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THE COASTAL
COMMUNITY
ADAPTATION PROJECT

*Helping Pacific Island
Communities Adapt to
a Changing Climate*

C-CAP NEWSLETTER

JULY 2013

PARI LEADS THE WAY FOR CYCLONE-PROOFING HEALTH CENTERS

The USAID/C-CAP team is implementing the project's first infrastructure activity in Pari, a coastal community of around four thousand people, located in the National Capital District of Papua New Guinea.

This project aims to prevent wind and storm damage to the community's Health Centre and disruption to essential medical services there following an extreme weather event. The retrofit will serve as a practical model for other Health Center facilities within PNG.

Pari community is amongst the first five participating PNG communities that have been identified as vulnerable to climate change impacts. The Pari community identified that high force winds are an issue in the village, as some buildings in the community are not built to withstand extreme weather events, including the Pari Health Center.

They also indicated that the Health Center is a critical community infrastructure asset, and increasingly so; the community has been experiencing an increase in the prevalence of health problems.



ABOVE and INSET: Buildings in Pari village which feature timber stilts and corrugated iron roofing are commonly built over seawater. Photos by C-CAP.

The Health Center nurse has attended to as many as 97 residents in one day. The community reports increased incidence of malaria and dengue fever, due to increased flooding during the rainy season which creates mosquito breeding grounds. Between 70 and 80 locals per day visited the Health Center in April and May this year, when many cases of the vector-borne illness, Chikungunya, were reported.

In the event that extreme weather caused severe damage to the facility, the impact would be very significant, as medical services would be disrupted at a time of greater need.

During site visits, the C-CAP team inspected the Health Center, and in consultation with representatives of the National Capital District (NCD) Department of Health, identified

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opportunities to reduce the facility's vulnerability to cyclone and storm damage. A small-scale 'cyclone-proofing' activity was therefore chosen as the initial adaptation activity to be undertaken within Pari.

By the late 21st century, tropical cyclones in the country are forecasted to be less frequent but the proportion of the more intense storms may increase, according to the Pacific Climate Change Science Program 2011 report on the current and future climate of Papua New Guinea. A quick and cost-effective way of improving a community's readiness for more intense cyclones and storms is to retrofit existing buildings with structural supports.

The Pari Health Center cyclone-proofing project was chosen as the commemorative activity for the C-CAP project launch on 1 March 2013. As a symbolic gesture of cooperation, US Ambassador to PNG, Walter North, and the USAID/ Pacific Islands Mission Director, Gloria D. Steele, presented cyclone-proofing materials to the community's Counsilar.

The cyclone-proofing intervention, adopted from best practice standards, primarily utilizes metal strapping and fastenings to reinforce connection points and enhance the structural integrity of the building.

A quick and cost-effective way of improving a community's readiness for more intense cyclones and storms is to retrofit existing buildings with structural supports.



LEFT: The Pari Health Centre is to be cyclone-proofed ahead of the next cyclone season.

BELOW: Typical house construction in Pari, PNG.



C-CAP will develop a retrofit primer in consultation with the NCD Department of Health, which can be used to amend the existing standards on the construction and renovation of NCD health centers to include cyclone-proofing provisions. The primer will include design drawings and specifications, a bill of quantities for required materials, and cost estimates. This documentation will assist the NCD Department of

Health to upgrade other vulnerable clinics within its system.

This small investment in the Pari Health Center will have a significant effect as it is replicated by the NCD Department of Health. In this way, Pari's small-scale infrastructure project is leading the way for climate change resilient health centers throughout PNG.

ADAPTING WITH MANGROVES



PHOTO BY C-CAP

Mangrove planting is one "soft" climate change adaptation strategy commonly used to enhance the resilience of coastal communities. Protecting the long term health of mangrove forests requires strategic planning and community participation.

Mangrove forests are comprised of a collection of salt-tolerant species that live in inter-tidal zones bordering tropical and subtropical coasts and estuaries. Mangroves provide many ecosystem services including: a habitat and nutrient-rich feeding and nursery ground for fish, birds, and other animals; shoreline protection from erosion caused by storm events and long-term wave action; and carbon sequestration. Mangrove forests can also protect agricultural land by reducing and preventing salt water intrusion. Mangrove forests are

ABOVE: This foreshore area in Boera village, PNG, was thick with mangroves before the forest was cut for fuel wood and house building materials. Efforts by the community to replant mangrove saplings in this area are underway.

