of a shift away from simply managing the symptoms of disasters and climate change. The purpose of the programme is: Governments, civil society and communities in trial locations, and in accordance with their unique contexts, identify risks and needs and formulate, and in some cases implement socially inclusive, effective and sustainable responses. The programme focuses on integration of CCDRM into routine national and sub-national planning and implementation processes, and is done in a gender and socially inclusive manner.

In Vanuatu, the establishment of the National Advisory Board (NAB) in 2012 has gone some way to improving the management of CCDRM initiatives. PRRP is working with the NAB to further strengthen 'risk governance' through the integration of CCDRM into development, particularly within national development planning processes across all development sectors (with a focus on agriculture and education), and sub-national level development planning in target provinces and communities.



*A new SMS 'public - private partnership' competition was part of the annual Vanuatu Climate Zone Quiz.*

## Activities and Results

The main approach of the programme in Vanuatu was determined by a Risk Governance Analysis (RGA). The objective of the RGA was to analyse the current development planning mechanism at national and sub-national levels and the extent to which CCDRM is integrated into governance mechanisms. This would be used as a platform for the government, with the support of PRRP and other partners, to further strengthen 'risk-governance' in Vanuatu. The RGA was led by a NAB task force with technical support from PRRP. It encompassed a number of components including: a climate finance, expenditure and institutional review (CPEIR), capacity assessments of national and sub-national administrations and risk profiling. The findings of RGA are helping to transform the way in which climate change and disaster risks are being addressed and managed within the development system.

PRRP is supporting the Government to lead on some key initiatives to undertake these changes and these include:

- Strengthening the NAB function: i) the NAB is now being co-chaired by the Prime Minister's Office and the Ministry

### Pacific Risk Resilience Programme (PRRP), 2012 - 2017

Vanuatu

United Nations Development Programme (UNDP), Live and Learn Environment Education, Government of Vanuatu

Partners: Secretariat of the Pacific Community (SPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), World Bank, The Vanuatu Climate Adaptation Network (VCAN)

Funding: Government of Australia

of Climate Change; ii) its strategic function is more clearly defined; iii) a Secretariat function for the NAB has been established to develop and oversee Vanuatu's strategic direction for CCDRM.

- Formulating an integrated Climate Change and Disaster Risk Reduction policy which for the first time will include specific strategies and measure for 'risk governance'. This has been developed through a substantive consultation process with communities, development sectors and partners.
- Defining the long term strategy for the newly created Ministry of Climate Change and its function within risk governance.
- Supporting the establishment of a monitoring and evaluation strategy for the Prime Minister's Office (PMO) while linking it to other sectoral Ministries, including Ministry of Climate Change.
- Supporting the Department of Local Authority to develop a sub-national planning, budgeting and monitoring guidelines integrating climate change and DRR factors.
- Supporting the Ministry of Climate Change and Ministry of Finance to implement recommendations identified through the Climate Public Expenditure and Institutional Review.
- Supporting post-disaster recovery planning processes.

The programme provided advice as to different options for consideration for efficient organisation of the Secretariat of NAB and facilitated consultations and workshops to bring different stakeholders on board. The programme is also assisting the Government in establishing a task force which will work on different thematic areas related to climate change and DRR.

## Challenges

The RGA is helping the Government of Vanuatu to pave the way for transformational and to determine how CCDRM is managed across development sectors and at sub-national levels. This sort of change, however, requires a significant shift in approaches and institutional structures and, as such, requires careful consultation and dialogue with key stakeholders. For example, the recommendation to establish a NAB Secretariat required careful consultations with stakeholders within existing structures. This involved numerous consultations and discussions with an analysis of options. Even though the process has taken a long time, it has involved all relevant stakeholders, which increases the prospect of success.

Due to limited capacity at different levels of government, it can take some time for government agencies to effectively institutionalise different concepts and implement them, especially at the Area Council level, where most of the activities are planned to be implemented. In order to address this issue PRRP is currently working with the Department of Local Authority (DLA) to reform the development planning process from the community level, Area Council and up to Provincial level. DLA is leading the process, with support from PRRP and other partners including the World Bank, and a network of NGOs, the Vanuatu Climate Adaptation Network (VCAN).

## Lessons Learnt

An integrated approach to climate change and DRM allows for more effective risk governance.

Risk Governance Assessments (RGA) are useful tools for identifying strengths and gaps in government structures when managing climate and disaster risk.

Establishing partnerships between government agencies while implementing specific activities in sectors is key to the success of integrating consideration of resilience into socio-economic developments.

CCDRM is everyone's business, delegation of CCDRM activities to different sectors rather than undertaking climate change and DRR activities through one technical line is a more effective approach to CCDRM.

Early identification of thematic entry points and change agents in different sectors is important for effective mainstreaming of CCDRM within a Government context.

[http://www.asia-pacific.undp.org/content/dam/rbap/docs/cpr/UNDP\\_PC\\_PRRP\\_brochure.pdf](http://www.asia-pacific.undp.org/content/dam/rbap/docs/cpr/UNDP_PC_PRRP_brochure.pdf)

<http://www.livelearn.org/projects/pacific-risk-resilience-program-working-towards-resilient-communities-pacific>



# Network approach to community-based adaptation

## Background

In common with many PICTs, Vanuatu's small population is spread across many islands. The remoteness of Ni-Vanuatu communities, coupled with considerable exposure to both geological and meteorological hazards and Vanuatu's status as a Least Developed Country, render the people of Vanuatu among the most vulnerable on earth to natural hazards. Climate change compounds this existing vulnerability.

A consortium of national and international NGOs was established to support communities to adapt to the impacts of climate change and to enable organisations to work in a more connected manner; sharing resources, capitalizing on each other's strengths, addressing gaps and avoiding duplication. The Vanuatu NGO Climate Change Adaptation Program (Bislama: Yumi stap redi long climate change) works with over 5,000 men, women and children on 12 islands across the provinces of Shefa, Tafea, Torba and Penama, including remote outer-island communities. The program has sought to strengthen existing governance structures and initiatives for reducing disaster risk and managing uncertainty.

The program takes a broad view of resilience as the ability of women, men and children to realise their rights and improve their wellbeing despite shocks, stresses and uncertainty.



*Mila Silas, Project Officer with CARE International, inspecting community gardens in Futuna. Photo: Simon Bradshaw, Oxfam.*

## Activities and Results

Among other things, the program is distinguished by its consortium model, by its success in fostering collaboration between government, NGOs and communities. It is also distinguished by the Vanuatu Community Resilience Framework for the consortium, which provides overall coherence and ensures all agencies are working towards a common definition of impact. This framework breaks down the goal of building community resilience into eight enabling characteristics: Basic needs met; diverse livelihood assets; fair, inclusive and responsive decision-making; access to traditional and external information; ability to innovate and take risks; ability to understand and act on shocks and changes; internal and external social networks; connected and responsive government.

In pursuing this goal, partners have individually or jointly supported communities to use traditional and external knowledge to plan and implement CCA actions. These include establishing means for communities to access and use weather, climate and climate change information and resources, coastal protection, livelihood development and climate change education. Each activity has focussed on increasing women's and youth's access to information, resources, skill development opportunities and decision making.

### Vanuatu NGO Climate Change Adaptation Program, 2012 -2014

Vanuatu

Save the Children, CARE International, Vanuatu Red Cross Society, Vanuatu Rural Development Centres Training Association (VRDTCA), Secretariat of the Pacific Community (SPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and coordinated by Oxfam

Funding: Government of Australia (2012-2015)

The program was instrumental in the establishment of the Vanuatu Climate Action Network (VCAN), which facilitates the sharing of lessons and good practice among over 20 civil society organizations and with the Government. It brings communities' priorities gathered by civil society into national, regional and international decision making forums. VCAN has coordinated civil society inputs on climate change and DRR into Vanuatu's National Sustainable Development Plan and has a permanent seat on the Government's National Advisory Board on Climate Change and Disaster Risk Reduction. Close collaboration between VCAN and the government resulted in three women representatives from VCAN, including a youth delegate, being members of Vanuatu's official delegation to the UN Climate Summit in Warsaw in 2013 (COP19) and support for a national submission to the United Nations Framework Convention on Climate Change (UNFCCC) on gender balance.



## Challenges

The preparation of several new resources written in Bislama has helped overcome two key challenges relating to communicating climate risk. First, the complex and technical nature of climate information and second, the need for information to be conveyed in a commonly understood language. In addition to providing straightforward information on climate basics, partners sought input from communities and interacted with the meteorological office on how to better communicate disaster warnings and seasonal forecasts.

The geography of Vanuatu presents challenges in coordination across remote and isolated islands. To address this challenge the program supports those agencies already active in Vanuatu to work in a more joined-up and coordinated manner, and to draw on the particular strengths of each consortium member. For example, while the Red Cross is only directly responsible for projects in the far north province of Torba, resources developed by the Red Cross for communicating climate change are used by consortium members working throughout the archipelago.

## Lessons Learnt

The experience of piloting the Vanuatu Community Resilience Framework throughout the design, implementation, monitoring, learning and adapting stages of the program has affirmed the value of

- a) working to a shared framework, and
- b) focussing on the enabling characteristics of resilience at the community level (see diagram).

The Vanuatu Community Resilience Framework has the potential to promote greater integration of CCA, DRR and development.

Network and consortium approaches can increase effectiveness and efficiencies; the program has delivered significant gains in terms of sharing tools and resources, capitalizing on each agency's strengths to engage in collective action and avoid duplication.

Supporting communities to increase their own resilience leads to more sustainable outcomes than expert driven, technology focused solutions. However, this also requires long term engagement to support changes in behaviours and power relationships that are required to increase resilience.

<http://ccp.nab.vu/organisation/Vanuatu%20NGO%20Climate%20Change%20Adaptation%20Consortium>

# Water safety and security planning for resilience

## Background

The freshwater resources of PICs are threatened by population growth, urbanisation, changing land-use patterns, frequent natural hazards, and climate change. Island nations are particularly threatened by the impact of climate change, notably sea level rise (which can cause seawater intrusion into aquifers), increased temperatures and changing rainfall patterns (affecting groundwater recharge and the viability of rainwater harvesting systems depended on by many) and increasing frequency of extreme weather events such as tropical depressions and cyclones.

An approach was developed to strengthen community management of water supplies, build resilience to climate variability and reduce disaster risk through rural drinking Water Safety and Security Planning (DWSP).

Under the United Nations Children's Fund (UNICEF) Pacific Programme, a water secure village is defined as one that:

- Has sufficient quantity of water of good enough quality for human basic needs inclusive of sanitation and hygiene.
- Collects and treats its used water to protect humans and the environment from pollution.
- Has the ability to cope with the uncertainties and risks of water-related hazards, for normal operation, pre-disaster preparation and post disaster scenarios.



*Community members in Wilit, North Ambrym enjoying piped water from a protected water source.*

## Activities and Results

Projects in Fiji and Vanuatu used an approach that begins by engaging communities in improving the safety of current water systems by preparing DWSP at workshops before implementing actions to improve water supply. This has an immediate benefit of improving water supply while building a solid foundation for future infrastructure by identifying, prioritizing, and treating existing risks. It provides a level of management capacity before large scale infrastructure is planned and built. Additional training is provided where required for additional operation and maintenance activities.

The approach uses a blend of United Nations established methodologies within the field of water to achieve all the aspects required, including the Water Safety Planning (WSP) approach promoted by the World Health Organisation, combined with the technical standards of water security.

In Vanuatu, project results include:

- National and Provincial staff from the Department of Geology, Mines and Water Resources trained in water safety and security planning.

### **Achieving Water Security in Rural Fiji, 2013- 2014**

### **Community Resilience and Coping with Climate Change and Natural Disasters in Vanuatu, 2011 - 2015**

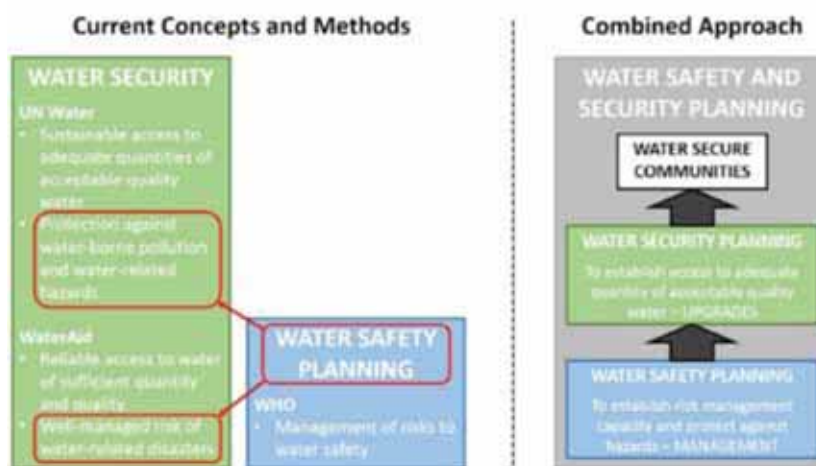
Fiji, Vanuatu

Partners in Community Development Fiji  
United Nations Children's Fund (UNICEF) Office for Pacific Island Countries

Partners: Government of Fiji, Government of Vanuatu

Funding: UNICEF, Government of Australia

- Ten project sites have completed water safety and security plans.
- Approximately 90% of the population in seven community sites have access to water within 50 metres from the household.
- All trained water committees and water artisans played leading roles in the rehabilitation and/or installation of a community water system.
- Two VIP demonstration toilets built by community during sanitation training.



## Fiji

After a year of implementation in Fiji, recent monitoring identified community-led action in four communities with important successes that could be replicated elsewhere. Results in communities include:

- communities involved in the monitoring exercise had regular water committee meetings and presented on water issues at village meetings;
- implemented Water Resource Management system using valve keys in the community;
- building of new toilets with no outside intervention;
- building new stand pipes connecting to four houses;
- regularly cleaning their water tanks; and
- steps to protect their water source.

## Challenges

The greatest challenge has been increasing community capacity for management, which is the key to resilience and long term coping mechanisms. Water security is a complex field and it can be difficult for communities to understand what they have to do, or have the incentive to undertake the required work to achieve it.

WASH programmes often struggle to ensure sustainable operation and maintenance of built infrastructure in the community. As such, the UNICEF projects have been designed to overcome these challenges in the following ways:

1. Engage community through operation and maintenance of current system before building infrastructure and constantly direct focus to management of the water system.
2. Ensure communities are engaged in their own planning and can adapt to local circumstances.
3. Ensure that management capacity is achieved before infrastructure is supplied.

## Lessons Learnt

Strengthening community management of water supplies through rural drinking water safety and water security planning builds resilience to climate variability and reduces disaster risk. It is the development of management capacity that has the most impact on long term resilience for communities.

Communities need significant guidance in planning activities to be empowered to make their own decisions rather than an outside 'expert' making all the decisions.

Providing an element of accountability is key to achieving an increase in management capacity.

Trying to improve community resilience requires commitment and hard work from community members. To promote greater change in the community environments, a combination of guidance and accountability is recommended, as well as a certain level of results based performance.

