



Pacific
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Global Climate Change Alliance: Pacific Small Island States Individual Country Evaluation Report - Palau

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REPORT PREPARED BY

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1. INTRODUCTION

This is one of nine individual country evaluation summary reports produced as part of the Global Climate Change Alliance: Pacific Small Island States post-project evaluation¹.

The Global Climate Change Alliance: Pacific Small Island States (GCCA: PSIS) Project is a European Union (EU) funded initiative to assist nine smaller Pacific Island states (Cook Islands, Federated States of Micronesia, Kiribati, Marshall Islands, Nauru, Niue, Palau, Tonga and Tuvalu) to adapt to climate change. The project was implemented by the Pacific Community (SPC), with an implementation period from July 2011 through to November 2016².

The overall objective of the project was to support the governments of nine small island states of the Pacific in their efforts to tackle the adverse effects of climate change.

The GCCA: PSIS project consisted of on-ground climate change adaptation activities in specific sectors – coastal protection, marine resources, health, agriculture, and freshwater; supported by mainstreaming of climate change into national and sectoral policies, plans, budgets and procedures. The project also provided technical assistance, capacity building and supported regional collaboration.

The four components and key result areas (KRA) of the project were:

1. Climate change mainstreamed into national and/or sector response strategies.
2. Well-articulated sectoral adaptation strategies that address budget support criteria.
3. National climate change adaptation projects implemented.
4. Streamlined technical assistance that supports national adaptation responses delivered by regional organisations in a collaborative manner.

The individual country evaluation report presented below is guided by responses to the key evaluation criteria provided in the original terms of reference:

- Relevance & EU Coherence
- Effectiveness
- Impact
- Efficiency
- Sustainability
- Cross-Cutting themes of gender and the environment
- Visibility

The report also provide a summary of best practices and any specific recommendations for future action or improvement.

¹ The evaluation report is presented as a full report containing all sections, as well as separate executive summary, individual country evaluation summaries and case studies.

² The project was granted a one-year extension.

2. PALAU EVALUATION REPORT

Sector for Climate Change Adaptation Project

Water sector

Project

Addressing water sector climate change vulnerabilities in the outlying states of Palau

The GGCA: PSIS project in Palau implemented on-ground projects in five outlying states:

- Angaur: development of a concrete water storage tank and solar pump at the Koska well; addition of rainwater storage at the community centre; replacement of pumps at the main well for water distribution, and leak testing and repairs.
- Peleliu: leak testing and repairs at the household level.
- Kayangel: installation of new pumps and three water storage tanks at the community centre.
- Hatohebei (Tobi): installation of 13 stand-alone rain catchments and storage tanks.
- Sonsorol: installation of six stand-alone rain catchments and storage tanks, and refurbishment of one community cistern.

The project funded the development of a training programme for water technicians/operators and the development of standard operating procedures.

An extensive education and awareness campaign was also conducted. Terms of reference were prepared for assessing groundwater in three outlying islands.

The project partnered with the National Development Bank of Palau (NDPB) to pilot the Palau Water Conservation Initiative (PWCI). The initiative provided subsidised loans to eligible households to obtain rainwater storage systems. The project provided funding to purchase 20 household rainwater storage tanks.

Implementing Entity

The implementing entity for the on-ground project was the Palau Public Utilities Corporation (PPUC), a public corporation. This arrangement worked well, with PPUC having the water sector knowledge and experience.

The Office of Environmental Response and Coordination (OERC) provided cross-government coordination for all GGCA: PSIS project activities in Palau.

Relevance & EU Coherence

The water sector project in Palau is relevant to national needs and demonstrates EU coherence.

The project aligns with Palau's National Master Development Plan – Palau 2020, and specifically with the high priority project 'Water system conservation, upgrading and cost recovery' identified in the Palau 'Medium-term Development Strategy: 2009-2014'³.

³ www.adb.org/sites/default/files/linked.../cobp-pal-2014-2016-sd.pdf

The project also aligns with Palau's needs and priorities in the EU-funded 2012 Water Policy⁴, which aims to protect and conserve Palau's water resources, ensure Palauans have access to safe, affordable, sustainable water supply and wastewater services, and that these services are managed and operated sustainably and effectively. The Koska well project in Angaur built on a previous Slovakian-funded project that installed a pump and water reticulation line at the Koska well.

The need to provide reliable and quality water was evident during the evaluation field visit in February 2016, with Palau being impacted by drought conditions linked to the El-Niño cycle, with water-rationing in place in Peleliu and Angaur. The need for improved water supply in the outlying atolls of Tobi and Sonsorol was urgent, as Palau's Environmental Quality Protection Board (EQPB) had advised the islands' residents that the existing fibreglass tanks were no longer safe to use for drinking water due to flaking of fibreglass.

Whilst the project's relevance to Palau is not disputed, the feasibility of implementing activities in five geographically-distant outlying states is worth questioning.