The ecosystem services that mangroves provide can help to counterbalance [climate change] risks



ABOVE: Red mangrove, a material used for building pole houses.



ABOVE: An existing mangrove rehabilitation project in Ahau, Tonga.

Additionally one of the main sources of firewood for coastal communities in the Pacific. Where mangrove stands are being deforested, these important ecosystem services are being lost. Already, as much as 50 per cent of the world's mangrove forests are thought to have disappeared.

Some of the climate change impacts that Pacific Island communities are likely to contend with over the next few decades include the decline of fish stocks from habitat destruction due to coral bleaching, as well as increased coastal erosion and property damage due to sea level rise and more intense storms. The ecosystem services that mangroves provide can help to counterbalance those risks, which is why mangrove re-establishment is a key "soft" infrastructure climate change adaptation strategy used in vulnerable coastal communities.

However, climate change threatens to diminish the world's mangrove forests because they are unable to survive sustained inundation, and are also vulnerable to sediment erosion and increased salinity. Under conditions of sea level change, mangroves are prone to retreat, and studies suggest that this has historically occurred on large scales in some locations during periods of sea level change (e.g. at the end of Ice Ages due to melting ice sheets). In the face of these risks, scientists are discovering that these highly adaptable trees—which unlike many other plants can thrive in salt water and dynamic coastal environments—show signs of coping with sea level rise.

A working paper recently authored by the Nature Conservancy and Wetlands International¹ reports that mangrove soil elevations seem to be keeping pace with rising sea levels in some locations. It also highlights historical evidence—obtained by analyzing mangrove peat—which supports the idea that mangrove soil surfaces can track sea level rise over extended periods of time and when rates of sea level rise are variable.

This adaptive ability is due to the fact that mangroves are naturally able to build soil levels over time by root growth, and the accretion of detritus and trapping of sediment.

¹ McIvor, A.L., Spencer, T., Moller, I. and Spalding, M. (2013) The response of mangrove soil surface elevation to sea level rise. Natural Coastal Protection Series: Report 3. Cambridge Coastal Research Unit Working Paper 42. Published by the The Nature Conservancy and Wetlands International. URL: <http://coastalresilience.org/science/mangroves/surface-elevation-and-sea-level-rise>

Despite this ability, rapid sea level rise presents a significant challenge to mangroves, and it is likely that climate change will be responsible for a percentage of mangrove forest losses in the future (estimated to be 10-20 percent by Gilman *et al*, 2008²).

Researchers advocate for mangrove establishment and rehabilitation activities to include provisions that will assist mangrove forests adapt to rising sea levels. Key strategies to do this—besides preventing direct degradation from deforestation and water pollution—include ensuring: adequate nutrient supply, an advantageous geomorphic setting and hydrological regimes (ensuring adequate sediment supply and freshwater inputs), and space for landward migration.

Establishing, restoring, and protecting thriving mangrove systems for the long term requires strategic planning on the part of project implementers and the support and participation of communities.

² Gilman, E.L., Ellison, J., Duke, N.C. and Field, C. (2008) 'Threats to mangroves from climate change and adaptation options: A review'. *Aquatic Botany*, Vol 89, Issue 2, pages 237-250. URL: <http://www.sciencedirect.com/science/article/pii/S030437700800003X>.

USAID is supporting the restoration of degraded mangrove areas within Papua New Guinea, Solomon Islands and Vanuatu under the five-year Mangrove Rehabilitation for Sustainably-Managed, Healthy Forests (MARSH) project. Focusing on climate change adaptation and mitigation issues, the MARSH project provides training for community-based, sustainable mangrove forest management and reforestation. The C-CAP team works with MARSH to develop strategies for C-CAP communities, which identify mangrove reforestation as a priority climate change intervention. C-CAP is currently investigating possible mangrove restoration projects to assist communities in Tonga and Fiji address coastal erosion.