<http://www.unicef.org/pacificislands/>

# Emergency Centres for disaster response

## Background

The 2012 floods in Fiji killed six people, temporarily displaced 15,000 people and caused damages to infrastructure, schools, homes, businesses and agriculture. The Salvation Army Nadi Corps hall was used as an evacuation centre, providing meals and shelter for 35 people. A water tank proved valuable in supplying water to the hall with the town supply out of action.

The Salvation Army Evacuation centres are places where immediate needs of shelter, food, rest, clean water, emotional support and personal hygiene needs can be met in a supervised environment. Support can also be given for the rehabilitation of victims back to their homes and communities.

The National Disaster Management Office Fiji (NDMO) in reviewing response to the Floods in 2012 concluded that there needs to be improved access for those with disabilities and for the elderly.

In response to this report and the Fiji floods, the Salvation Army identified the need for improvements for local disaster resilience and response. In particular to increase the number and usability of registered evacuation facilities to cater for demand during disaster, reduce post-disaster social issues, such as domestic violence and sexual abuse, increase the ability to return to normality following a disaster, and to ensure elderly and people with disabilities have access to centres and necessary facilities.



*Liet. Sekaia with Sigatoka Salvation Army container.*

## Activities and Results

The Improved Resilience to Disasters project upgraded 10 Salvation Army Halls (Emergency Centres) in Fiji through the following actions:

- Upgrade of facilities to cyclone certificate and disaster resilience standards with a focus on accessibility for the elderly and people with disabilities. This included building ramps and ensuring appropriate toilet facilities. These centres are able to be both temporary evacuations centres and longer term shelters. 10,000 litre water tanks and generators to ensure these centres are ready immediately following a disaster were installed.
- Emergency supply containers provided based on previous disaster needs and SPEHERE guidelines, including: mattresses (particularly for elderly and persons with disabilities), first aid kits, wheelbarrows, spades, tarpaulins, torches and batteries, gumboots, hardhats, radio's, disinfectant, chainsaws, women's hygiene products and baby products. Having these already on sites is vital, especially as transportation is challenging immediately after a disaster.
- A management kit and training for Evacuation Centre Managers. Each of these centres is managed by a couple who live on site 24/7. These Salvation Army Officers are well known members of the local community. The officers are trained in order to ensure safe environments through 'Empower Pacific'<sup>15</sup>, which focuses on management of

### Improved Resilience to Disasters, 2013- 2015

Fiji

The Salvation Army New Zealand Territory

Partners: The Salvation Army Fiji Division

Funding: Government of New Zealand

evacuation centres, listening skills, grief counselling, anger management, crowd control and general disaster risk preparedness.

The project has increased the number of evacuation centres available in Fiji following a disaster, which can be used as both immediate and longer term shelters. Local capacities have been developed and collaboration with the Fiji NDMO has ensured a cohesive disaster response and preparedness strategy.

The availability of these centres means that schools are no longer relied on as shelters, and classes can resume as quickly as possible following a disaster, which has been shown to be an important aspect of post-disaster rehabilitation.

Elderly and persons with disabilities are able to access centres and their facilities, separate rooms are available for women and children, and the likelihood of domestic abuse following a disaster has reduced due to an alcohol ban as well as supervision by officers.

## Challenges

Challenges emerged in relation to long waiting periods for supplies and issues with getting supplies to communities. Due to the size of Fiji, there is little stock on hand. This was addressed by purchasing containers to place at each of the evacuation centres which contained emergency supplies, e.g. hygiene products, mattresses, basic first aid supplies, radio, candles, generator, shovels, and chainsaws.

Non-perishable food was initially to be stored in the containers, however, because of the heat. It was decided that storing non-perishable food was too risky as it may not be edible by the time a disaster strikes. To address this, an arrangement was made with a national supermarket chain whereby when a disaster is imminent The Salvation Army is guaranteed they can purchase adequate supplies.

The training for management officers initially did not cover several key aspects of disaster response, including grief counselling and anger management. This was addressed by updating training materials before any training programmes began and extending training from three to five days.

## Lessons Learnt

Planning for management of evacuation centres should not just meet physical needs but also focus on social and psychological impacts of disasters, including locally appropriate anger management and grief counselling.

Evaluations and reflections of previous disaster response are a key starting point for successful disaster response and preparedness projects.

It is important to involve local communities and governments at all stages of planning and implementation in order to foster trust and cohesion.

Education is a vital component of disaster preparedness and the definition of what needs to be included in this is continuing to widen.



Salvation Army Evacuation Centre with container and water tank.

<http://www.salvationarmy.org/ihq/news/inr030412>

<http://www.salvationarmy.org.nz/centres/fiji>

# Village relocation as a climate change adaptation measure

## Background

The Vunidogoloa village in the Koroalau district of Cakaudrove province is located on the island of Vanua Levu, north of Fiji. It has experienced first-hand the impacts from an eroding coastline and increased flooding over the years. The village ancestors settled in this area during the 1800's.

Over the years, increasing episodes of seawater inundation and flooding from the river, have resulted in sizeable portions of the village being washed away, leaving only a small area. The seawall built to salvage and safeguard the village was destroyed by the waves and rising water levels.

Vunidogoloa village was identified for relocation in 2010 by the Government of Fiji after the events of Tropical Cyclone Tomas. It was noted from preliminary inspection that the village was succumbing to flooding during heavy rain and high tide. This raised health concerns due to the lack of waste disposal management and community housing rotting. Due to such impacts, a new village location over the hill (2kms inland) known as Cevuvu Settlement was identified alongside the main Saqani Road.



*Relocated Vunidogoloa village in Vanua Levu, Fiji.*

## Activities and Results

In 2011, the village relocation project began with funding from the Government of Fiji and support from the Vunidogoloa village community. The government provided over FJD \$500,000 for the village relocation including:

- Preliminary works that included site levelling
- Housing including water and solar energy projects and Environmental Impact Assessment
- Construction of eight fish ponds and purchase of some breeding cattle
- Copra drier and the pineapple plants.

The community provided the timber for the construction worth approximately FJD \$250,000. A local logging company offered their services to fell the village-owned trees.

Thirty (30) houses for the 30 individual families were constructed with proper flush toilets and water supply sourced from a natural spring at a nearby mountain close to Kenani. The International Labour Organisation (ILO) provided both qualified volunteers to help construct homes and funding for the purchase of pineapple seedlings post relocation.

Further to government livelihood programmes, the villagers are to establish nurseries for crops for their women to generate income within their homes. These nurseries would include indigenous timber, vegetables, fruits and flowers to

### Vunidogoloa Village Relocation Project, 2010 - 2014

Fiji

Government of Fiji

Funding: Government of Fiji, Vunidogoloa community

have continuous supply of seeds and ensure long term security. The villagers continue to farm around the surrounding areas for their livelihood and they hope to continue to improve on their living standards with the assistance provided by the Government.

Moreover, the relocation provides more socio-economic opportunities for the women and youth, as well as easy accessibility to the school children and the elderly. With accessibility to the main road, women and youth are encouraged to adopt new income generating projects. With the availability of arable land at the new site, villagers are encouraged to have more agricultural activities for food security.

## Challenges

The main challenge to the Vunidogoloa relocation project is to bring a new life to the community of Vunidogoloa. As a fishing community, focus will be more on use of land with diminished activities along the coast and sea. The community will have to tend to their fish farms close to the village rather than venturing to sea.

Adapting to living on the new site will be a nostalgic experience for community members as they have left a place where they have a sense of affection for and memories of their ancestors. The Pacific Conference of Churches (PCC) has been working with villagers to help them deal with the loss of their homelands.

## Lessons Learnt

Although the Vunidogoloa project was an expensive exercise for the Government of Fiji, the intent of the project is positive. A community can be rescued from the scourge of the past and the devastation from health, environmental, and weather related hazards. These DRR and CCA measures have provided a future for a struggling community.

By committing to DRR projects, such as Vunidogoloa and with the 'build back safer and better' concepts put into practice, including focus on livelihood, the financial loss to government will be compensated by a thriving community not hassled by hazards of the past but promises of a better future.

The Government of Fiji is looking at long-term solutions and has shown genuine concern for the plight and welfare of its people.



*Relocated Vunidogoloa village in Vanua Levu, Fiji.*

<http://www.fiji.gov.fj/Photos---Video/Photo-Gallery/PM-Bainimarama-opens-Vunidogoloa-Village-Relocatio.aspx>

<http://www.unocha.org/top-stories/all-stories/fiji-building-resilience-face-climate-change>



# Planning for weather variability in local areas

## Background

Specific local weather predictions are important for Pacific Islanders for planning daily activities, such as agriculture and tourism, and are also extremely important for response to extreme weather events. For businesses, this is important for managing risk and planning for events and actions. Often, weather and extreme event warnings are presented in technical language that is not easily understood by an average person. In Fiji, NaDraki Holdings Ltd provides specific local weather forecasts for individuals and areas of Fiji.

## Activities and Results

The company provides subscription services with specific and customised information on weather, including warnings and natural hazards such as cyclones and tsunamis, in language easily understood by the average person.

Over 80 businesses in Fiji use the NaDraki Premium Weather Subscription as part of their day to day operations to help reduce risk to weather and climate hazards. The scope of these subscribers include businesses in the tourism, engineering, logistical, shipping, and disaster management industries as well as property teams in banking corporations, specially funded research projects, and for personal use.

Information is disseminated through emails sent daily to subscribers with short range forecasts. Email updates are sent more frequently during adverse weather, typically every 3-6 hours. Clients can directly request specific weather information. Weather forecasts can also be accessed via text messaging.

NaDraki utilises the social media sites of Facebook and Twitter. Each post will reach a minimum of 2,000 people in times of bad weather or tsunami warnings.

## Challenges

It is common that during times of bad weather there are disruptions to the supply of electricity as electrical wires and posts get damaged. For reliable service, consistent internet access and connectivity is required. To ensure services are not affected, staff are on call 24/7 with flash-net modems or wifi access at all times and take turns to be on duty in order to save battery.

Where the wellbeing of people and their properties are at stake, it is important not to withhold vital information from non-paying followers on social media. NaDraki makes efforts to overcome this by posting very short summaries of information that paid clients receive.



*Neville and Seini Koop at the 2014 FDB Small and Medium Enterprise Awards where NaDraki took the award in the Professional Business Services - Partnership category.*

### Weather forecasts, 2009 – ongoing

Fiji

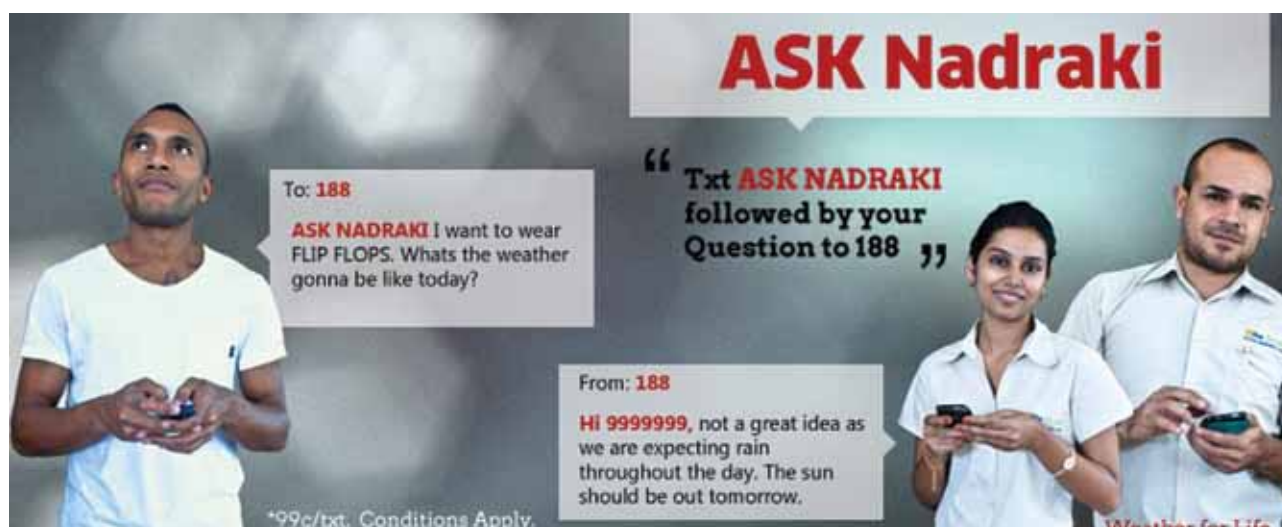
NaDraki Holdings Ltd

Funding: Commercial

## Lessons Learnt

It is important for private weather enterprises to maintain the trust of clients by being a reliable source of weather, climate, and tsunami information. Information should be disseminated quickly and in an easily accessible format to ensure most efficient and optimum decision making by the user. This will often involve the user, especially when it comes to the technology most appropriate for receiving information, and, in many cases, multiple platforms are used simultaneously. For example, a brief text message via twitter or a radio broadcast can provide instantaneous advice that a more detailed message is available via email or as a download via a web site.

The content of the information provided should be simple to understand, avoiding jargon and technical language. Similarly, it is also necessary to ensure the data is relevant to the users need. In the situation where a tropical cyclone threatens, specific users want to know impacts expected at their location, rather than the generalised information relating to the strength and movement of the cyclone provided by the warning centre. A good example of this which occurs frequently is forecasting exceedance of certain thresholds; i.e. forecasting when winds exceed a certain speed at a specific location that can affect movement of ships and aircraft.



**ASK Nadraki**

To: **188**  
**ASK NADRAKI** I want to wear FLIP FLOPS. Whats the weather gonna be like today?

“ Txt **ASK NADRAKI** followed by your Question to 188 ”

From: **188**  
**Hi 9999999**, not a great idea as we are expecting rain throughout the day. The sun should be out tomorrow.

\*99c/txt. Conditions Apply.

Weather for Life

# Flood early warning systems and community disaster preparedness

## Background

Fiji suffers from flooding caused by torrential rains brought about by cyclones on a regular basis. In 2009, Fiji recorded the damage level from flooding at approximately FJD \$112 million.

The National Disaster Management Office (NDMO) is in charge of issuing evacuation alerts based on meteorological monitoring data. However, they face challenges in predicting flooding in specific areas and rivers. In addition, disaster response manuals and training on how to respond to emergencies are limited, creating challenges for collaboration between agencies in the event of disaster.

In response to these challenges, the Government of Fiji requested support from the Government of Japan and the Strengthening of Community-Based Disaster Risk Management Project was developed across the Pacific Region. Japan International Cooperation Agency (JICA) implemented the pilot project in Ba, Northwest of Viti Levu Island of Fiji to develop a system in which the residents of the selected community areas are able to evacuate appropriately in time of disaster.



*Community members developing their own hazard maps.*

## Activities and Results

A flood warning system was developed, installed and managed by Ba District Officer and NDMO in cooperation with the Meteorological Office and Water Authority. The flood warning system included the Ba Hydrological Information System with automatic rain and water level gauges and simple rain gauges in Nawaqarua and Nasolo communities. The local flood warning system, introduced in the project has proven effective for local communities to develop their 'self-help' capacities when faced with disasters. Specifically:

- Enabling local communities to operate simple rain gauges and to disseminate local flood information among each other have created strong ownership of the system that lead to sustainable preparedness activities.
- Because simple rain gauges can be built at low cost with locally available materials, the communities are able to maintain and replicate the system by themselves as required.
- Simple rain gauges combined with improved flood information from NDMO and Fiji Meteorological Service (FMS), further enhanced the local flood warning system.