The project's Concept Note (developed September 2012, approved October 2012) originally outlined a holistic project focused on Angaur⁵. Angaur was selected as its population of approximately 200 residents were dependent on groundwater that was insufficient in volume and of poor quality⁶. The concept note indicated that the Angaur model could be replicated to Palau's 15 other outlying states.

However, several events occurred which made the Government of Palau expand the scope of the project. The European Union in their comments on the Concept Note on 27.10.12 asked for justification for using a €0.5 million grant for 43 households. In December 2012 Typhoon Bopha, a category 4 storm, passed just south of Angaur, a rare occurrence for Palau which is south of the main typhoon zone. This was a wake-up call for the country and emphasising as it did the vulnerability of the outlying island states. Finally in January 2013 there was a change of government. The combination of these events and changes resulted in the Government of Palau, in February – March 2013, advising SPC that the scope of the project had expanded to include the other four outlying states. A second version of the concept note, which included all five outlying states was prepared and was the basis of the consultation meeting in May 2013.

A consultation meeting (May 2013) discussed relevant activities in the five outlying states recognising that significant investments in the water sector were already planned for Kayangel (proposed solar water pumping and gravity feed tank funded by SIDS DOCK/PIGGAREP+⁷) and Peleliu (USD4 million reverse osmosis treatment plant funded by Japan as part of the Pacific Environment Community Fund).

⁴ European Union-funded Integrated Water Resources Management (EU IWRM) administered by SPC

⁵ The proposed project in Angaur consisted of eight activities forming a holistic package, from assessment of groundwater to support policy and actions, to enhancing water storage, training staff, household water efficiency measures, and public awareness. The focus on Angaur is also evident in an email confirming the selection of the water sector⁵ (4/8/2012) and in the formal letter confirming the sector choice (13/12/2012)

⁶ The concept note states (p4): "This groundwater supply has been declared by the National Government (Environmental Quality Protection Board) unsafe for human consumption and food preparation. Intermittently tested household and community tanks have also been found to have unsafe levels of e-coli contamination".

⁷ <http://prdrse4all.spc.int/production/node/4/content/piggarep-project-north-pacific-sustaining-renewable-energy-and-energy-efficiency>

A re-scoping of activities was required due to a budget shortfall⁸, with the final revised PDD (October 2014) reducing the groundwater assessment component to simply developing the terms of reference for a groundwater assessment (to be funded in the future). Interestingly, in the consultation report (May 2013), Angaur representatives prioritised the need to assess the quantity of groundwater as the primary activity. The reduction in scope of works in Angaur could have led to a reputational risk to SPC/EU due to the community expectations arising from the consultation and original PDD. However, this was averted by the United Arab Emirates (UAE) grant to construct a water treatment plant.

Effectiveness

The project was most effective in providing rainwater harvesting in two outer island States, and in developing a Climate Change Policy

The project's achievements against the revised logframe (revised October 2014) are presented below. The Palau GCCA: PSIS was effective in achieving most of its revised indicators by February 2016, with some activities running behind schedule but on track to finish by end-March 2016.

Expected result	Indicator	Indicators achieved
Overall Objective: To increase the resilience of the water sector to climate change impacts in Palau	Climate variability and change incorporated into PPUC long term planning and operations by 06/2015	Achieved: PPUC has provided input into the Climate Change Policy, specifically Intervention G.5 to 'Undertake a comprehensive water resource inventory and develop an integrated water resource management plan'. PPUC also in process of preparing strategic plan which includes using core budget for conducting hydrological assessments (based on KRA 3 output).
Purpose: To help ensure water quality and supply meets the needs of the people in the outlying island states of Palau	More than 20% of the population of two of the outlying states of Palau have improved water storage capacity by 06/2015.	Achieved: All of the population of Tobi and Sonsorol now have access to improved water storage. 13 stand-alone systems with two 750 gallon tanks installed in Tobi; six community water harvesting systems installed, 1200 gallons each, and refurbishment of one existing cistern.

⁸ The revised PDD (October 2014) states: "Engineering designs and costs of the planned water infrastructure activities in five outlying island states were completed in July 2014. These costs showed a significant increase over those estimated in the original Project Design Document. This budget shortfall was largely due to under-estimation of the cost of local transport as well as changes in the priorities identified by the island states in 2013."