For further information about MARSH, contact the Chief of Party for the project, Dr Eric Verheij eric.verheij@iucn.org



PHOTO BY C-CAP

SECURE WATER FUTURE FOR FOUR SAMOAN COMMUNITIES

C-CAP will deliver rainwater harvesting infrastructure to four vulnerable Samoan communities, giving them access to clean water for the future.

The Pacific Climate Change Science Project report for Samoa (2011) indicates that the country is likely to experience an increase in the number of very hot days, more extreme rainfall days during the wet season, and less dry season rainfall into the future particularly in the north-west of Samoa's main islands. C-CAP's first-year efforts in Samoa will focus on a section of this highly vulnerable region, situated on the largest and highest Samoan island of Savai'i.

SECURE WATER FUTURE FOR FOUR SAMOAN COMMUNITIES *continued...*

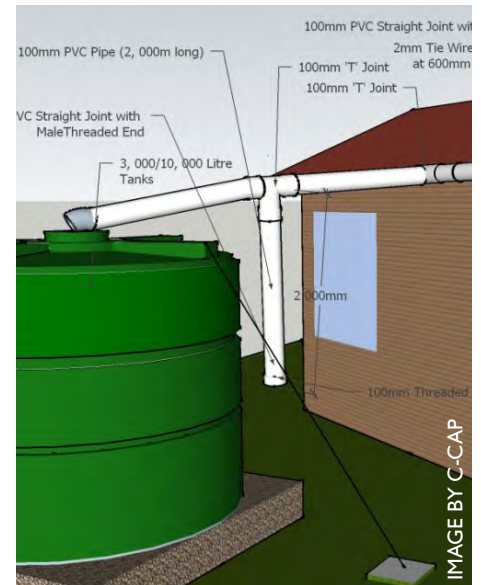
One way that Pacific Island communities can prepare for the impacts of climate change is to establish a reliable supply of fresh water. The existing water systems and springs in four of C-CAP's priority communities on Savai'i Island do not provide the necessary quantity and quality of water to these communities, and local ground water resources are increasingly contaminated by salt water intrusion. It is the most vulnerable community members that are often the hardest hit by water shortages; when the government trucked water to households in the north-west of Savai'i during the 2011 drought, vulnerable households were unable to benefit because they did not have their own water storage facilities.

To assist communities in north-west Savai'i to contend with future droughts, C-CAP is installing 89 three-thousand liter water tanks and guttering to the most vulnerable households in Falealupo, Asau, Auala and Sapapali'i communities. In addition, C-CAP is installing collection systems and a ten-thousand liter tank and guttering to a designated evacuation center within each community, to the benefit of all residents.

Community members will be instructed in the maintenance of roof catchment structures and guttering, and management of the collected water for domestic use. The result of this work will be an ongoing supply of clean water for these communities, preparing them to for future drought events.



ABOVE: An existing household rainwater collection system in Sapapalii, Samoa, which will be replaced with a new collection and tank system through C-CAP.



ABOVE: Simple rainwater catchment systems will deliver a sustainable fresh water supply to four C-CAP communities.

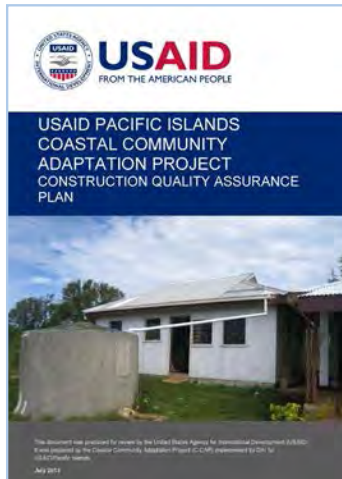
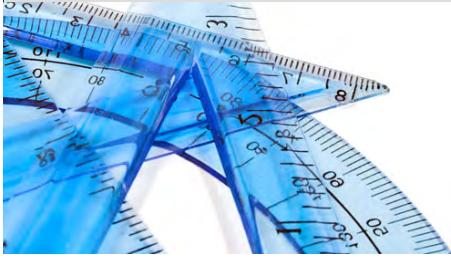
Rainwater

Rainwater harvesting systems are simple and inexpensive to install, operate, and maintain. They provide water at the point of consumption and operating costs are negligible. Water collected from roof catchments into household storage tanks can be treated (filtered and boiled) for potable purposes, as well as used for a number of non-potable activities such as toilet flushing, laundry, garden irrigation, and bathing. Since rainwater is collected using existing structures (i.e., the roof), rainwater harvesting has few negative environmental impacts.