In addition, the project undertook capacity development with NDMO to conduct disaster management for local levels. This included:

- Development of the Flood Disaster Management Plan

### **Strengthening the Community - Based DRM Project in the Pacific Region (CBDRM), 2010 – 2013**

Fiji

Japan International Cooperation Agency (JICA)

Partners: Government of Fiji, Water Authority of Fiji, Community Residents in Ba

Funding: Government of Japan

- Development of sectoral Standard Operating Procedures (SOPs) through stakeholder consultation process
- Development of operation manual for Flood Disaster Management
- Simulation exercise, utilizing the flood warning system and flood management plan
- Workshop to disseminate experience and lessons learned from activities above.

The project also raised awareness for disaster preparedness of target communities through Community Disaster Committee meetings and implementation of community disaster awareness programs led by the NDMO.

## Challenges

Community participation to the preparedness activities proved difficult in the initial stages of the project as community members did not see the benefits of the self-operated flood early warning system because they were used to receiving warnings and instructions from the local authorities. However, after conducting a series of awareness training activities such as to maintain and operate the simple rain and river water level gauges and DRR drills utilizing the system, participation by community members increased significantly resulting in community ownership of managing the early warning system.

Continuance of maintenance and operation of simple rain gauges has been a challenge because the equipment was initially owned by the NDMO, but this has improved with the smooth handover of installed equipment to the local community.

## Lessons Learnt

Developing flood warning systems that rely on community participation contributes towards improved preparedness and response to climate and disaster hazards. It requires an understanding of the local context including traditional knowledge and local risk perceptions. For example, it is known that local communities observe the turbidity of the river water to predict the possibility of river floods when there is heavy rain in the upstream areas.

Sustainability of community disaster preparedness can be enhanced through guidelines, manuals, committees and involvement of local stakeholders, such as private sector, women's groups and Community-based organizations.

Local ownership of disaster preparedness can be enhanced through involvement of local stakeholders in the decision-making process and supporting them to be the main actors for preparedness activities.

Awareness raising is an important factor for encouraging governments and especially local communities to continue to invest not only financially, but also in kind labour for disaster preparedness.



*Community members discussing Disaster Response Plans.*

# Protecting natural resources to reduce greenhouse emissions and increase resilience

## Background

Gau Island, Fiji has an area of 136.1 square kilometres and a rural population of over 3000 involved in commercial agriculture and intensive fishing. People's activities are rapidly altering the coastal habitats such as mangrove forests, seagrass beds and coral reefs. In addition, changes in the villages, such as population growth and the adoption of westernized lifestyles are resulting in coastal pollution and more exploitative uses of natural resources, thus threatening the people's living conditions.

The Lomani Gau project encourages local communities to care for and sustainably use their environment and natural resources that they depend on for sustenance and income generation. The project promotes integrated resource management to secure alternative sources of livelihood that can support the people's sustainable development aspirations.



*Gau Secondary School students planting mangroves in Nawaikama, Gau.*

## Activities and Results

Lomani Gau project activities emphasise capacity building in local communities; strengthened governance; techniques to adapt to climate change; implement disaster preparedness activities and to promote sustainable rural development.

Capacity building is conducted through workshops and meetings at the village, district and island council levels to boost awareness and determine development activities. The meetings allow the sharing of new ideas, practices, training and planning and the monitoring of project activities. Lomani Gau has supported over 50 meetings including, six meetings of the Gau Island Council.

Activities undertaken so far include:

- (i) Reforestation of coastal habitats around the island to complement the marine management initiatives on Gau. All 16 villages, one settlement and the Gau Secondary School each planted over 3000 trees for a total of over 180,000 trees. The villagers are planting trees as a source of income and building materials. They have banned wildfires and are working to protect their forests and biodiversity from their own agricultural and development activities.
- (ii) Wetland conservation and protection are observed to protect wetlands that are essential for flood control and the preservation of wetland ecosystems. Mangroves and swamps are protected and rehabilitated for coastal protection, fisheries management, biodiversity conservation and cultural reasons, such as the protection of swamp farmlands.
- (iii) Forests are protected to safeguard water catchment, and protect the soil along the river systems. Maintaining buffer zones along waterways, ban on wildfires and unplanned deforestation and farming on lowlands are

### **Lomani (treasure and care for) Gau, 2005 - ongoing**

Fiji

International Ocean Institute-Pacific Islands (IOI-PI), the University of the South Pacific (USP)

Partners: Nature Fiji Mareqeti Viti

Funding: Japan International Cooperation Agency (JICA), IOI-PI, USP, Global Environment Fund (GEF), United Nations Development Programme (UNDP), Mie University, Government of Japan

promoted to lessen soil erosion, sediment build up in waterways and biodiversity loss. More efficient cooking stoves are promoted to reduce firewood use.

- (iv) Fisheries management is supported through the network of 16 marine locally managed areas on Gau. These sites enhance recovery through re-stocking, reseeded and the controlled use of resources. Waste management is emphasised while water pollution is minimised to maintain healthy habitat. Fish aggregation devices are provided to compensate for the loss of fishing areas.
- (v) Alternative sources of livelihood are promoted to balance the use of natural resources and increase the climate and disaster resilience of the communities. Some of the income earning ventures include the: growing of yaqona (*Piper methysticum*) and copra; planting of trees; raising animals commercially; micro credit facility; opening of village stores; sale of fuel and mat buying from women.

Results of the project included:

- Appreciating biodiversity and ecological services offered by cloud mountane forests, rivers, mangroves, coral reefs and marine environment.
- Implementing activities such as planting trees, protecting forests, using efficient cooking apparatus (smokeless stove) to reduce greenhouse gas emissions, safeguarding the land and reducing pollution of coastal areas and upholding the health of villagers, particularly by the women. Renewable energy, such as solar is replacing diesel generators and battery-powered lights in all villages. Sustainable transportation through sailing and wind powered vessels.
- Regular meetings of Gau Island Council to plan and prioritise sustainable development options and connection to the villages and external partners. Training workshops on fisheries management, project cycle and DRR.

## Challenges

Governance presents the biggest challenge at local levels in families, villages, districts and island. New systems of governance are required to meet the demands of behaviour change. In addition, ongoing impacts of changing climate, wildfire, deforestation, overfishing and poaching from management areas all need to be closely monitored and addressed.

The challenges must be addressed through regular meetings, training using visual aids, establishment of supportive network for action, and engagement of women and youth. This demands good visionary and fair leadership.

## Lessons Learnt

Only a healthy environment will provide quality ecological service to people. People in small Pacific Islands must protect their environments as these are important to their survival.

Awareness and empowerment of local communities are necessary to attain the desired changes that are needed.



*A submerged fish aggregation device (FAD) in Qarani, Gau.*

[http://www.researchgate.net/profile/Joeli\\_Veitayaki/publication/265126347\\_Vakarau\\_ni\\_se\\_Siga\\_Toka\\_\(Prepare\\_while\\_there\\_is\\_time\)\\_Lomani\\_Gau's\\_response\\_to\\_climate\\_change/links/53ffacbc0cf24c81027db34e.pdf](http://www.researchgate.net/profile/Joeli_Veitayaki/publication/265126347_Vakarau_ni_se_Siga_Toka_(Prepare_while_there_is_time)_Lomani_Gau's_response_to_climate_change/links/53ffacbc0cf24c81027db34e.pdf)

# Town planning as climate change adaptation

## Background

Lami Town is located on Viti Levu in Fiji, and is considered part of the greater Suva area, occupying the inshore coastline of Suva Harbour. Lami Town and adjacent peri-urban areas comprise a mixture of formal and informal settlements with approximately 21,000 people. Located in a mountainous coastal zone with steep hills and three rivers flowing to the ocean, the town is highly vulnerable to flooding and erosion. The natural protective resources available are mangroves, coral reefs, seagrass and mudflats. In order to address the current and future impacts of climate change, Lami Town partnered with UN Habitat's Cities and Climate Change Initiative to enhance policy dialogue awareness, education and capacity building. The aim is to firmly establish climate change within the towns corporate plan (annual), strategic action plan (five years) and the Lami Town Planning Scheme to support their efforts to bring about changes for adapting to climate change.



*Climate awareness meeting at Kalekana Community Hall, Lami, Fiji.*

## Activities and Results

Lami Town is one of four pilot cities of the Cities and Climate Change Initiative in the Pacific. In 2011, a Climate Change Vulnerability Assessment was undertaken by UN-Habitat funded by the Government of Norway, which strengthened the Council's institutional capacity for governance (improve partnerships) and planning and knowledge of climate change and risk reliance, while also improving relationships with the residential and commercial communities. The assessment included: scoping exposure, sensitivity, adaptive capacity, vulnerability of people, places and sectors, and identified potential adaptation options and practical adaptation actions to address climate change within Lami Town. The town experiences flooding and erosion along coastal areas due to storm surges and sea level rise, and during excess rainfall when either rivers burst their bank or when water gathers in low-lying areas.

In developing the assessment, a house to house survey, face to face interviews, and evening awareness programmes were carried out in vulnerable areas. Information from the vulnerability and adaptation assessment was then shared with the community through communication products, including brochures and community meetings and the council's website.

A Cost Benefit Analysis for ecosystem-based adaptation and hard engineering options for Lami (2012) identified cost effective methods to address the impacts of climate change along with additional benefits of ecosystem-based adaptation methods. The report recommended a combined approach, using some ecosystem based adaptation options to protect higher value priority infrastructure. With the success of the analysis of the Lami Town urban area, SPREP is conducting a similar assessment for the Lami River Watershed Area.

### **Climate Change Vulnerability Assessment / Cost Benefit Analysis for ecosystem-based adaptation and engineering options for Lami, 2012- ongoing**

Fiji

Lami Town Council

Partner(s): World Wildlife Fund (WWF), Secretariat of the Pacific Regional Environment Programme (SPREP), University of Maryland Integration and Application Network, Conservation International

Funding: UN-Habitat, United Nations Environment Programme (UNEP), Government of Norway

Lami Town Council has prioritised recommendations from both the Climate Change Vulnerability Assessment Report and the Cost Benefit Analysis for ecosystem based adaptation and hard engineering options for Lami. Council, with funding from United Nations Environment Programme (UNEP), is working with UN-Habitat and World Wildlife Fund (WWF) to implement cost effective community action planning. This has included a waste management system at the Lami market for composting green waste generated in the market for resale and the restoration of mangroves along vulnerable areas involving community planting days. The establishment of the mangrove nursery has provided employment for three new staff with potential to become a revenue source for council. Packaged as building a resilient town, Council has further undertaken a coastal protection project (with external funding) for a tsunami early warning system.

## Challenges

The lack of documented data on the status of informal communities at local level meant relying solely on government census information, and navigating government's approval processes to obtain useful statistics on communities in Lami.

Residents of informal settlements continue to lack security of tenure; therefore, while they actively participate in the community action planning exercises, such as recycling and composting, they are less likely to make investments towards improving their homes and the community at large, such as contributing towards a user-pay communal garbage collection fee.

## Lessons Learnt

It is important to undertake sound assessment of the vulnerability of areas and populations in order to design practical climate change adaptation responses. Cost benefit analysis is essential to assist in evidenced decision making for adaptation responses. This facilitates that actions and funds are targeted to the most vulnerable areas in the most effective manner.

The initiatives have been a learning process of the value of participatory consulting and including acknowledging individual concerns and interests have fostered a sense of ownership and responsiveness from the community to take better care of the environment.

Lami Town Council has recognised the importance of fostering climate change awareness within its community by taking ownership of the vulnerability assessments and developing cost effective adaptation measures to create a resilient and green Town.



*Mangrove seedling planting at Lami Town Council Depot nursery.*

<http://www.sprep.org/publications/a-comparative-analysis-of-ecosystem-based-adaptation-and-engineering-options-for-lami-town-fiji-synthesis-report>

[http://ian.umces.edu/pdfs/ian\\_report\\_392.pdf](http://ian.umces.edu/pdfs/ian_report_392.pdf)



# Reducing greenhouse gas emissions through renewable energy

## Background

Like other countries in the Pacific region, Samoa is both vulnerable to the impacts of climate change and highly dependent on imported fossil fuels. Samoa has some hydropower production in its energy mix, but the majority is fossil fuels (petroleum). In the last few years, developments within other renewable energies, such as wind, solar, biomass and biogas have emerged in Samoa.

Renewable energy is a priority issue at national levels across the Pacific, and has been reflected in national and sectoral policies, strategies, plans and/or roadmaps in most countries. Samoa's efforts to reduce greenhouse gas emissions have been developed by the Government's relevant authorities and the Electric Power Corporation (EPC). The Samoan Energy Sector Plan 2012-2016 highlights the Government's commitment to renewable energy and to reduce reliance on imported fuels.

With the impacts of climate change, and the recent increases in the price of imported oil, EPC acknowledges the urgency of exploring least cost renewable energy to generate power to meet the demands of a growing population. Reliable access to affordable energy sources and carriers is also a driver of economic growth. As such, renewable energy resources that are available naturally such as wind, solar, hydro and bio-energy are being explored (including the conduct of quality research and analysis) for development by EPC.

The goal of the Pacific Island Greenhouse Gas Abatement through Renewable Energy project in Samoa, as well as in the other 13 countries that are part of the project, has been to reduce the growth rate of greenhouse gas emissions from fossil fuel use through the removal of the barriers to the widespread and cost effective use of feasible renewable energy technologies. This has, and will be, achieved by removing barriers for renewable energy technologies. For example by investing in training and capacity building in public institutions, communities and households; providing the data needed to develop renewable energies including monitoring studies, feasibility studies and other data collection.



*Solar PV System, Samoa.*

## Activities and Results

This project's activities in Samoa have included renewable energy promotions, hydro data collection, wind resources monitoring and assessment studies and a solar PV grid-connected feasibility study, coordinated by the Government of Samoa in collaboration with EPC and coordinated and supported by Secretariat of the Pacific Regional Environment Programme (SPREP) and United Nations Development Programme (UNDP).

### **Pacific Islands Greenhouse Gas Abatement through Renewable Energy Project (PIGGAREP), 2008 - 2014**

Samoa

United Nations Development Programme (UNDP)

Partners: Secretariat of the Pacific Regional Environment Programme (SPREP), Government of Samoa, Electric Power Corporation

Funding: Global Environment Facility (GEF), Government of Denmark, UNDP

The project resulted in:

- Wind monitoring stations, measuring the resource potential for wind power in Samoa. The barrier of the lack of information in determining the feasibility of wind power, which is a quite costly development, has been removed through Pacific Islands Greenhouse Gas Abatement through Renewable Energy Project (PIGGAREP) studies. Although the specific site monitored under the PIGGAREP project has not yet been developed, the studies may also have contributed to the decision of developing the 2 x 275 kW wind turbines on the south coast of the island, funded by the Government of United Arab Emirates.
- Hydropower feasibility studies completed in Samoa have revealed the potential for mini-hydropower stations on the two main islands, leading to the Asian Development Bank and other donor partners funding the development of the sites. PIGGAREP funded a hydro data collection programme to address the lack of baseline hydrological data in the catchments with hydropower potential. Good quality data was obtained from 2009 up till 2012, giving Samoa's EPC sufficient information for assessing the feasibility of several hydropower schemes. The Asian Development Bank further analyzed the data, showing that six sites have potential for generating electrical power, and the construction of the sites are expected to start in the next few years.
- The promotion of renewable energy and energy efficiency benefits with school students to equip them with the necessary tools to reduce greenhouse gas emissions.
- The feasibility study into the design of three solar PV grid connected systems has resulted in the Pacific Environment Community (PEC) Fund procuring and installing in those three sites a total of 546 kW of peak power.