Expected result	Indicator	Indicators achieved
	Community water catchments area increased by 10% in one outlying island state by 06/2015	Achieved: Upgrade of roof catchment (two new storage tanks and roof improvements) at Angaur community centre; three 750 gallon tanks installed at community buildings in Kayangel; and provision of plastic roofing for one large community tank at Tobi.
	10% of population adopt a long term water conservation measure by 09/2015	Achieved: Though difficult to determine actual 'adoption of water conservation measures': Household water audits in all 150 homes in Peleliu connected to water reticulation system. 60 homes had external leaks fixed. Water rationing in Peleliu and Angaur due to low water level in wells. Water conservation strategies already in place on Tobi and Sonsorol due to reliance on rainwater storage. Household leak detection planned for Kayangel was cancelled after Typhoon Haiyan damaged most homes, and a Taiwanese funded project provided new kit homes with stainless steel water tanks.
Key Result Area 1: Enhanced capacity of key stakeholders in Palau to monitor and maintain water systems in the outlying states	Four water technicians successfully complete water operations certification course by 09/2015	Exceeded: In 2015 water technicians (36 male) from 19 different water systems in Palau were trained in the certification programme and 68% passed. PPUC plan to use the certification programme as a standard for all water operators.
	Water operations maintenance schedule prepared for the outlying island states for Jan-Dec 2016 by 09/2015	Achieved: Part of Standard Operating Procedures Manual training manual developed by Hawaii Rural Water Association (HWRA). Schedules worked on as part of water operators' training.

Expected result	Indicator	Indicators achieved
Key Result Area 2: Appropriate improvements made in water sector infrastructure in the outlying states	1 new community water catchment demonstration site operational in Angaur by 12/2015	Delayed, on track for achievement. Raised concrete storage tank built at Koska Well, with solar powered pump. Area fenced and provision for public water supply (tap) to be added by end-March 2016.
	1 new community water distillation demonstration site operational in Kayangel by 09/2015	Replaced and partially achieved: Due to procurement issue with the company (insolvent), activity replaced with installation of two new pumps at the existing wells and leak detection and repair, and installation of three tanks at community centres.
	Rainwater catchment capacity increased by at least 20% in Sonsorol and Hatohobei by 09/2015	Achieved: Refurbishment of one cistern and purchase, transport and installation of six stand-alone water catchment systems in Sonsorol, and thirteen stand-alone systems (12 on Tobi and one on Helen's Reef), as well as provision of plastic roofing for one large community tank, contributing to reliable and safe rainwater catchment systems for 100% of the population. The project nearly doubles the amount of drinking water available for Tobi households (from 800 gallons to 1500 gallons), and provides a further 800 gallons (fibreglass tanks) for cleaning and washing purposes.
Key Result Area 3: Outline scoping for an assessment of the availability and quality of water resources in the outlying island states prepared	Scope and terms of reference for a hydrogeological assessment of water availability in the outlying island states prepared by 09.2015	Achieved: SPC Water & Sanitation Program reviewed information provided by PPUC to develop a draft terms of reference for a hydrogeological study into the sustainability of the water lens and the quality of ground water in the outlying island states of Angaur, Kayangel and Peleliu.

Expected result	Indicator	Indicators achieved
Key Result Area 4: Level of awareness about water conservation raised and appropriate measures implemented by Palauan residents	Awareness raising plan by 03/2015	Achieved: Roll'em Productions prepared a Water Conservation / Climate Change Awareness Action Plan in February 2015.
	At least 2 water conservation awareness activities implemented and evaluated by 06/2015	Achieved: Wonders of Water (WOW) fairs delivered in Peleliu, Angaur, Tobi and Sonsorol. WOW fair also held in Bethlehem Park (Koror). These were interactive events with a number of booths, including demonstration of First Flush Diverters and activities for children. 'Faucetina' created as a mascot for the campaign. Wider Palau population reached through TV show and radio spots.

Whilst each of these five states demonstrated the need for further investment in their water supply infrastructure, there is an argument that the project's spread over five states has diluted the overall effectiveness and benefit.

In terms of overall need, both Tobi and Sonsorol had the most urgent need, as both these outlying states are reliant on rain, and the existing fibreglass tanks were no longer fit to supply potable water. The installation of new High-Density Polyethylene (HDPE) potable water storage in Tobi allows the community to use the water from the existing fibreglass tanks for cleaning and washing, and the new tanks for drinking and cooking⁹. Overall, the effectiveness of the on-ground activities in ensuring a reliable and safe water supply was most pronounced in Tobi and Sonsorol.

Peleliu's reverse osmosis treatment plant produces potable water, but the benefit to the community was negated by leaks in the reticulation system (mains and household level), untreated groundwater was being pumped into the main water reticulation system to boost the water pressure, so that householders at the end of the line were able to receive water¹⁰. The household leak detection testing in Peleliu covered all 150 homes connected to the main water reticulation system. Leaks outside homes were detected and fixed in 60 residences. It was reported that most households did not allow the PPUC audit team to enter homes. Based on the few homes that were inspected inside, it is likely that considerable leakage remains from internal fixtures. PPUC staff asked householders to check for leaks, and also offered residents help to fix leaks for free if residents purchased the materials. PPUC staff indicated that only a few households had taken up the offer at the time of the evaluation field visit (February 2016). PPUC staff also indicated that most households thought that leaks at the

⁹ The community originally wanted stainless steel tanks that were locally available in Palau but these were found to have issues with rusting.