C-CAP has developed a design for inexpensive and sustainable rainwater collection systems, to be constructed largely from PVC piping directly attached to roof collection surfaces. The innovative design reduces costs, eliminates the need for expensive fascia boards, and affords a higher degree of protection, preventing external damage and disruption to the system. Equipped with a simple "first flush" system, debris is automatically removed after rain events, resulting in a cleaner collection system and improved water quality. Lowering the costs, and designing features that both protect the systems and improve the quality of the collected water, contribute to the sustainability of the interventions at the community level.

TECHNICAL FOCUS

CONSTRUCTION QUALITY FOR LONG TERM SUCCESS



C-CAP's Construction Quality Assurance Plan establishes the project's procedures to ensure compliance with construction quality and procurement standards.

To receive an electronic copy of the Plan, please send an email with the subject line

REQUEST: C-CAP CQAP
to C-CAPcommunications@dai.com

The C-CAP team is following various standards and regulations to ensure construction works are delivered safely, efficiently, effectively, and to a high standard.

Through C-CAP, 90 coastal communities across the Pacific will receive support from the US Government over five years to create, maintain, or strengthen infrastructure for climate change adaptation. These small-scale infrastructure activities will often involve construction works. Although C-CAP construction activities will be small in scale, the scope of the project, and therefore cumulative output, is large. Delivering construction works safely, efficiently, effectively, and to a high standard is a key priority for the C-CAP team.

To achieve this, the C-CAP team follows various regulations and guidelines on construction quality standards including those set by USAID and the respective Pacific Island countries. The US Federal Acquisition Regulation (FAR), which specifies tendering and contracting processes, is also observed.

At the project level, the C-CAP contractor and subcontractors are following a Construction Quality Assurance Plan that sets out strategies for effectively managing construction activities. Strategies for the planning phase include engaging subcontractors and vendors that are appropriately qualified, and ensuring the proposed technology is correct for the task, and the cost is appropriate. During the construction phase, strategies to support high quality outcomes include maintaining good communication flows and verifying work is delivered to agreed standards and specifications.

Facilitating the long-term sustainability of infrastructure is an important part of achieving quality construction outcomes. Remoteness and salt exposure are two issues that can put coastal island communities at a particular disadvantage when it comes to maintaining infrastructure. C-CAP communities and infrastructure owners will receive operations and maintenance training for project infrastructure where it is considered beneficial, in order to support their resilience to the impacts of climate change over the long-term.

ADAPTATION ANIMATION



A whimsical hermit crab and a reggae-obsessed parrot are the stars in two animated videos delivering a serious message to Pacific Island audiences.



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ABOVE: Reggae Parrot (top) and Climate Crab (bottom) animations

The collaborative project is being delivered by the Red Cross and the Australian Government's Pacific-Australia Climate Change Science and Adaptation Planning Program. A number of organizations, including the Red Cross, the Australian Bureau of Meteorology, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), the Vanuatu Meteorology and Geo-hazard Department (VMGD) and the SPC-GIZ Climate Change Program joined forces to implement the project.

C-CAP encourages the use of understandable, accessible and affordable science-based climate change information by Pacific Island coastal communities so they can confidently make ongoing and longer-term plans for climate change adaptation.

The two climate change animations describe the seasonal weather patterns affecting life in the Pacific Island region. Reasons behind the weather patterns are explained, including the major movements of trade winds and cloud, and the characteristics of El Niño and La Niña (Bigfala Drae Taem and Bigfala Taem Blo Ren). The animations carry the message that people can prepare for extreme weather events by listening to, and acting on, weather forecasts.

The Climate Crab animation targets Pacific Island audiences generally, while the Cloud Nasara animation featuring the reggae parrot is for Ni-Vanuatu audiences and available in Bislama, English and French. Both animations come with resources for use with communities.

DOWNLOAD

The free animations and accompanying resources are available for download from

www.pacificclimatechangescience.org/animations/

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