Currently, a biogas project is under development in Samoa through PIGGAREP, testing new ground by developing a biomass-based electrical power generation plant for the first time ever in Samoa. As a highly innovative project, it will bring substantial knowledge to the island on the possibilities of developing bioenergy, as well as provide several kilowatts of clean power to the local communities.

## Challenges

Challenges for projects like PIGGAREP are the massive needs on the ground, both in terms of training, capacity building, development of renewable energy know-how, and also relating to the actual procurement and installation of the systems. To address this, countries like Samoa need solid partners with long-term engagement, who are willing to work with local and national authorities in the lead.

The lack of legislation and regulation to enforce relevant policy frameworks is a barrier to renewable energy increase in the energy mix and to the widespread use of renewable energy in the country. This is being addressed through the development of an Energy Bill for Samoa.

## Lessons Learnt

High level dialogue between PICs has been established to discuss and exchange on the issues of renewable energy to reduce greenhouse gas emissions and reduce reliance on importing energy sources such as diesel.

There is a need for investing in knowledge and capacity building, so that the proper frame for developing new and innovative renewable energy and energy efficient solutions is in place when projects are implemented. The project has contributed with facts and data, and feasibility studies of renewable energy options. However, dedicated efforts should be directed towards the technical capacity needs of PICTs in specialised areas.

Utilisation of renewable energy reduces greenhouse gas emissions and improves resilience of communities by reducing reliance on external energy sources and the impacts of price fluctuations.



*Samoa is developing its first ever biogas system for electricity generation. The project will use green waste, such as invasive vines, as fuel. Photo: Mina Weydahl, UNDP.*

<http://www.sprep.org/Pacific-Islands-Greenhouse-Gas-Abatement-through-Renewable-Energy-Project/about-piggarep>

# Adapting to sudden sea level rise

## Background

'I am living in fear because of the sea'.

For the community of Lifuka Island in Tonga's Ha'apai group, the impacts of sea-level rise are suddenly evident. A confluence of climate change and subsidence caused by seismic events (2006 earthquake) has exposed homes, a church and a hospital, as well as sewerage and water storage systems, to flooding during high tide and storm surge events. Rising sea-levels over the next several decades will expose them even further.

The project responded to a direct request for assistance from the Government of Tonga's Ministry for Lands, Survey, Natural Resources, Environment and Climate Change (MLSNRECC), based on local community concerns of accelerated coastal erosion and flooding, following a major earthquake in 2006.

The goal was to provide the evidence needed for communities on Lifuka and for the Government of Tonga to make informed decisions about adapting to coastal erosion and sea level rise. The project also aimed to be a blueprint for other low-lying nations considering adaptation options.

The project was developed and implemented as a partnership between the Australian Government's Pacific Adaptation Strategy Assistance Program (PASAP), the MLSNRECC, the Secretariat of the Pacific Community (SPC) and the Tonga Community Development Trust.



*Damaged coastline and houses, Lifuka, Tonga, March 2012.*

## Activities and Results

The project followed a multi-disciplinary approach, combining both the physical and social aspects of climate impacts and adaptation responses.

To develop an understanding of current and future risks to the Lifuka community from sea level rise and flooding, the project investigated the causes of coastal erosion, through sediment composition analysis and using current and historical aerial photographs and satellite images to map changes in shoreline position over time. The possible coastal flooding associated with a 1 in 100 year storm event coupled with sea level projections for the year 2100 was modelled. The impact of rising sea-levels on groundwater and the future availability of drinkable water were also explored through monitoring of salinity levels and analysis of rainfall projections.

The project included engagement with the local community to understand their experience of coastal inundation and water use, and their views on potential adaptation options, costs and benefits. The participatory approach involved focus group discussions and interviews, as well as a household survey.

### **Assessing Vulnerability and Adaptation to Sea-Level Rise; Lifuka Island, Ha'apai, Tonga - Pacific Adaptation Strategy Assistance Program (PASAP), 2010 - 2013**

Tonga

Secretariat of the Pacific Community (SPC)

Partners: Government of Tonga, Government of Australia, Tonga Community Development Trust

Funding: Government of Australia

The project placed strong emphasis on capacity building. Government agency staff were involved in field work to survey the coastline, assess groundwater availability, and conduct community consultations. Training resources, such as a Manual for Working with Communities, were developed as part of the project and assisted the government and project partners to replicate the approach in similar CCA work in Tonga and, potentially in other PICs.

Adaptation options identified through the project included; engineered coastal protection such as revetments; new building design standards; and options for re-location of some buildings and supporting infrastructure. A cost-benefit analysis of feasible adaptation options was undertaken and incorporated community views gathered during the project.

Based on the scientific and economic analysis, as well as the community consultations, managed retreat was recommended by the project team for the community of Lifuka. This incorporated a setback zone in the erosive and highly exposed coastal fringe and was supported by other strategies, such as elevation of buildings in hazard areas. Recommendations to protect water resources included better gutter maintenance and adjusting abstraction rates based on salinity levels.

A key output of the project was the development of hazard zones defined by their degree of risk in relation to coastal erosion, sea level rise and flooding. The coastal hazard zones developed from the project are being used by the Government of Tonga, the World Bank and Asian Development Bank to investigate ways to build back better following the devastation of Cyclone Ian (which hit Tonga in January 2014) to protect the Lifuka community from future coastal risks.

## Challenges

No single adaptation option offers a straight forward solution to the threat of coastal flooding and inundation in the face of climate change. While the recommendation from the project team was to initiate a managed retreat, the Lifuka community largely rejected this as the preferred option, noting a retreat would be costly and involve highly complicated land access negotiations.

After completion of the project, Tropical Cyclone Ian hit Tonga and led to extensive damage to buildings in Lifuka. In the main town of Pangai, an estimated 75 per cent of houses were destroyed. This contributed to a greater awareness of the need to change existing building sites, reconsider building construction standards, and made possible further consideration of relocation as an adaptation strategy in the rebuilding process.

## Lessons Learnt

It is essential to undertake scientific assessment of current and future risk from hazards such as flooding and sea level rise as well as scientific and economic assessment of adaptation options.

Coastal multi-hazard mapping is an essential tool to support communities in making decisions that reduce the exposure of the built environment to climate change and extreme events. However, when hazard maps are used to guide adaptation options, especially options involving a managed retreat from coastal areas, the geospatial data needs to be used in tandem with information on customary land tenure and kinship. It is recommended that any future projects that consider a managed retreat need to be supported by guidelines on land transfer operations and the proposed local relocation process.

Multi-disciplinary teams can deliver direct benefits, facilitating holistic, pragmatic and people-centred policy approaches. Lifuka is a practical example of working with the community to determine options first and foremost and then working this into climate change adaptation considerations. The multi-disciplinary approach contributed to improved understanding of the cross-sectoral impacts of climate change within the project team.

The final outcome demonstrates that evidence based adaptation strategies are a useful input to disaster planning, recovery efforts and longer term risk reduction, particularly in response to storm surge and tropical cyclones. Post disaster event reconstruction and recovery provides a good entry point for adaptation action.

<http://www.spc.int/en/home/869-lifuka-island-tonga-at-the-forefront-in-understanding-climate-change-impacts-on-small-islands.html>

<http://vimeo.com/53200521>

# Hazard mapping for coastal adaptation

## Background

The township of Avarua is the economic, administrative and tourism hub of the Cook Islands. Previous cyclones that impacted Rarotonga, including the unprecedented five cyclones in 2005, caused significant damage to infrastructure and threatened lives, raising concerns about the vulnerability of the Avarua area to extreme cyclones. At risk from storm surge along the Avarua coast are essential DRM facilities such as government and police offices, the National Emergency Operations Centre and cyclone shelters, as well as other critical infrastructure such as the international airport, Avatiu Port, bulk fuel storage tanks and the main shopping and residential development in the Cook Islands.

Recognising the critical importance of the Avarua area to the economy of the Cook Islands and the urgent need to reduce the vulnerability of the area to cyclones, the Government of Cook Islands and the Water Research Laboratory (UNSW Australia) initiated the Coastal Adaptation for Extreme Events and Climate Change, Avarua, Rarotonga project. The project aimed to: understand the risk posed by changes to sea level and wave climate on coastal infrastructure and the community, particularly during extreme events; identify needs and develop options for response to the risks; and build local capacity to understand the science and manage the risk assessment and planning process.



*Surveying the harbour COPED Breakwater, Avarua Nikao, Rarotonga, Cook Islands.*

## Activities and Results

The project used robust science and modelling to understand the coastal climate risks to development in the Avarua area, and provided information and recommendations to inform future development that is climate resilient and sustainable.

A data collation and data collection program was initially undertaken, which included collation of geophysical and geospatial data sets, historical photographic and video records from previous disasters, technical investigations, and exposure information. Following an information gap analysis, a comprehensive geospatial data collection program was undertaken that collected over 25,000 topographic and bathymetric survey points. This allowed for accurate mapping of land levels and infrastructure locations throughout the entire Avarua township, and improved the understanding of site specific details of the fringing reef and lagoon that create localised effects on coastal environmental conditions such as storm surges and waves.

An innovative and best-practice technical assessment methodology was used to study cyclone wave and storm surge processes. This included the construction and testing of scale models of the Avarua coastline in large wave machine tanks to simulate wave and storm surge processes and visualise their impacts. This wave tank modelling was combined with computer models to simulate storm surge inundation of low-lying areas of the Avarua township and develop a detailed understanding of the vulnerability to cyclone risks.

### Coastal Adaptation for Extreme Events and Climate Change, Avarua, Rarotonga, 2012- 2013

Cook Islands

Climate Change Cook Islands, Government of Cook Islands

Partners: University of New South Wales (UNSW), Government of Australia

Funding: Government of Australia

Based on analysis of the site specific environmental and physical processes, a series of hazard maps were developed in a Geographic Information System (GIS) that visually identified specific areas of Avarua that are at risk from storm surge and wave impacts. The maps were suitably detailed to identify localised areas of the town that would be exposed to storm surges and/or waves, as well as the predicted intensity and depth of inundation. This information allowed:

- Assessment of the vulnerability and risk for each individual house and infrastructure throughout the town; and
- Planning of future development that is resilient to the specific environmental and climatic conditions to which it will be exposed.

The hazard maps were used in discussions with government, industry and the community to clearly convey new information from the investigation, raising awareness, developing recommendations and promoting the need to build preparedness. The maps were also incorporated into the Cook Islands DRR Portal to guide DRM for the area.

Throughout the project there were meetings and workshops held with focus groups of staff members from relevant Government agencies. The purpose of the meetings varied during the project from raising project awareness, information gathering, and finally presentation of results, outcomes and recommendations. These recommendations will allow a pre-emptive approach to reducing risks to critical infrastructure items, as opposed to a responsive approach once damage has been realised.

## Challenges

Initially, inadequate awareness of the expected project outputs limited participation from some government agencies during the early parts of the project. The full potential of the project outputs was only properly realised during the presentation of preliminary results, more so than during earlier project execution stages. This resulted in extensions to the project duration and additional engagement meetings and workshops to properly encourage stakeholder participation. This has improved effectiveness of the overall project, including implementation of recommendations.

At the time, there was not a unified strategy across Cook Islands Government agencies for accommodating the impacts of climate change and extreme events into infrastructure design, DRR, natural resources and sustainable development. This has the potential to be a barrier to implementation of some recommendations from the project. An integrated approach across government agencies would have strengthened and improved the value of the project outcomes.

## Lessons Learnt

Robust scientific assessment and modelling of risks is required prior to decision making and planning in order to efficiently progress towards climate resilience. Well-designed modelling can provide technical guidance, such as:

- Identification of development that requires urgent attention through short-term or interim solutions, in contrast to other development that can have climate resilience built-in steadily as time progresses;
- Identification of climate resilience measures that are targeted at site-specific requirements on a localised scale. For example, it allows more educated planning and avoids a 'one size fits all' approach.

How ever, robust scientific assessment is only as reliable as the data on which it is based, and, in order to understand the requirements on a localised scale, modelling must be underpinned by high quality environmental and geospatial data.

Ensuring adequate consultation with key stakeholders during the development of the project goals and objectives, helps to raise awareness and ownership of the project ahead of implementation. Ensuring government agencies have adequate capacity to be involved during project execution leads to improved uptake of project outcomes and in-turn allows for further capacity building opportunities.

It would be a significant advantage for government agencies across a range of sectors to develop an integrated approach that considers a broad range of needs such as infrastructure, DRR, DRM and the environment.

<http://www.mfem.gov.ck/development/development-programmes/57-development/development-programmes/410-coastal-adaptation-needs-for-extreme-events-and-climate-change>

<http://www.drrprojects.net/drrp/project/project/1019/read>

<http://www.pacificclimatechange.net/index.php/eresources/documents?task=view&id=1013&catid=152>

# Coastal calculator assists with harbour design to adapt to climate change

## Background

Mangaia is the southernmost island and second largest of the Cook Islands, and has a population of about 572 people. Mangaia's harbour, the transportation hub and main entry point for supplies to the island, was badly damaged by two tropical cyclones in early 2005.

The aim of the Pacific Adaptation to Climate Change (PACC) project is to contribute to reduced vulnerability and increased adaptive capacity to adverse effects of climate change in the Cook Islands. In order to achieve this the project aimed to develop a stronger and safer harbour that can withstand current and future climate-related threats. In parallel, the project has helped to develop an integrated coastal management policy and plan for Mangaia.



*Community meeting to obtain local knowledge regarding extent of stormsurge and cyclone wave run-up around Mangaia.*

## Activities and Results

The PACC project brought together engineers, climate scientists and the community to discuss the design and construction of the harbour. Combining climate analysis with engineering approaches, the project developed key tools to help design the harbour:

- A 'geospatial assessment framework', to better understand the shape and height of the foreshore, offshore and nearshore topography and bathymetry of Mangaia. This will help in understanding the climate change impacts on Mangaia and its infrastructure over the next 10 years; and
- The Cook Islands Coastal Calculator provides information on waves and water levels and circulation, including undercurrent, using current variability, frequency and future scenarios. Understanding extreme ocean water levels and wave conditions, how likely they are to behave and react during cyclone and large swell events. How these two parameters influence wave set-up, wave run-up, overtopping and over-washing at the shoreline is fundamental in understanding and assessing inundation of land areas, and impacts on other coastal assets.

The findings using these tools were presented to the community, who helped to ground-truth them. With this information, the project team and the community were able to make informed decisions about the harbour improvements. Design and construction followed, and the new climate-proof harbour was completed and officially opened in April 2014.