¹⁰ Peleliu presents a good example of the importance of identifying all the causes to a problem before investing large funds to install a reverse osmosis plant, when the likely benefit is negated by other foreseeable and fixable factors.

household level (i.e. branching off the main line) were still the responsibility of PPUC. A resident interviewed indicated that people did not care about fixing leaks as there was a flat rate for water consumption (i.e. no metered tariff). The planned installation of water meters and a move to a tiered tariff planned for 2016 should encourage the uptake of water conservation measures. The household water audits did not include any printed material. Such material would have been beneficial to act as a reminder and guide for households to check and fix internal leaks.

Angaur already benefited from the installation of a mobile solar-powered reverse osmosis system (Progetti Plant) installed in 2012 (and refurbished in 2015)¹¹. The installation of a new water storage tank at the Koska Well in Angaur will be effective in securing an alternative source of water. The Lieutenant Governor indicated that the Koska Well provided the cleanest, best tasting water as it was filtered through limestone, and that it will likely be used by Angaur's northern population, as it is a closer water source than the community centre (Progetti Plant). The rainwater catchment being added to the community centre will provide a back-up water supply in the event of a breakdown of the Progetti Plant. Feedback from stakeholders interviewed indicated that the Progetti Plant was now functioning well since its last refurbishment and was a valued clean water source for most of the Angaur community.

The activities in Kayangel focused on providing two new pumps for the main well, and installing three 750 gallon tanks at community buildings in the wake of Typhoon Haiyan. There is still a need to establish gravity flow to improve water pressure to households. The SIDS DOCK project aims to work on this. The GCCA project tried to work with SIDS DOCK to contribute funds towards a combined initiative but timing and cost prevented this from materialising. SIDS DOCK seeks to install a solar pump, and the GCCA pumps will act as a back-up once the solar pumps are operational.

The GCCA: PSIS project in Palau partnered with the National Development Bank of Palau (NDBP) to deliver the Palau Water Conservation Initiative (PWCI). This programme provided loans to households to purchase and install a rainwater tank plumbed into the house. The GCCA project provided funding to purchase 20 food-grade plastic rainwater storage systems to reduce the cost to householders for the pilot programme. The system specifications were designed by the SPC GCCA: PSIS Water Advisor, and included first flush diverter and pressure pump. The system is plumbed into homes via a line after the water meter. This allows households to close the mains off and just use tank water. When there are water outages, households can use the system and still have water.

At the time of the evaluation (February 2016), seven households had taken on loans and had rainwater systems installed. The slower than expected uptake is due to several factors, including changes in management at the NDBP, numerous and unexpectedly long permit processes for households to obtain from state governments, the overall cost of the system, and the eligibility criteria to qualify for a loan. A further eight households were in the process of obtaining the required permits. The PWCI builds on energy efficiency and renewable energy loan programmes for new homes and renovations run by the NDBP, so there is scope to integrate the water component with energy component in the future.

The training of water operators provided participants with new knowledge on how to maintain water systems and groundwater wells. It was reported that the training provided participants more confidence in undertaking their duties. The pass rate (68%) was reportedly better than expected,

¹¹ The Progetti reportedly led to a reduction in the number of people, particularly elderly and young, getting sick from dysentery.

considering the language barrier, and most operators having only high school education complemented with work experience.

Additional activities beyond the focus of the water sector

The project co-funded (with USAID and GIZ-CCCP) the development of the 'Palau Climate Change Policy for Climate and Disaster Resilient Low Emissions Development', which includes a prioritised and costed action plan covering ten sectors

A core coordinating group involving OERC, Palau Energy Office, NEMO, Palau National Weather Service provided oversight of the development of the Climate Change Policy. Oversight was also provided by the National Environmental Protection Council (NEPC), through an ad-hoc committee.

Stakeholders interviewed indicated that the development of this policy was very important, with the process bringing stakeholders across government together for the first time to plan for addressing the impacts of climate change.

There was some differing viewpoints from stakeholders as to the effectiveness of the process to develop the policy (a separate case study has been developed to discuss the development process, effectiveness and likely impact of the policy). One issue in particular was the cohesiveness of the different consultants working on the separate tenders, as well as the cohesiveness of the team of international and national consultants developing the framework. The quality of one deliverable in particular was also a concern for some of the stakeholders.

A review of climate change mainstreaming into national plans and policies in Palau was conducted in 2013. A subsequent assessment report of budget support readiness showed that the likelihood that Palau would qualify for direct budget support for climate change is low given its capacity constraints and limited sectoral and national strategic plans incorporating climate change endorsed or enacted at the time. The Grants Coordinator advised that Palau has made progress in climate change financing, and was working towards the Ministry of Finance getting accredited for the Green Climate Fund.