The draft Mangaia Integrated Coastal Management Policy Framework was developed which envisages an integrated coastal management implementation framework that comprises a baseline assessment of the coastline, coastal management legislation, institutional arrangements for coastal management, and a coastal management plan.

### **Pacific Adaptation to Climate Change (PACC) programme: Cook Islands , 2009 - 2014**

Cook Islands

Secretariat of Pacific Regional Environment Programme (SPREP)

Partners: Infrastructure Cook Islands (ICI), United Nations Development Programme (UNDP), NIWA New Zealand, Secretariat of the Pacific Community (SPC)

Funding: Government of Australia, Global Environment Facility (GEF)

## Challenges

The length of time needed for the assessments posed a challenge to the community and the project team. The assessments took two years and the construction of the harbour took five months. However, now that the harbour is built, the people can see the improvements and better understand the need for the assessments.

The lack of a policy that would have provided a framework for the project presented a challenge. Ideally, the Integrated Coastal Management Policy should have been developed first, before the project was implemented. However, a number of legislation and regulation instruments relating to resource management of the outer islands of Cook Islands had to be in place first at the national level before such an outer-island specific policy could be established. A policy framework has been drafted for the coastal resource of Mangaia.

## Lessons Learnt

Projects such as the adaptation of coastal infrastructure should not be carried out as stand-alone efforts, they need to be part of comprehensive coastal management planning within an integrated coastal management policy, and backed up by appropriate and effective legislation. A climate-responsive policy framework will assist in effective and efficient implementation of climate projects in the outer islands.

The Cook Islands Coastal Calculator is a design and assessment tool that can help with designing coastal infrastructure adaptive to climatic impacts in the Cook Islands. It can also be adapted for other islands of the Cook Islands, as the coastal environments of each of the islands have been uploaded to the database of the Coastal Calculator. It can be a useful tool in the design of all types of coastal infrastructure such as harbours, roads, and buildings. It is relatively easy to install, share and use, and it does not need highly technical expertise.

Actions to adapt to climate change such as improving the design of a harbour also reduce risks of disasters to the communities that the harbour serves as there is less likelihood of damage to infrastructure, trade and transport routes.

Good communications and collaboration with other government agencies is also important, to keep everyone updated and informed, and also to optimise opportunities to work together. For example, the project worked closely with the Ministry of Internal Affairs (Gender Division) to incorporate gender perspective into the project.



*Construction at the Mangaia harbour, Cook Islands.*

<https://www.sprep.org/pacc/cookislands>

<https://undp.exposure.co/providing-a-safe-haven>

<https://www.pacificclimatechange.net>

PACC Technical Report No.12 in <https://www.sprep.org/pacc/publications>



# Addressing health risks of marine biotoxin food poisoning to increase community resilience

## Background

Ciguatera poisoning which affects between 25,000 and 50,000 people worldwide annually, results from the consumption of fish or marine invertebrates contaminated by lipid soluble toxins (ciguatoxins). It is characterized by gastrointestinal, neurological, cutaneous, cardiovascular and respiratory disorders of variable intensity, often complicated by chronic symptoms lasting months to years. There is no effective treatment. Although rarely lethal, the high morbidity of this debilitating and sometimes long-lasting illness makes it a prominent problem for subsistence and recreational fisheries worldwide.

Originally limited to localized regions in the Pacific, Caribbean and Indian Oceans, the incidence of Ciguatera has spread due to the expansion of travel, tourism, and increased importation of fish from the tropics. Ciguatera is currently responsible for numerous 'imported cases' in the US, Canada and Europe.

French Polynesia is regarded as a long-standing hotspot of Ciguatera in the Pacific. Indeed, marine products such as fish, giant clams and trochus are used as a subsistence resource by many local communities, who are therefore highly vulnerable to this hazard.



Education and public outreach actions targeted at the youth of the island of Raivavae, Australes, French Polynesia. Photo: ILM.

## Activities and Results

In order to address the growing issues of Ciguatera, the Louis Malardé Institute (ILM) and the French Institute of Research for Development (IRD) have developed joint research programmes since 2007, in order to foster increased knowledge and understanding of the biological mechanisms involved in this phenomenon, information, education and public outreach.

Ciguatera disease often goes under-reported, e.g. in the South Pacific, the statistics are estimated to represent only 20% of the actual cases. Hence, a long-term epidemiological surveillance programme was set up in partnership with the public health personnel of the Public Health Directorate of French Polynesia. This programme aims not only at the real time monitoring of new emerging Ciguatera hotspots, but also at a better characterization of the true incidence rates of this disease. Moreover, the recent implementation of a Ciguatera website ([www.ciguatera-online.com](http://www.ciguatera-online.com)) that private healthcare professionals and individuals can use to anonymously report one or several cases of Ciguatera, also contributes to reinforce this epidemiological surveillance.

### Assessing and managing the risk of human intoxications associated with the consumption of fish and seafood contaminated with ciguatera, 2014 – ongoing

French Polynesia

Louis Malardé Institute (ILM), French Institute of Research for Development (IRD)

Partners: Ifremer Nantes, Université de Polynésie française, National Oceanic and Atmospheric Agency (USA), Cawthron Institute (NZ), Centre National de la Recherche Scientifique (CNRS), ARVAM (La Réunion)

Funding: Contrats de Projet Etat-Pays, Agence Nationale Recherche (ANR), Ministère de l'Outre-Mer (MOM), Fonds Pacifique

Large-scale Ciguatera risk assessment campaigns in several French Polynesian lagoons have led to risk stratification maps useful for local populations to identify the fishing zones and seafood species/products most at risk. Interactive maps are also accessible through the Ciguatera website.

Various laboratory tools have been developed and currently improved in order to provide French Polynesia with the latest analytic methods, particularly in regards to the detection of new families of toxins emerging in French Polynesian lagoons. For example, ultra-sensitive and specific detection tests useful for (i) the high-throughput screening of several marine products highly popular among local populations and potentially contaminated by ciguatera toxins, and (ii) the development of a diagnosis tool of ciguatera from the blood of patients.

Studies were also undertaken as to the potential interest of various indigenous plants in traditional medicine to treat Ciguatera. In particular, studies on the therapeutic effects of a traditional plant widely used in the South Pacific, *Heliotropium foertherianum* (tahinu), have yielded results, encouraging enough to consider moving to the step of clinical trials.

These combined research efforts have resulted in a significant decrease in the food-poisoning incidence rates in islands such as Raivavae and Rapa.

## Challenges

For a good number of islands and island groups in French Polynesia, the lack of long-term environmental (e.g. water surface temperatures) and weather databases (times-series) makes it difficult to assess the true impacts of climate change on the frequency and magnitude of algal blooms and related seafood poisonings at those sites. This issue could be addressed through the deployment of a greater number of multi-parameter sensors.

The remote location of the islands undoubtedly raises challenges in terms of access to distant islands, recently identified as new Ciguatera hotspots, e.g. in the Australes and Tuamotu. To address this issue, the applicability of innovative and standardized passive monitoring methods that are also cheap and easy to implement, are currently under validation.

## Lessons Learnt

Addressing health risks related to the consumption of seafood contaminated with marine biotoxins can strengthen health and food security for local communities, thus increasing their resilience to climate change and risk disasters.

Addressing Ciguatera related-health risks requires an integrated multi-sectorial approach through implementation of actions at both the epidemiological, medical, environmental, technological and sociological levels.

There is an urgent need for a policy to support all government measures aiming at the development of remote islands, to reduce impacts on the complex and fragile ecosystems of the islands in French Polynesia and across the Pacific. There is also a need to strengthen information, education and public outreach actions for a better prevention of populations.



*Development of refined laboratory in vitro tests routinely used at Institut Louis Malarde, Tahiti, French Polynesia, for the detection of seafood at risk of Ciguatera. Photo: G. Boissy, ILM.*

<http://www.ciguatera.pf>

[www.ciguatera-online.com](http://www.ciguatera-online.com)

# Improving water security and community resilience

## Background

Tokelau consists of three atolls, each made up of a number of reef-bound islets (motu) encircling a lagoon. Fresh water is very limited on all the atolls, although some is retained in lenses underlying a number of the larger islets. As there is no surface water, Tokelauans have been dependent on rainwater storage and wells tapping these 'freshwater' lenses. However, the lenses are thin and are affected by the rate of extraction. They are also vulnerable to natural influences of rainfall, tides, seepage and evapotranspiration. The intermixing of seawater with the freshwater lenses most recently caused by Cyclone Ofa has resulted in brackish ground water that is unfit for consumption.

To reduce vulnerability and to increase adaptive capacity to the adverse effects of climate change the Tokelau Pacific Adaptation to Climate Change (PACC) project objective is to contribute to reduced vulnerability and increased adaptive capacity to adverse effects of climate change in Tokelau.



*Tanks, guttering, and pipes installed on house by the PACC project.*

## Activities and Results

Targeting all households in the three atoll communities of Atafu, Nukunonu and Fakaofu, the project has been working to improve water security in terms of both quantity and quality, and at both household and community levels. As of July 2014, about 229 households (77.3%) have repaired rainwater connections such as pipes, guttering, and water tanks and about 117 households have repaired tanks (52.9%).

To improve water quality, the project has installed 161 households with first-flush diverters, 53.1% of households, which significantly reduces the risk of contaminants from the roofs entering the water tanks.

The project is also building awareness in the communities on water and sanitation issues, and a WASH (Water, Sanitation and Hygiene) guide has been developed, with the Secretariat of the Pacific Community (SPC), and translated into the local language. The guide has increased the understanding and participation from the target audience to enable them to think critically about water issues and ways to address them. Training has been carried out using the guide, e.g. a Training of Trainers workshop was held in Apia in June 2013 with participants from all three villages.

The project also aimed to install new weather stations, to collect essential weather data.

The project team has been promoting mainstreaming of climate risk. Three village Water and Sanitation Plans have been developed, and a national climate change strategy and a disaster risk reduction plan have also been developed.

### **Pacific Adaptation to Climate Change (PACC) programme: Tokelau, 2009 - 2014**

Tokelau

Secretariat of the Pacific Regional Environment Programme (SPREP)

Partners: Government of Tokelau, United Nations Development Programme (UNDP)

Funding: Government of Australia

## Challenges

Project activities have been affected by major national and village events, causing delays. This could be mitigated in the future by project planning that integrates village priorities and activities.

There is limited local plumbing capacity. The project overcame this by bringing in contractors from Samoa.

All equipment and supplies have to be brought in by sea, posing a risk to the project. The team managed this by keeping a close relationship with transport agencies.

Language was potentially an issue. With a 'new' topic such as climate change, there is a risk that people will introduce new words and phrases, which might confuse and complicate issues. In translating the WASH guide, the project consulted the Tokelau Language Commission to ensure the language was clear and consistent.

## Lessons Learnt

Improving water security through improved rain water systems increases community resilience to climate and disaster risks by improving water availability in times of drought, cyclone and other hazards. It is good practice for households to take responsibility for cleaning and maintenance of their rainwater system, i.e. guttering, water tanks, and FFDs. This builds community ownership and buy-in to the project.

Attention is needed regarding cultural and gender sensitivities. For example, it was found to be more effective to separate women and men into gender groups for capacity-building in water and sanitation issues and matters. Both men and women confide and participate well within their respective gatherings as they have similar concerns, similar issues and see and tackle issues in similar ways within their group, and different to the other gender group.

People in the Pacific know about the climate and have witnessed changes. So climate change should be related to what they know, rather than presented as a new issue.



Winning poster in school competition which is part of the PACC project's awareness raising.

<https://www.sprep.org/pacc/tokelau>

<https://undp.exposure.co/healthy-tokelau>

# Converting from diesel to solar energy reducing emissions and increasing resilience

## Background

Until recently, the nation of Tokelau has relied 100% on diesel for power generation. Tokelau was dependent on imported fossil fuels to meet energy needs, and was therefore vulnerable to international price fluctuations and escalating fuel costs. For Tokelau, difficulties of access and a very small market size makes the costs of energy for Tokelau one of the highest in the Pacific.

To address these issues, the Tokelau National Energy Policy and Strategic Action Plan (NEPSAP) 2004 aimed 'to work toward independence from imported fuels by progressively increasing the use of affordable renewable energy with the ultimate goal of 100% renewable energy for Tokelau'.

At the end of 2012 Tokelau shifted from 100% diesel electricity to 90% solar electricity using a design specifically created to fit the difficult tropical marine environment and the limited capacity of the local community-based utility to perform troubleshooting and maintenance.

The project was the result of a decade of preparation starting with a comprehensive national energy assessment in 2003 funded by United Nations Development Program (UNDP). This fed into a 2004 Tokelau Government policy to shift to 100% renewables in order to lower dependency on external fuels, maintain the pristine atoll environment from pollution by oil spills and diesel exhaust, and to improve energy security.



*Local energy staff connecting cables on the Solar PV system.*

## Activities and Results

A general study was undertaken to determine the best technology to shift to renewable energy. Solar was determined to be most appropriate and a successful small scale trial funded by New Zealand, France and UNDP powered around 15 Tokelau homes with a 10 kWp solar mini-grid for several years. The concept was deemed practical and assistance was obtained from UNDP to prepare a feasibility study and if found to be feasible technically and economically, to prepare a design to fit the island requirements and prepare the documentation needed to obtain the necessary funding.

The three islands were each found to require around 300 kWp of solar to reach the goal of 90% solar generation with the remainder planned to be supplied by the existing diesel engines which are to be fuelled in the future by coconut oil based biofuel that is locally produced. A loan from New Zealand provided the finance and the first stage of an international tender was issued in 2010 with the final stage in 2011. PowerSmart in collaboration with IT Power won the tender and provided

### **Conversion of Tokelau Power Systems for 100% Diesel to 90% Solar , 2003- 2012**

Tokelau

Government of Tokelau, Powersmart, IT Power, SMA Solar Technology AG

Partners: Government of New Zealand, Government of France, United Nations Educational, Scientific, and Cultural Organisation (UNESCO), United Nations Development Programme (UNDP), Dr. Herbert A. Wade

Funding: Government of Tokelau, Government of New Zealand, Government of France, UNDP

all materials, did the detailed design and supervised the installation that was largely carried out by local residents. The three installations, totalling nearly one megawatt of solar were commissioned in late 2012.

A technical design that utilises large industrial lead-acid batteries for storage and multiple 3 kW SMA inverters operating in clusters was chosen in order to provide for ease of maintenance and repair by relatively unskilled resident technicians and to meet the temperature, moisture and salt corrosion requirements of the islands. The design approach is unconventional for this large an installation but has a number of sustainability advantages over large rack mounted inverters when intended for small, remote tropical islands. A special passive cooled power house design was also prepared to minimize the need for energy based cooling.

Utility technicians were given training in the regular operation and maintenance of the PV system's components, and of troubleshooting procedures and solutions. Theoretical training on Nukunonu and Atafu was given one night a week over the course of the installation of the systems on those atolls. This was found to be effective at getting technicians to retain knowledge, as it was being delivered gradually over several weeks. The theoretical knowledge was reinforced with practical training in the construction of the systems so by the end of construction the utility personnel were proficient in the use of their new PV power systems. Basic maintenance tasks on a PV system are simple and cost very little. However, they are crucial to the long-term success of the project, and must be carried out regularly and thoroughly.

## Challenges

The project was implemented over a long period of time. The initial preparatory work began back in 2001 and commissioning of the three power systems took place at the end of 2012. The process was not linear, i.e. during the more than 10-years period there was progress, as well as set-backs. The key factor has been continued high level commitment in Tokelau including by heads of government (Ulu o Tokelau), the village council of elders (Taupulega) and energy ministers.

Challenges also arose in relation to financing. Several options were considered by the Government of Tokelau, including commercial loans from the private sector and a soft loan from an emerging donor. At the end, it was agreed that New Zealand would advance future budgetary allocations to Tokelau, which was then used to finance the required equipment and civil works.

## Lessons Learnt

In small countries such as Tokelau, almost complete conversion of the country to renewable energy based power generation can be undertaken.

Renewable energy, such as solar energy captured through photovoltaics not only reduces greenhouse gas emissions, it also allows for energy independence and reducing reliance on expensive imported diesel, increasing national resilience to climate and disaster impacts.

In a publication from 2012 the International Renewable Energy Agency (IRENA) concluded that the '...process used by Tokelau to reach the goal of 100% renewable generation is a model for similar efforts in the Pacific Islands region'<sup>16</sup>. Successful elements of this model included:

- Clear policies, providing long term direction and sustainability goals to shift to renewable energy.
- Ensuring political and community level commitment support for implementation of an ambitious energy policy.
- Following due processes, including acquiring independent advice and getting the best-value-for money technical option via comprehensive unrestricted international tendering.
- Working with supportive partners, such as New Zealand, UNDP and renewable energy specialists.



*Tokelau Energy Team on their study time. This is part of ongoing training to increase local capacity on the maintenance of Solar PV systems.*

[http://www.irena.org/DocumentDownloads/events/Workshop\\_Accelerated\\_Renewable\\_Energy\\_Deployment/Session7/S7\\_1Forumpresentation2.pdf](http://www.irena.org/DocumentDownloads/events/Workshop_Accelerated_Renewable_Energy_Deployment/Session7/S7_1Forumpresentation2.pdf) <http://tokelau.org.nz/site/tokelau/files/NEPSAP%20Main%20Text.pdf>

# Manufacturing water tanks for water security

## Background

Niue has no surface water, with a population of about 1,600 mainly relying on the underground lens for its freshwater. However, reliance on this single source contributes to vulnerability to climate change and climate variability. Groundwater resources are vulnerable to prolonged (more than six months) drought, and water supply may be disrupted during and after cyclone events. An additional factor is that pumping groundwater depends on imported fuel, which makes it expensive and at risk if the power supply is cut for any reason. In the past, the people of Niue harvested rainwater, but the systems had deteriorated and are no longer functional.

With funding available from the Pacific Adaptation to Climate Change (PACC) programme and the Global Climate Change Alliance (GCCA:PSIS) project, Niue embarked on an ambitious programme to provide an alternative water source. Rainwater harvesting was identified as the most suitable option for strengthening water security in Niue.



*Tank moulding plant developed to produce water tanks in Niue.*

## Activities and Results

A process of research, consultation and analysis (including cost-benefit analysis) led to the decision to build a tank moulding facility to manufacture water tanks in Niue. Tanks could be made at half the price of importing them, and this would further increase resilience by reducing dependence on imports.

The new moulding facility was opened in December 2013. The facility is capable of producing up to eight 5,000 litre tanks each day. The tanks are made of a robust plastic called high-density polyethylene (HDPE), which is imported in powder form before it is processed and moulded into tanks. The tanks are lightweight, there are no joints that can split, and the plastic material complies with New Zealand and Australian safety standards. Niue is presently investigating using the moulding facility for other types of plastic containers once the project is finished (septic tanks, containers for noni and garbage bins). This will greatly reduce freight costs for these items.

The project is aiming to provide a tank to each inhabited household on the island. The tanks will provide an alternative water source and an assured source of water before, during, and after extreme events such as cyclones, when power is disrupted.

Householders are responsible for maintenance of their tanks, and are required to pay for guttering and fascia boards needed to complete the system. The project team has been working within communities to raise awareness of the value of the tanks, and carrying out training on system maintenance to ensure the tanks are kept in good order. In parallel,

### **Augmentation of Rainwater Capture and Storage in Niue**

**Global Climate Change Alliance: Pacific Small Island States (GCCA: PSIS), 2012 - 2015**

**Pacific Adaptation to Climate Change Project (PACC), 2009 – 2015**

Niue

Government of Niue

Partners: Secretariat of the Pacific Community (SPC), Secretariat of the Pacific Regional Environment Programme (SPREP)

Funding: European Union, Global Environment Fund (GEF), Government of Australia

the project has been raising awareness on water conservation and protection, using a comprehensive communications strategy developed in collaboration with the Pacific IWRM programme and including using various media including video, radio, posters and news releases. Consultations have also been conducted in all 14 communities.

The Government of Niue completed a Climate Change Policy in 2009, approved by Cabinet. Work is also underway on the Joint National Action Plan (JNAP) on Climate Change Adaptation and Disaster Risk Management, as well as linking these processes with the National Integrated Strategic Plan (NISP) 2014–2017 which is the main planning document for the country.

## Challenges

The three projects started at different times and each project had different requirements making overall project management and reporting extremely arduous and time consuming for the Niue Government.

It was very time consuming to engage and involve all the different stakeholders and a continuous communication strategy was implemented, using different types of media, to address the different needs and perspectives.

Not all households in Niue could be supplied with a water tank by the end of the project so it was necessary to conduct an assessment to identify and prioritise the most vulnerable households.

## Lessons Learnt

Countries can take the initiative to get donors and projects to work together and combine funds. Ideally this should be done at the inception and design stage so that one overall project is created rather than two or three projects working alongside each other.

The storage tanks increase community resilience to climate variability and change, as well as DRR. One of the ways this is being achieved is by providing access to safe drinking water when the central supply is disrupted by extreme weather conditions.

Public and private partnerships can allow for effective and efficient delivery of services. The creation of a tank moulding facility is a new enterprise for Niue, providing opportunities for the manufacture of different plastic containers and for new employment and skills development.

Making householders responsible for maintenance of the system and contributing to the cost strengthens ownership and adds to sustainability of water security outcomes.



*Installed water tank, Niue.*

<https://www.sprep.org/pacc/niue>

[http://www2008.spc.int/index.php?option=com\\_content&view=article&id=1117:augmentation-of-rainwater-harvesting-in-niue&catid=256&Itemid=562](http://www2008.spc.int/index.php?option=com_content&view=article&id=1117:augmentation-of-rainwater-harvesting-in-niue&catid=256&Itemid=562)

<http://www.pacificclimatechange.net/index.php/eresources/documents?task=view&id=1133&catid=177>



# School going solar to reduce emissions and improve access to electricity

## Background

The Motufoua School is the only government secondary school in Tuvalu and is located on the atoll island of Vaitupu, 130 km north of the capital Funafuti. The school has had just over 500 students and has had access to electricity since the late 1970s. Initially power was available from 5.30 a.m. to 10.00 p.m. daily. This was later extended to midnight in the year 2000, when all islands in Tuvalu were electrified.

The Tuvalu Photovoltaic Electricity Network Integration Project has been set up to fulfil electricity needs for the school while reducing Tuvalu Electricity Corporation's dependence on imported diesel, therefore, contributing to Tuvalu's plan of combating the escalating price of imported fuel, particularly for the island of Vaitupu. Tuvalu has a target of obtaining 100% of its electricity generation from renewable energy sources by the year 2020.



Site for installation of on-grid solar PV system.

## Activities and Results

This project installed a 46 kW grid-parallel PV system at Motufoua secondary school. The configuration of the system includes PV panels, battery banks, a connection to the grid and a standby generator.

The project has enabled the school to access power on a continuous basis (24 hours) as the island power supply to which the school is connected only operates for 18 hours per day. The project saves the school from using 44,000 litres of diesel fuel per annum which translates to 109 tonnes of carbon dioxide. This project is one of the largest hybrid power supply systems installed in a rural setting in any PIC and the first of its kind in the Pacific region where a storage facility (battery bank) has been used. The use of the battery bank allows the system to provide power even when there is no sunshine.

The second component comprises the installation of 10 solar PV streetlights in the school. The solar streetlights have provided a secure environment inside the school compound, particularly around the girls' dormitory. It has also enabled students to study after dark. Since the installation of the streetlight, students gather around the streetlight at 4.00 a.m. studying during good weather.

The hybrid system has been used for training regional solar technicians. Being the first of its kind in the region, a training workshop was conducted on the management and maintenance of the system for technicians from interested countries in the Pacific. The training was in anticipation for similar systems planned for other PICs. The training was carried out in collaboration with the company that designed and installed the system and the company that supplied the special inverters used in the system.

### Tuvalu Photovoltaic Electricity Network Integration Project (TPVENIP), 2009 - 2011

Tuvalu

International Union for Conservation of Nature Oceania Regional Office (IUCN ORO)

Partners: Tuvalu Electricity Corporation

Funding: Government of Italy, Austrian Development Cooperation

## Challenges

The remoteness of the island poses a great challenge in terms of transportation and delivering the equipment to the site. The equipment including the batteries had to be transferred to a small open boat from the big ship anchored outside the lagoon. The batteries are so heavy that it took four adults to carry one.

Managing and operating the highly complex control system requires highly trained and skilled personnel. This proves to be a great challenge for the Tuvalu Electricity Corporation as it will try to retain the staff that have attained such skills and knowledge.

Tuvalu Electricity Corporation does not have the capacity to monitor the system remotely from its headquarters in Funafuti. It can only have the ability to do so if telephone and internet connections are improved.

## Lessons Learnt

The hybrid power supply system is an option for providing reliable power supply to rural and remote communities. It is clean and helps reduce imported fuel consumption and is also appropriate for reducing greenhouse gas emissions. However, the hybrid power system requires specialised training due to its complex technical configuration.

For remote Pacific Island communities, hybrid solar power systems can improve daily access times to electricity which can improve education and community services. Moving away from reliance on imported diesel for electricity production increases the resilience of communities. This prevents them from being subject to fluctuating diesel prices and limited supplies during times of climate hazards, such as cyclones.



*Tuvalu Electricity Corporation.*

[http://www.iucn.org/news\\_homepage/news\\_by\\_date/2010\\_news/may\\_2010/?5080/Tuvalu-solar-project-commissioned](http://www.iucn.org/news_homepage/news_by_date/2010_news/may_2010/?5080/Tuvalu-solar-project-commissioned)

# Disaster risk reduction planning for tsunami risk

## Background

Wallis and Futuna are vulnerable to disasters, including tsunamis, which have affected Futuna in 1993 and 2009. The French territory has sought to enhance its capacity to mitigate the risk of natural disasters, with a focus on tsunami preparedness and response.

In order to do this, more accurate assessment of the tsunami hazard was required. The Secretariat of the Pacific Community (SPC), in partnership with the National Institute of Water and Atmospheric Research New Zealand and the French Institute of Research for Development provided Wallis and Futuna with critical information to support tsunami planning. This included inundation maps outlining zones at risk and reaction time based on specific tsunami scenarios. The project aimed to improve the territory's capacity to manage disaster situations and falls under Wallis and Futuna's long-term efforts to improve civil security following significant damage on Futuna after Tropical Cyclone Thomas which hit the territory in March 2010.



*Network installation services by Radiocom, Futuna.*

## Activities and Results

Wallis and Futuna has considerably improved its understanding of tsunami risk, its capacity to respond to disasters and the tools at its disposal, such as communications equipment, village-level early warning, and disaster plans.

A tsunami hazard study utilised 14 possible tsunami models to identify which regional and local tsunamis are most likely to affect Wallis and Futuna. The risk of damage is thought to be greater for Futuna as the reef around Wallis provides some protection. Several products were developed to guide government decision-making: bathymetric maps for Uvea and Futuna-Alofi, hydrodynamic models of trans-Pacific and regional tsunami scenarios, the assessment of reaction time available based on select scenarios, and the identification of inundation impact for all coastal zones.

Disaster response arrangements were reassessed along with a review of the territory's preparedness and response plan. The revised plan offers a fresh analysis of the risks facing the territory in which the results of the tsunami assessment above are reflected. It also includes a new operational strategy for the core response team, with the redefinition of the roles of state and territorial authorities in crisis management.

Limited radio coverage on the two main islands prevented swift communication during crises. To address this issue, the authorities procured and installed telecommunication equipment, including relay towers, antennas and radios. Other types of equipment were secured, such as tsunami siren maintenance kits and emergency response kits (e.g.

### **Responding to Crises: Enhanced Knowledge of Risk and Preparedness for a Territory Facing a Range of Natural Hazards, including Tsunamis, Supporting Disaster Risk Reduction in Pacific Overseas Countries and Territories, 2011 - 2013**

Wallis and Futuna

Secretariat of the Pacific Community (SPC)

Partners: Government of Wallis and Futuna, National Institute of Water and Atmospheric Research New Zealand, Institut de Recherche pour le Développement, Wallis and Futuna's Red Cross Society, French Red Cross

Funding: European Union (EU)

water pumps, generators, tarpaulins). Under this component, 16 sirens were also rehabilitated after suffering damage following cyclone Evan in December 2012.

Village-level training was conducted across Wallis and Futuna by the Wallis and Futuna's Red Cross branch supported by the French Red Cross. The goal was to identify and train village leaders to coordinate community mobilisation and evacuation during times of crisis. As part of the training, early warning procedures were reviewed including the proper use of communications equipment. The location of evacuation zones and the signage of routes were also assessed and in many cases, improved. In total, 36 people were trained covering 16 villages on Futuna and 20 on Wallis. They represent a crucial link between the population and officials in case of emergency.

To enhance information available to the public, Wallis and Futuna authorities developed a series of leaflets on tsunami, cyclone and maritime risk. A reminder to the public of the security measures to follow during an emergency, as well as key contact numbers. They are available in French, Wallisian and Futunian. TV spots were also developed and are broadcast on a regular basis.

## Challenges

The availability of equipment and technical capacity (e.g. to install radio relays) is very limited on Wallis. Most of the materials had to be procured overseas (in New Caledonia or metropolitan France) and shipped to Wallis, which proved expensive and led to implementation delays.

This project was one of the first development projects implemented by the Cabinet of the French Administrator of Wallis et Futuna (which has responsibility for civil security). It proved challenging to find sufficient human resource capacity to take on this project. Considerable investment of working hours by the project team has contributed to its success.

## Lessons Learnt

Tsunami risk maps showing projected inundation have proved useful in CCA and DRR planning but are also important in land and environmental planning and coastal management initiatives. It is important to undertake robust scientific assessment of risk to ensure informed decision making processes.

The thorough and participatory review of response plans will impact positively on government and stakeholders to respond to disasters efficiently and in a coordinated manner. Other improvements (e.g. new equipment, broader radio coverage, and village-level preparedness for early warning and evacuation) also contribute to improved communication and local reactivity during disaster times.