The project and Koror State funded a 'south-south' exchange involving national government and Koror State government staff visiting Tonga's coastal protection project. This exchange was effective in highlighting new methods for coastal protection that can be applied in parts of Palau. The exchange also highlighted the different land use and land management practices between the two countries.

Training in 'Proposal Preparation using the Logical Framework Approach (LFA)' was delivered to 27 people (15 women, 12 men) in May 2013. The post-training evaluation indicated that the training was successful in building capacity and motivation of Palau government staff and community based groups to use the LFA to design projects and inform the preparation of proposals. A 'Refresher training in the LFA and in Monitoring and Evaluation' was conducted in April 2015, attended by 18 people (14 women, 4 men). The post-training evaluation noted that participants who attended the initial LFA training benefited from the refresher and extended their knowledge with project monitoring and a more detailed look at project timeline and budget. Participants who were new to LFA also benefited and the feedback indicated they can see the value of the LFA and most obtained a degree of confidence to use the LFA in their work. The benefits from the two rounds are demonstrated by the following two comments from participants from the first and second round respectively.

"Overall the training was awesome and I recommend it to anyone who wants to learn about grant writing".

"All the content that I learned from this workshop will be very useful at work".

The Palau Grants Coordinator is developing a 'Manual for Grant Management' that incorporates elements of the LFA training, which indicates that the content was deemed valuable.

Impact

Whilst some project impacts will not be known or proven until one or more years into the future, some noted short term impacts have been observed.

The biggest impact in terms of long term climate change adaptation is likely to result from the 'Palau Climate Change Policy for Climate and Disaster Resilient Low Emissions Development' if actions are implemented by relevant sectors

The Climate Change Policy brought 10 sectors together for the first time to work towards a common goal of climate change adaptation, disaster risk reduction and low carbon emission development. The sector consultation process raised a lot of awareness on climate change with sector representatives. The policy was endorsed by both houses of government on 24th November 2015 and forms the basis of Palau's Intended Nationally Determined Contribution (INDC) submitted to the UNFCCC in November 2015.¹².

The action plan contained in the policy is already being advanced. The food security sector has already integrated climate change into their plan through the PACC project. Public Health has developed a climate change and health action plan but not a sector-wide policy. Other sectors are being encouraged to take the top three actions from the Climate Change Policy and turn these into grant proposals. The new Climate Change Office will be critical in the policy implementation process, as will the NEPC to ensure that sectors are involved in developing sector-specific climate change adaptation policies and plans.

An issue raised by four stakeholders during interviews was that there was a risk that the Climate Change Policy is losing momentum. Suggested actions included a formal launch of the policy, or reconvening the sector stakeholders.

The GCCA project provided an opportunity to re-establish relationships and improve the OERC's institutional set-up. The project has also led the national government to fund the establishment of a Climate Change Office.

The project introduced first flush diverters to Palau, ensuring better quality water being captured and stored

First Flush Diverters (FFD) were installed in all the project's rainwater capture and storage systems (Tobi, Sonsorol, Angaur, Kayangel, PWCI). This device has received very positive feedback from PPUC as well as other stakeholders. Whilst rainwater capture and storage systems often had leaf screens, FFD divert a specified volume of water that includes debris, as well as other finer or soluble contaminants. This means that the water that is captured and stored is cleaner, and of better quality. A future project could see the roll out of FFDs to all states.

¹²

http://www4.unfccc.int/submissions/INDC/Published%20Documents/Palau/1/Palau_INDC.Final%20Copy.pdf

The project also used HDPE tanks, rather than the more commonly available stainless steel tanks. There were numerous reports of stainless steel tanks rusting. There was also one report from a resident of the welds in stainless steel tanks leaching lead into the water.

The impacts from the on-ground projects are greatest in Tobi and Sonsorol, with residents in these two states having increased their total water supply, and having secured a potable water supply

The project provided homes in Tobi with two 750 gallon tanks (with roof catchments and first flush diverters) to provide potable water. These tanks replace 800 gallon fibreglass tanks declared unsuitable for drinking water. The project nearly doubles the amount of drinking water available for households (from 800 gallons to 1500 gallons), and provides a further 800 gallons (fibreglass tanks) for cleaning and washing purposes. An agreement exists between the state and households for water to be shared with others in the community if it is needed.

The community water tanks in Sonsorol have also provided the community with potable water. The new water tanks in Sonsorol were full at the time of the evaluation visit¹³.

The project added 31,350 gallons in extra rainwater storage across five states

The project has added considerable 32,500 gallons (approximately 125 KL) of rainwater storage (Table 1) plus 20,000 gallons of groundwater storage at the Koska well.

Table 1. Rainwater storage capacity added by the GCCA project in Palau*

Project Site and water capacity	Gallons added
Tobi (13 systems, 2x750 gallons each)	19,500
Sonsorol (6x1200 gallons)	7200
Angaur (community centre, 2 x 1200 gallons)	2400
Kayangel (2x750 gallons, 1 x 1200 gallons)	2700
NDBP demonstration tank (1 x 750 gallons)	750
Total (gallons)**	32,550

* Excluding PWCI household loan programme.