*Evacuation simulation, community training.*

<http://www.spc.int/en/employment/1136-pubic-alerts-at-the-heart-of-spcs-regional-exchanges.html>

# Pairing schools and community in adaptation and disaster risk reduction education

## Background

The Federated States of Micronesia (FSM) and the Republic of the Marshall Islands (RMI) are small island states in Micronesia. FSM is a group of 607 small islands, totalling 702 km<sup>2</sup> of land, of which only 65 are inhabited. FSM faces a high degree of natural disaster risk as the islands experience a cyclone season each year.

RMI is made up of 1,200 islands, islets and atolls with a land area of 180 km<sup>2</sup>. RMI experiences a medium vulnerability to cyclones and droughts, and a high vulnerability to coastal flooding. Due to RMI's isolation, transportation and logistics during emergency response is difficult.

The Climate Adaptation, Disaster Risk Reduction and Education (CADRE) programme originally started as a small scale pilot program for six schools in Pohnpei funded by the United States. There was a Pacific Wide Tsunami alert and the United States ambassador was aghast that many people in Pohnpei did not respond appropriately to the alert and were not aware of what to do in the case of a tsunami threat. The International Organisation for Migration (IOM) was asked to develop a public awareness raising program and also to work with schools on safety programming to address natural hazards. The pilot program enjoyed great success and Australia saw the potential to make a more comprehensive program to improve DRM in the region.



*Sekere Elementary School, 8th Grade students planting to reduce risks of landslide on their campus.*

## Activities and Results

The CADRE project aims to build the resilience of vulnerable schools and communities in the FSM and RMI to natural hazards and, particularly, those that are climate induced.

The project targeted approximately 10,000 school-aged students, 50 schools and their surrounding communities to undertake:

- Delivery of a two-week module of lessons focused on CCA and DRR to Grade 8 science in FSM and Grade 9 in the RMI (2,2120 boys and 2,268 girls or 4,388 students).
- The module of lessons includes a pre-test and a post-test to capture learning gains of students. Each school also receives a medical evacuation kit, which is pre-positioned at the school and Emergency First Response training.
- Multi-hazard School Emergency Management Plans (SEMP) were developed and tested with regular emergency drills (13,668 students in 50 schools better prepared).

### Climate Adaptation, Disaster Risk Reduction and Education (CADRE) programme, 2012 - 2015

Federated States of Micronesia, Republic of Marshall Islands

International Organisation for Migration (IOM)

Partners: Women United Together Marshall Islands (WUTMI), Conservation Society of Pohnpei (CSP), Chuuk Conservation Society (CCS), Yap CAP, Kosrae Conservation and Safety Organization (KCSO), the Marine and Environmental Institute of Pohnpei (MERIP)

Funding: Government of Australia

- Information, Education, Communication (IEC) materials were developed including: five hazard specific comic books (typhoon, tsunami, landslide, drought and climate change), five hazard specific instructional posters, five hazard specific brochures, student workbook, teacher handbook, colouring book, tele-cards, local language video, pencils, radio campaigns, etc.
- Hazard vulnerability capacity mapping exercises were conducted resulting in short and long-term community action plans in partnership with four local conservation organizations and one women's organization. Interventions emerging from these plans include climate adaptation and disaster mitigation projects such as, rain water harvesting systems, solar photovoltaic (PV) cells, and coastal protection measures.

For example, the intervention at UFO Elementary School in Fefen Chuuk includes installation of : piping from spring to new 5,000 gallon ground water tank, repair of piping to existing water tanks, 1,500 Watt solar PV panel installed on roof and connected to new SSB radio. The intervention addresses concerns raised by the community in the HVCM exercise facilitated by IOM and Chuuk Conservation Society staff. Community members (62) including the mayor and traditional chief attended the mapping exercise. Their primary concerns included the insufficient community water catchments and the need to be better prepared for typhoons. The intervention increased the availability of water at the school and the solar PV panel and radio increased the resiliency of the Fefen Community to natural hazards.

## Challenges

As in all development initiatives, sustainability is a challenge, in particular the on-going training of educators and school leaders in CCA and DRR. The IOM CADRE programme has supported the FSM National Department of Education (NDOC) to enhance the national curriculum to include standards related to DRR. The changes were officially adopted in August 2014. IOM has conducted 12 CADRE teacher training sessions, benefiting 400 educators. IOM has also worked with the the College of Micronesia to specifically target service teachers and institutionalise the CADRE model of lessons. Similarly, School Emergency Management Training for school leaders and Emergency First Response training for educators have been offered.

Challenges arise with implementing physical interventions on school grounds particularly where there are not clear boundaries of land. To address this challenge, the programme worked closely with civil society partners and school, community, and traditional leaders to ensure that assets were installed on public land.

## Lessons Learnt

Focusing on schools and communities and pairing education and awareness raising with community-owned climate adaptation/mitigation interventions is an effective model for building climate and disaster resilience in communities.

Integrating CCA and DRR streamlines education materials and reduces duplication.

Starting and ending an education project/program with a Knowledge, Attitude, and Practice (KAP) survey is a fascinating and innovative approach. Measuring the impact on the general public or greater society is often lacking in projects.

Focus group sessions identified that beneficiaries most appreciated the Emergency Response Training and Medical Kits for schools, the co-teaching model where trainers visit classrooms and work together with local teachers in delivering CCA and DRR lessons, and participatory process that led to community driven projects.



*Science teacher training in the Republic of Marshall Islands.*

<http://micronesia.iom.int/projects/cadre>

# Solar water purifiers to address water security

## Background

Nauru is one of the smallest nations in the world. To complete a marathon, you would have to run around the entire country more than twice. This small space means capturing enough water for Nauru's population is a challenge.

Drinking water has been a continuous problem for Nauruans. The country often experiences long periods of drought and the limited fresh water supplies have been subject to high levels of biological and industrial pollution for many years. During the drought of 1998–2000, Nauru's desalination plant went out of service, severely limiting water supplies. People were forced to rely on ground water, which in 2010 was found to be highly contaminated.

To reduce vulnerability and to increase adaptive capacity to the adverse effects of climate change, the Pacific Adaptation to Climate Change (PACC) programme in Nauru aimed to reduce the impacts of drought by improving management of the island's water supply.



*Solar panels installed for water purification in Nauru.*

## Activities and Results

The PACC project has been promoting conjunctive use of water in Nauru in order to reduce vulnerability to drought. Conjunctive water use means using water from the various sources, potable and non-potable, for different uses at different times, to improve sustainability of limited water resources.

Two vulnerable communities were identified and pilot projects developed within the communities. A vulnerability and adaptation assessment was carried out to fully assess the vulnerabilities of the communities, and to identify potential adaptation measures. These measures were then subjected to multi-criteria analysis to select the most feasible, relevant and sustainable options.

The first pilot project was the introduction of solar water purifiers to selected households in Aiwo district. Solar purifiers produce clean drinking-quality water from contaminated, non-potable water, e.g. seawater. These were introduced to 20 households and have proved successful. The units, as installed, provide up to an additional 80 L of clean water per day per household, which is critical during drought but useful at any time. This reduces the need for expensive desalinated water.

The second pilot has planned the restoration of the seawater reticulation system (piped water network), so that communities can use seawater for purposes, such as washing clothes.

The project has improved 150 household guttering and downpipes to improve rainwater harvesting systems.

The project team, working closely with the Pacific Integrated Water Resources Management (IWRM) project, has helped

### **Pacific Adaptation to Climate Change (PACC) programme: Nauru, 2009 - 2014**

Nauru

Secretariat of the Pacific Regional Environment Programme (SPREP)

Partners: Government of Nauru, United Nations Development Programme (UNDP)

Funding: Government of Australia, Global Environment Facility (GEF)

to set up a Water Unit, a Water Technical Committee, and other coordination mechanisms. The team has worked on mainstreaming climate change into the water sector through its contributions to three key documents: the National Water, Sanitation and Hygiene Policy; the Water Sector Climate Change Action Plan; and the Drought Management Strategy. The project team has also carried out awareness raising on the island, taking advantage of opportunities such as World Water Day, and lobbying successfully to incorporate water conservation into school curricula.

## Challenges

Land tenure issues presented challenges as insufficient land was available for project implementation. The team overcame this by carrying out community consultations and asking the community to negotiate with the landowners. It also identified schools as back-up sites for carrying out some of these project activities. For example, installation of water harvesting systems that included water storage tanks and solar water purifier panels being installed and mounted on roofs of the schools

The technical support services to monitor, carry out maintenance and improve the water systems, networks and operations was not in place in government. These support services, however, have now proved to be in critical need during the implementation, monitoring and evaluation stages of the project. The team addressed this key issue by setting up a 'water unit' under the Ministry of Commerce, Industry and Environment, and established a water and sanitation policy for Nauru. This institution and policy was endorsed by cabinet, and was a result of a partnership effort between the government through PACC, the communities, and project partners such as the Secretariat of the Pacific Community (SPC) and its supported to the Integrated Water Resource Management (IWRM) project; the project unit is now established and the policy is guiding its work.

While the salt water reticulation system assessment recommended that the existing system be de-commissioned and reconstructed, the activity was cancelled. Budget and time were two main factors that inhibited the project activity from going forward. As a result, the water reticulation system has been moved to form as a potentially new project activity or a new project on its own.

## Lessons Learnt

Address strategic level issues such as the need for policies, plans and structures in place before fully implementing actions to address climate change. Installing solar water purifiers is important to ensure effective, relevant, and sustainable results that address current and future vulnerabilities of the water sector.

Solar water purifiers produce clean drinking-quality water from contaminated or non-potable water sources such as seawater with no electricity costs. After the initial cost outlay, only maintenance is required to ensure their ongoing success. Solar water purifiers are being utilised as a water security solution in other PICs.

In relation to project design, it should be community specific, consider ongoing costs and capacity needs and identify operating and maintenance needs.

Lessons from Nauru and other PICs, have shown that proper policy and plans for water resource management must be in place to guide and attain further support for the water sector.

As water is one of the most vulnerable resources in the Pacific to climate change, priority must be given to establish the maintenance and operational support systems required to address and respond to a healthy and sustainable water sector. Setting up of an institution or management unit focusing solely on water, is a good governance practice that must be established immediately if not already in place.



*Solar panels installed for water purification in Nauru.*

<https://www.sprep.org/pacc/nauru>



# Improving energy efficiency in homes to reduce emissions and increase resilience

## Background

Palau is a small country in the Pacific that is environmentally vulnerable as a result of climate change. A small population results in a lack of significant economies of scale.

Many new homes are designed and built to be air conditioned, straining the financial and infrastructural capacity of the power utility which relies purely on diesel generation. Being almost 100 % dependent on imported fossil fuels, Palau is highly susceptible to international energy market movements and price volatility. Palau has one of the highest electricity consumption per capita in the Pacific<sup>17</sup>.

Recognising that improving the efficiency of energy use has greater short term value on reducing consumption of fossil energy than any other action, the Palau National Energy Policy (2010) states that energy efficiency standards for new buildings and renovations, including homes, businesses and government premises are to be introduced. The policy target is set at a 30% reduction in overall national energy consumption by 2020.



*Newly constructed energy efficient housing in Palau.*

The Energy Efficiency Home Loan Programme targets the housing sector and implements a mechanism to finance energy efficiency measures in new homes to reduce energy consumption of new homes by 15%.

To build new homes, the International Union for Conservation of Nature Oceania Regional Office (IUCN ORO) works with the National Development Bank of Palau (NDBP) through an innovative financing scheme called the Energy Efficiency Subsidy Programme (EESP), which allows the people of Palau to own a new energy efficient home. The project is also helping Palau to achieve its national target of a minimum 20% of electrical energy generated in Palau from renewable energy by 2020 and 30% reduction in overall national energy consumption by 2020.

## Activities and Results

To promote the energy efficiency measures, subsidies are used as an incentive within the home loan approval process. Through this EESP, families can build new homes, with choices of energy saving features suitable for the Palau environment. The National Development Bank of Palau (NDBP) provides subsidies to the borrowers ranging from a minimum of USD \$3,000 to \$10, 000, depending on the type and number of features selected by the new home owner.

All new homeowners applying to the NDBP for loans are entitled to the subsidy component. By the programmes fourth year, NDBP had issued loans for over 100 new homes under the programme.

Home owners have a range of energy saving options to choose from including: tinted or high performance glass, solar water heaters, hot water piping insulation, exterior window shading or awnings, energy saver lights and energy star appliances.

### Energy Efficiency Home Loan Programme, 2008 - 2014

Palau

International Union for Conservation of Nature Oceania Regional Office (IUCN ORO)

Partners: Palau National Development Bank of Palau (NDBP), United Nations Development Programme (UNDP)

Funding: Government of Italy, Austrian Development Cooperation, Global Environment Facility (GEF)

To help interested clients decide on what energy saving features they prefer, four energy model homes are available for viewing. These model homes enjoy the maximum subsidy of USD \$10,000, in return for showing would-be customers the energy efficient features in their homes.

Some of the notable benefits of the programme include:

- (i) Increased employment in the building industry and the import and retail sector.
- (ii) Creation of a market for energy efficient products.
- (iii) Contribution to lower electricity bills (up to 15%) for the homeowners who now enjoy a more comfortable living space without relying on the more energy-consuming air conditioners. The power utility has registered a decrease in peak demand thus increasing its ability to meet extra demand. This translates into less fuel being used for power generation hence a saving for the utility.
- (iv) Increased awareness of energy efficiency by Palau residents.
- (v) Discussions as to the prospect of duplicating the programme in other PICTs.

## Challenges

The energy efficiency concept is not always understood easily by lay people like the loans officers of development financing institutions such as the NDBP. There is the possibility of attaching incorrect dollar values which can result in incorrect subsidy values given to the efficiency measures being considered in the loan subsidy programme.

The subsidy programme is not sustainable unless the bank creates a 'subsidy pool' by dedicating a certain percentage of the interest charged to the customers' loan entitlement. To create such a pool the bank may have to either increase the interest rate or reduce the value of the subsidy.

The cost of hiring extra staff to support the subsidy programme is something that the bank will have to bear. Being a commercial entity, the bank is likely to pass the extra cost to customers. This can have an indirect impact on the value of the benefits of energy efficiency as the cost of incorporating the energy efficiency measures →to the customer increases.

Up-scaling the energy efficiency subsidy programme in the region can be quite challenging as most of the development financing institutions receive annual budgetary allocation from national governments to support their operation.

## Lessons Learnt

Various energy efficiency measures can be part of an effective strategies for countries and communities by:

- reducing fuel imports; and
- acting as a stimulant for new product market and creating employment reducing the electricity bill and saving money for the home owners.

Financing institutions, such as national development banks and the private sector play a critical role in the implementation of an effective energy efficiency programme.

The subsidy programme is an effective way of realising the benefits of energy efficiency measures which, in turn, help in changing people's attitude and reducing greenhouse gas emissions.

Energy efficiency measures are less expensive with more immediate results than other greenhouse gas emission reduction options.



*Newly constructed energy efficient housing in Palau.*

[https://www.iucn.org/news\\_homepage/news\\_by\\_date/?12808/Palau-goes-for-energy-efficient-homes](https://www.iucn.org/news_homepage/news_by_date/?12808/Palau-goes-for-energy-efficient-homes)

## F. Case Study Matrix

	Case Study Title	Country	Implementing Agency	Funding	Project /Program	Pg.
1	Integrating gender equality in climate change programmes	Pacific region	Secretariat of the Pacific Community (SPC), Secretariat of the Pacific Regional Environment Programme (SPREP), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), United Nations Development Programme (UNDP), UN Women	Secretariat of the Pacific Community (SPC), Secretariat of the Pacific Regional Environment Programme (SPREP), German Federal Ministry of Economic Cooperation and Development (BMZ), UN Women	Pacific Gender and Climate Change Toolkit and associated training programme	6
2	Financial resilience of Pacific Island countries to disasters and climate change	Pacific region	Secretariat of the Pacific Community (SPC)	World Bank, Asian Development Bank, Government of Japan	Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI)	8
3	Training tomorrow's climate leaders through formal and non-formal training	Pacific region	The University of the South Pacific (USP)	European Union (EU)	Global Climate Change Alliance (USP EU-GCCA)	10
4	Financing renewable energy and sea water desalination	Pacific region	Pacific Island Forum Secretariat (PIFS)	Government of Japan	Pacific Environment Community (PEC) Fund	12
5	Explaining climate variability through animation	Pacific region, Vanuatu	Australian Bureau of Meteorology, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Government of Vanuatu, Australian and Vanuatu Red Cross, Red Cross Red Crescent Climate Centre, International Federation of the Red Cross and Red Cross Societies (IFRC), Secretariat of the Pacific Regional Environment Programme (SPREP), Secretariat of Pacific Community (SPC) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Government of Australia	Pacific Climate Animation Project	14
6	Showcasing 'voices of youth' through media production	Pacific Region, Samoa, Vanuatu, Kiribati, Tuvalu	Apidae Development Innovations	Government of Australia	Action Against Climate Change (A2C2)	16
7	Building capacity of youth and community workers for community-based disaster risk reduction	Fiji, Papua New Guinea, Tonga, Solomon Islands, Vanuatu	TEAR Foundation New Zealand, Ola Pau Pasifika Youth Development, Praxis Pacific	Government of New Zealand, TEAR Fund, Praxis	Pacific Island Youth Leadership Programme	18

	Case Study Title	Country	Implementing Agency	Funding	Project /Program	Pg.
8	Child centred adaptation actions	Fiji, Kiribati, Solomon Islands, Tonga, Tuvalu, Papua New Guinea	Foundation of the Peoples of the South Pacific International (FSPI), Tonga Community Development Trust, Foundation for the People and Community Development PNG, Solomon Island Development Trust, Partners in Community Development Fiji, Tuvalu-Tuvalu Association of NGOs, Foundation for the Peoples of the South Pacific Kiribati	Government of Australia	Child Centred Climate Change Adaptation Program (4CA)	20
9	Surveying and sharing climate change perceptions	Fiji, Samoa, Vanuatu	Apidae Development Innovations, United Nations Educational, Scientific and Cultural Organisation (UNESCO)	United Nations Educational, Scientific and Cultural Organisation (UNESCO)	Sharing Perceptions of Adaptation, Resilience and Climate Knowledge (SPARCK)	22
10	Media strategies to support rural women during disasters	Fiji, Solomon Islands, Papua New Guinea, Tonga	FemLINKPACIFIC	FemLINKPACIFIC	Women's Weather Watch: Communicating Gender Equality in DRR, Response and Management	24
11	Remote communities, planning for resilience	Papua New Guinea	CARE International	Government of Australia	Community Based Adaptation to Climate Change in Nissan District	26
12	Youth volunteers motivate community to build resilience	Papua New Guinea	Papua New Guinea Red Cross Society	European Commission, Humanitarian Aid and Civil Protection (ECHO)	Disaster Risk Reduction Program, Papua New Guinea Red Cross Society, Western Highlands Province Branch	28
13	Water safety planning for resilience	New Caledonia	Secretariat of the Pacific Community (SPC)	European Union (EU)	Reducing Public Health Risk in New Caledonia Through Water Safety Planning, Supporting Disaster Risk Reduction in Pacific Overseas Countries and Territories	30
14	Simulations for disaster response and community-based disaster risk management	Solomon Islands	World Vision Solomon Islands	Government of Australia, private donations	Malaita Community Resilience and Livelihoods Project	32
15	'Whole-of-island' and ridge-to-reef approach to address climate change	Solomon Islands	Provincial Government of Choiseul, Government of Solomon Islands, Secretariat of the Pacific Community (SPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Secretariat of the Pacific Regional Environment Programme (SPREP), United Nations Development Programme (UNDP), The Nature Conservancy (TNC)		Choiseul Integrated Climate Change Programme (CHICCAP)	34

Case Study Title	Country	Implementing Agency	Funding	Project /Program	Pg.	
16	Simulations for disaster response and disaster risk reduction strategies	Vanuatu, Fiji, Tonga	Adventist Development and Relief Agency New Zealand (ADRA NZ), Caritas, Christian World Service, Oxfam, Rotary, Tear Fund, United Nations Children's Fund (UNICEF)	Government of New Zealand	Enhancing Emergency Preparedness and Disaster Risk Reduction Strategies in Fiji, Tonga and Vanuatu	36
17	Solar food dryer to improve community resilience	Vanuatu	Government of Vanuatu, Secretariat of the Pacific Community (SPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	German Federal Ministry for Economic Cooperation and Development (BMZ)	Vanuatu Women's Solar Food Preservation Climate Adaptation Initiative, Coping with Climate Change in the Pacific Island Region Program (CCCPIR)	38
18	Strengthening the education sector for disaster management	Vanuatu	Save the Children	European Commission	Education Sector Disaster Management for School Community Risk Reduction and Preparedness	40
19	Effective risk governance to improve resilience	Vanuatu	United Nations Development Programme (UNDP), Live and Learn Environment Education, Government of Vanuatu	Government of Australia	Pacific Risk Resilience Programme (PRRP)	42
20	Network approach to community-based adaptation	Vanuatu	Save the Children, CARE International, Vanuatu Red Cross Society, Vanuatu Rural Development Centres Training Association (VRDTCA), Secretariat of the Pacific Community (SPC), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and coordinated by Oxfam	Government of Australia	Vanuatu NGO Climate Change Adaptation Program	44
21	Water safety and security planning for resilience	Fiji, Vanuatu	Partners in Community Development Fiji  United Nations Children's Fund (UNICEF) Office for Pacific Island Countries	United Nations Children's Fund (UNICEF) Office for Pacific Island Countries, Government of Australia	Achieving Water Security in Rural Fiji  Community Resilience and Coping with Climate Change and Natural Disasters in Vanuatu,	46
22	Emergency centres for disaster response	Fiji	The Salvation Army New Zealand Territory	Government of New Zealand	Improved Resilience to Disasters	48
23	Village relocation as a climate change adaptation measure	Fiji	Government of Fiji	Government of Fiji, Vunidogoloa community	Vunidogoloa Village Relocation Project	50

	Case Study Title	Country	Implementing Agency	Funding	Project /Program	Pg.
24	Planning for weather variability in local areas	Fiji	NaDraki Holdings Ltd	Commercial	Weather forecasts	52
25	Flood early warning systems and community disaster preparedness	Fiji	Japan International Cooperation Agency (JICA)	Government of Japan	Strengthening the Community - Based DRM Project in the Pacific Region (CBDRR)	54
26	Protecting natural resources to reduce greenhouse gas emissions and increase resilience	Fiji	International Ocean Institute-Pacific Islands (IOI-PI) and the University of the South Pacific (USP)	Japan International Cooperation Agency (JICA), Global Environment Fund (GEF), United Nations Development Programme (UNDP), Mie University, Government of Japan	Lomani (treasure and care for) Gau	56
27	Town planning as climate change adaptation	Fiji	Lami Town Council	UN Habitat, United Nations Environment Programme (UNEP), Government of Norway	Climate Change Vulnerability Assessment / Cost Benefit Analysis for ecosystem-based adaptation and engineering options for Lami	58
28	Reducing greenhouse gas emissions through renewable energy	Samoa	United Nations Development Programme (UNDP)	Global Environment Fund (GEF), Government of Denmark, United Nations Development Programme (UNDP)	Pacific Islands Greenhouse Gas Abatement through Renewable Energy Project (PIGGAREP)	60
29	Adapting to sudden sea level rise	Tonga	Secretariat of the Pacific Community (SPC)	Government of Australia	Assessing Vulnerability and Adaptation to Sea-Level Rise; Lifuka Island, Ha'apai, Tonga - Pacific Adaptation Strategy Assistance Program (PASAP)	62
30	Hazard mapping for coastal adaptation	Cook Islands	Climate Change Cook Islands, Government of Cook Islands	Government of Australia	Coastal Adaptation for Extreme Events and Climate Change, Avarua, Rarotonga	64
31	Coastal calculator assists with harbour design to adapt to climate change	Cook Islands	Secretariat of Pacific Regional Environment Programme (SPREP)	Government of Australia, Global Environment Facility (GEF)	Pacific Adaptation to Climate Change (PACC) programme: Cook Islands	66
32	Addressing health risks of marine biotoxin poisoning to increase community resilience	French Polynesia	Louis Malardé Institute (ILM), French Institute of Research for Development (IRD)	Contrats de Projet Etat-Pays, Agence Nationale Recherche (ANR), Ministère de l'Outre-Mer (MOM), Fonds Pacifique	Assessing and managing the risk of human intoxications associated with the consumption of fish and seafood contaminated with ciguatera	68

	Case Study Title	Country	Implementing Agency	Funding	Project /Program	Pg.
33	Improving water security and community resilience	Tokelau	Secretariat of the Pacific Regional Environment Programme (SPREP)	Government of Australia	Pacific Adaptation to Climate Change (PACC) programme: Tokelau	70
34	Converting from diesel to solar energy reducing emissions and increasing resilience	Tokelau	Government of Tokelau, Powersmart, IT Power, SMA Solar Technology AG	Government of Tokelau, Government of New Zealand, Government of France, United Nations Development Programme (UNDP)	Conversion of Tokelau Power Systems for 100% Diesel to 90% Solar	72
35	Manufacturing water tanks for water security	Niue	Government of Niue	European Union (EU), Global Environment Fund (GEF), Government of Australia	Augmentation of Rainwater Capture and Storage in Niue, Global Climate Change Alliance (GCCA): Pacific Small Island States Project, Pacific Adaptation to Climate Change (PACC) program	74
36	School going solar to reduce emissions and improve access to electricity	Tuvalu	International Union for Conservation of Nature Oceania Regional Office (IUCN ORO)	Government of Italy, Austrian Development Cooperation	Tuvalu Photovoltaic Electricity Network Integration Project (TPVENIP)	76
37	Disaster risk reduction planning for tsunami risk	Wallis and Futuna	Secretariat of the Pacific Community (SPC)	European Union (EU)	Responding to Crises: Enhanced Knowledge of Risk and Preparedness for a Territory Facing a Range of Natural Hazards, including Tsunamis, Supporting Disaster Risk Reduction in Pacific Overseas Countries and Territories	78
38	Pairing schools and community in adaptation and disaster risk reduction education	Federated States of Micronesia, Republic of Marshall Islands	International Organisation for Migration (IOM)	Government of Australia	Climate Adaptation, Disaster Risk Reduction and Education (CADRE) programme	80
39	Solar water purifiers to address water security	Nauru	Secretariat of the Pacific Regional Environment Programme (SPREP)	Government of Australia, Global Environment Facility (GEF)	Pacific Adaptation to Climate Change (PACC) programme: Nauru	82
40	Improving energy efficiency in homes to reduce emissions and increase resilience	Palau	International Union for Conservation of Nature Oceania Regional Office (IUCN ORO)	Government of Italy, Austrian Development Cooperation, Global Environment Facility (GEF)	Energy Efficiency Home Loan Programme	84

## G. References

1. See Endnote.
2. This report refers to PICTs as: American Samoa, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Pitcairn Islands, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, and Wallis and Futuna.
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5. Lowy Institute 2014, 'The role of the private sector in promoting economic growth and reducing poverty in the Indo-Pacific region' , <http://m.lowyinstitute.org/publications/role-private-sector-promoting-economic-growth-and-reducing-poverty-indo-pacific-region>.
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13. *Cook Islands, Fiji Islands, Kiribati, Federated States of Micronesia, Republic of Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu together with Timor Leste.*
14. <http://www.isiswomen.org/phocadownload/print/isispub/pc4d/INTRODUCTION.pdf>
15. <http://empowerpacific.com/about-empower-pacific/>
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# H. Glossary

## **Adaptation**

Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. [Source: IPCC AR4, WGII]

## **Climate Change**

Any change in climate over time, including in climate variability and extremes, whether due to natural variability or as a result of human activity, including changes in climate variability and extremes; this usage differs from that in the United Nations Framework Convention on Climate Change, which refers only to changes that can be attributed directly or indirectly to human activity. [Source: adapted from IPCC AR4, WGII].

## **Disaster**

A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, and exceeding the ability of the affected community or society to cope using its own resources; disasters may be slow or rapid onset, and widespread (e.g. where dispersed populations are exposed to repeated or persistent hazard conditions of low or moderate intensity) or concentrated (e.g. where large concentrations of people and economic activities are exposed to intense hazard events such as strong earthquakes, active volcanoes, heavy floods, tsunamis, or major storms, which can lead to potentially catastrophic disaster impacts involving high mortality and asset loss). [Source: based on UNISDR, 2009]

## **Disaster Management**

The organisation and management of resources and responsibilities for dealing with all humanitarian and related aspects of emergencies, in particular preparedness, response (including early recovery) and reconstruction/rehabilitation, in order to lessen the impact of a disaster. [Source: various]

## **Disaster Risk Management**

The systematic process of using policies, plans, organisations, and operational skills, capacities and actions to lessen the adverse impacts of hazards as well as the possibility of a disaster. [Source: adapted from UNISDR, 2009]

## **Disaster Risk Reduction**

A systematic approach to identifying, assessing and reducing the risk of a disaster. [Source: adapted from UNISDR, 2009]

## **Resilience**

The ability of a system, community or society exposed to hazards, and/or climate change, to resist, absorb, accommodate, and recover from the consequences of a hazard event or of climate change in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions. [Source: UNISDR, 2009]

# I. Endnote

## Pacific Roadmap Process

A Roadmap towards the development of the Strategy for Climate and Disaster Resilience in the Pacific (SRDP) was developed and endorsed by the Pacific region in 2011. This process was officially kick-started in 2013, with the first Joint Meeting of the Pacific Platform for Disaster Risk Management (PPDRM) and the Pacific Climate Change Roundtable (PCCR). The Roadmap includes three deliverables:

- The Strategy for Climate and Disaster Resilient Development in the Pacific (SRDP)
- A Regional Synthesis Report on the implementation of the regional frameworks (RFA and PIFACC)
- A Compendium of Case Studies on Climate and Disaster Resilient Development in the Pacific.

## Programme and Project Level

This compendium includes case studies from both programmes and projects. For this compendium, a project relates to organised activities to provide unique products and services to address an identified need. This compendium refers to programmes as a framework of aims, objectives, and approaches to support projects to be undertaken either on different topics or in different locations.