** 32,550 gallons is equivalent to 123,215 litres.

The Governor of Kayangel noted that the GCCA: PSIS project came at a very opportune time, straight after Typhoon Haiyan, and helped improve the existing water system. Kayangel residents are used to obtaining potable water from community building storage tanks, so the addition of the three tanks, with first flush diverters, will be effective in increasing potable water supply.

The Koska Well provides a closer source of potable water for Angaur's northern community

The impact of the Angaur project is likely to be high over the shorter term, as the northern community has a closer source of clean water. Over the long term, the impact is likely to be less once the UAE-funded water treatment plant comes on line.

Leak testing has increased water pressure in Peleliu but more needs to be done

The impact from the leak testing and repair in Peleliu is limited as there are still leaks inside homes, and untreated groundwater is still added to boost the pressure of the main water reticulation system in times outside water rationing. The water leak testing and repairs has increased water pressure,

¹³ The Governor of Sonsorol received a phone call during the evaluation interview letting him know that recent rains had filled all the tanks.

from around 10-15 PSI at end of line in 2014, to around 24 PSI at end of line following the water audits. PPUC are aiming for 30 PSI, and despite the household testing, groundwater is still being pumped into the system, leading to a sulphide-like smell emanating from the water. PPUC indicated that they have not detected any leaks in the main line. At the time of the evaluation (February 2016), a resident interviewed indicated that because of water rationing (limited hours of water supply), there was less smell in the water. PPUC indicated that this was because there was no need to boost the main line with groundwater.

The introduction of the metered water tariff should help drive behaviour change at the household level. It would be beneficial to time future community engagement activities targeting water conservation with the introduction of the water meters and tariff. PPUC should also undertake further investigations into ways to ensure there is sufficient pressure to ensure that the treated water from the reverse osmosis plant is delivered to households without resorting to adding groundwater.

The PWCI provides households with a reliable independent water supply when mains water is not available

The impact from the PWCI is limited in terms of numbers, but for those households that took out a loan, the benefits are immediate, especially during cuts to the mains water supply. One Koror resident interviewed indicated that there could be water cuts of up to three days when pipes were broken, but since the water tank installation (plumbed into the house), the household had a reliable water supply. The resident indicated that they "*felt safe even when there is no water (from the mains)*" as the tank provided up to one week's supply. It was also reported that the system design provided better quality water and better water pressure.

There was differing views as to the suitability of the 'design' of the rainwater capture and storage system used in the PWCI. Some stakeholders considered the system too complicated (in terms of being plumbed into the home, and using HDPE tanks) and too costly. It was suggested that those most in need of rainwater storage (poorer households not connected to mains water) would not be eligible for the loans. Another viewpoint is that the system is right for Palau, as people want the convenience of running water in their homes, and they would less likely use the system if it was not plumbed in and pressurised. The PWCI may consider offering different system designs (not plumbed, and plumbed in) to cater to different budgets.

The water operator's training programme will raise the overall skill level of PPUC field staff

The impact of the water operators' training will be felt over time as all water operators are trained to a basic level. Each state will have standard operating procedures for their water systems developed as a result of training.

Efficiency

Time

The on-ground activities experienced considerable delays due to transport logistics, and sourcing material. For example, the rainwater tanks were sourced through a local hardware but needed to come from New Zealand, as these were the only ones in Palau that were deemed safe to use for potable water supply (i.e. food grade plastic). The transport to outer islands was delayed due to the limited options and high cost of chartered shipping.

This has resulted in some project activities still being completed at the time of the evaluation field trip, such as the Koska Well and rainwater storage in Angaur, and the rainwater storage in Kayangel. These projects are expected to be finished by end-March 2016.

The project experienced delays at the start following national elections in Palau. There were significant staff changes in OERC, as well as the amalgamation of the Palau Water and Sewerage Corporation (PWSC) into the new PPUC.

In relation to the process to develop the Palau Climate Change Policy, some stakeholders consulted indicated that it would have been beneficial to spend more time on sector consultation. Only three months was available¹⁴, but it was suggested that a year would have yielded better quality consultation. However, the timeframe was constrained by the schedule originally set by the national government (for policy to be completed prior to COP21), and that the sector consultation was an additional component to the original process¹⁵. Several stakeholders questioned the usefulness of the outputs from the first two steps (community engagement and gaps analysis), suggesting that they could have been done together, and as part of an overall team contracted for the development of the overall policy.

Cost

Palau had acquitted 83% of its €600,000 allocation for the on-ground project by March 2016 and all remaining funds are committed which will result in 100% expenditure by the end of the project. €95,290 was allocated for national coordination and 95% of these funds were acquitted with the remaining funding committed.

The project budget was varied between the Key Result Areas (KRA) as a result of cost-differences between the PDD stage and the implementation stage. Costing of the hydrogeological assessment (KRA 3) was underestimated, due to the high cost of drilling¹⁶.

The cost of transport to outer islands was noted to be very high. For example, the cost of hiring the barge to transport water tanks and equipment to Tobi and Sonsorol was budgeted at US\$64,000 and the actual cost was US\$77,000. State Governors reportedly offered to help with this cost of transport at the planning stage but the offer was later withdrawn due to their own budget constraints. It is important for outer island projects to budget a relatively large contingency for transport costs.

Staffing

The project funded four staff; two staff in OERC- national coordinator, office manager, as well as a finance assistant and project officer in PPUC.

The post-2012 election changes at OERC meant that there was no institutional knowledge of the project. The funding for two staff within OERC helped re-establish the office after the 2012 elections. The OERC also benefited from a staff member funded by USAID to assist with the Climate Change

¹⁴ Sector consultation tender released in October 2014, whereas community engagement and gaps and needs tenders released January 2013, and policy framework tender released March 2014.

¹⁵ Fourth step was originally "Preparation of a climate change plan of action" but changed to "Sector analysis and preparation of an action plan for the Palau climate change policy framework" by the time of the tender for sector consultation (October 2014).

¹⁶ KRA 3 was modified to preparing the scope of services to undertake a hydrogeological assessment (to be funded by a separate future project). The funds saved from KRA 3 were re-allocated to KRA2.

Policy work. There was some duplication in roles between the national coordinator's role in the policy development process and the USAID-funded staff and this was resolved.

PPUC had one engineer who was able to provide assistance. It was reported during stakeholder consultation that PPUC have limited capacity to undertake large on-ground projects. However, it was noted that training of local staff is still required to ensure the sustainability of such projects.

The project received considerable assistance from SPC-GCCA's technical advisor for water, who assisted with the design and procurement for the water projects. SPC-GCCA's Climate Change Advisor based in the North Pacific Regional Office also provided valuable support to the policy development process. The support provided by the SPC team was noted to be valuable in overcoming issues through pragmatic and flexible solutions, as well as for supporting the project's momentum by undertaking frequent visits.

Staff built their skills through a number of informal training activities:

- SPC project manager, climate change adviser, and finance officer provided on the job training in project financial management and in procurement to Palau counterparts in PPUC, OERC and Finance.
- The national coordinator and office manager funded through the project were both supported to attend the GIZ CCCPIR training in the Coastal Change Module of the Climate Change Toolkit, as well as several SPC Disaster Risk Management workshops.
- National coordinator was supported to attend negotiations training through participation in the United Nations Conference of Parties on Climate Change.

Sustainability

There is a high level of community ownership of the water tanks installed in Tobi and Sonsorol. Tobi residents are reportedly very satisfied with the project. Some Sonsorol people residing in Koror took annual leave to go to the island and help build water catchments. Householders have been trained in maintenance of FFDs and state workers will help households maintain water tanks.

The use of HDPE tanks will ensure their longevity over their design life, compared to stainless steel tanks which have been prone to rust.

In Puloana, one of the islands of Sonsorol, the community modified the rainwater tanks set-up to reduce the likelihood of significant water loss from any damage to the tank faucet. The community have added two 200 gallon stainless steel tanks that are filled from the GCCA water tanks using 12 volt pumps. The stainless steel tanks are used to obtain water, thereby limiting any water loss from damaged faucets to 200 gallons at the most. This demonstrates that the community have a high level of ownership of initiative and has learnt from past issues with tank faucets.

The sustainability of water systems in the other three states with reticulated water systems will be improved with the introduction of a water tariff that provides PPUC with cost recovery for the provision of the services¹⁷. A number of stakeholders noted that whilst the education and awareness component of the project was great, there is no motivation to save water as there is no metering and tariff. The training of water operators and the development of standard operating procedures for each state's water system will also support the sustainability of the water systems. The development

¹⁷ Noting Kayangel already has a tariff, but set at a lower rate than the capital.

of the terms of reference for the hydrological assessments will also support the sustainability of groundwater extraction if the assessments are implemented and recommendations applied.

The endorsement of the Climate Change Policy should assist Palau's sustainable development. The prioritised and costed action plan represents a blueprint for moving forward over the next decade. Furthermore the policy is fully owned by Palau and is not seen as a donor-driven initiative. The development of the policy provided a catalyst for the establishment of a Climate Change Office.

The skills gained by the staff funded by the project will be retained in government, with all staff now being absorbed into permanent roles. This will be important particularly to support the implementation of priority actions from the Climate Change Policy. The establishment of the PMU will also support the implementation of priority actions. The development of a 'Manual for Grant Management' that is based on the LFA will support clear project proposals.

Cross-Cutting

Gender

There were few opportunities to introduce a gender focus into project activities. The water projects were designed to benefit the whole community. The project planning workshop had a good representation of women (12, from a total of 27 present). Other training activities involved both men and women, although often it was difficult to achieve proportional representation e.g. LFA training involved almost all female and the PPUC operator training was all male.

The international consultants developing the Climate Change Policy had a gender specialist to ensure gender considerations were included, but this was not reflected in detail in the overarching policy document.

Land inheritance in Palau is matrilineal and women have significant roles in decision making, including two states having female governors over the course of the project. Both men and women were involved in most aspects of the water project implementation in communities. However, there were challenges in achieving proportional gender representation in training. For example the operator training only extended to PPUC staff, all male, and the LFA training participants were almost all female despite the invitations being more widely distributed.

One of the criticisms pointed towards the PWCI is that it excludes poorer households that are often in outlying parts of the main island, and that are not connected to the main water system. The financial eligibility requirements to access the NDBP loans for the rainwater storage systems prevents the most vulnerable from benefiting from the initiative. A more affordable rainwater storage system (HDPE tank and FFD not plumbed into homes) could be developed for households with less collateral to put against the loan, whilst the most vulnerable households should be the target of donor-funded rainwater harvesting systems.

Environment

The project worked closely with the Environmental Quality Protection Board (EQPB) to ensure that water infrastructure improvements complied with regulations (e.g. for excavation for improvements to the groundwater well in Angaur State). All households applying for rainwater tanks through the PWCI also had to obtain a number of permits from EQPB and State agencies.

Whilst there were no environmental risks identified in the risk management section of the PDD, the barge delivering water tanks to Tobi got stuck on the reef at low tide. Fortunately no environmental

damage was reported, but future projects should consider the transport-related risk to outer islands without port or berthing facilities.

In Peleliu, household water wastage was reduced through the implementation of a leak detection and repair activity. An extensive awareness programme was conducted in 2014 and 2015 across the wider Palauan community focusing on water conservation.

Palau Public Utilities Corporation (PPUC) water operators went through a tailored certification training course developed with Hawaii Rural Water Association that included standard operating procedures designed to minimise impact on water sources, as well as monitoring of climate impacts.

The Climate Change Policy covers the environment sectors and should lead to environmental benefits in the longer term.

Visibility

The project benefited from having an awareness plan developed by the local television production company (Roll'em Productions, Oceania Television Network).

There have been extensive awareness activities done within Palau, including the Palau Wonder of Water (WOW) campaign, World Water Day, and Climate Change and Disaster Resilient Development Summit. All of these events had extensive coverage in the local media.

Rainwater tanks already installed have clearly visible stickers highlighting the EU. Signage at the Koska Well and water tanks in Angaur is still to be added.

The household water audits in Peleliu did not include any printed material, which is a missed opportunity in terms of providing residents reminders of water saving actions, as well as a means to provide visibility for the EU.

The project had a high level of national and regional media exposure through media releases (e.g. March 2015 SPC Media Release: *SPC and EU support south- south cooperation between Palau and Tonga*), articles in regional newsletters (e.g. SPREP 2015 Climate Change Matters: *Contractors in Palau trained in the installation of rainwater harvesting systems*), and presentations at regional and international events.

Video has been found to be one of the most useful forms of communicating project results and activities. The Palau video '*From coconuts to fresh water*' is one of nine country-specific videos in the series 'Climate Change Adaptation – the Pacific Way' and was shown extensively at regional meetings and on television throughout the Pacific on the Pacific Way. It is also available on YouTube.

A half day national lessons learnt meeting focusing on the water security adaptation activities including the NDBP program was held December 2015. A national lessons learnt workshop (February 2015) was held to enable the project team and local partners to identify and document lessons learnt. A regional workshop (September 2015) involving all SPC GGCA: PSIS project teams and other development partners provided a forum to share national and regional lessons.

Best practices & Recommendations

Best practices

1. HDPE tanks and first flush diverters represent best practice for rainwater harvesting systems.
2. The PWCI component provides a financially self-sustaining model to provide rainwater tanks, though its reach may be limited due to loan criteria.
3. National government sectors were appropriately consulted for the development of the Climate Change Policy, leading to a high level of ownership of the policy.
4. The use of experienced local consultants for components of the policy development process ensured that the local context and language was reflected in the final Climate Change Policy.

Recommendations

1. Projects should use the logical framework approach, in particular the problem analysis step, to clearly identify the core problem and purpose of the project.
2. Use the “rule of thumb” developed by the GCCA: PSIS project to realistically deliver projects in outer islands: carefully plan schedules and budgets and then multiply by 2.
3. Implement projects in one State at a time, or in adjacent States, and set realistic targets rather than being overambitious at the design stage.
4. Use behavioural change campaigns to shift behaviours and attitudes (e.g. fixing household leaks to reduce groundwater consumption).