Water for Life
Final Evaluation Report

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Pacific Resources for Education and Learning (PREL)

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EXECUTIVE SUMMARY

Funded by the National Science Foundation (NSF), *Water for Life* has completed its final year of a five-year full-scale development project designed to create and implement a community-based informal science education (ISE) program focused on water conservation and safe drinking water. The four main project locations included the Republic of the Marshall Islands (Majuro), two locations in the Federated States of Micronesia (Chuuk and Yap), and Palau. In each of these four locations, a few outer islands were also included in project activities.

David Heil & Associates, Inc. (DHA) served as the independent, third party evaluator on the project. This report covers project activity in the fifth and final year of the project. The primary focus of the report presents site-specific and general findings from a two-week site visit in late May and early June 2017 to active *Water for Life* project sites affiliated with each of the four primary locations. The qualitative data for the report was collected through project site observations, interviews, and facilitated discussions with a range of project stakeholders

in each location. Ethan Allen, *Water for Life* Project Director, accompanied the DHA evaluator on this trip. This provided an opportunity for daily reflections and discussions regarding the formative findings and insights as the trip progressed. As a result, much of the content of this report has been jointly experienced and previously considered through these reflective discussions. In addition to this site visit, the DHA evaluator attended an All Team Meeting of WfL project staff, advisors, and Core Team members from all four sites held in Palau in September 2016. The first section of this report summarizes participant feedback and evaluator insights from this five-day reporting and planning event.

The *Water for Life* project was implemented in communities with unique characteristics and challenges. In each location, there were cultural, economic, environmental, and behavioral factors to consider. That said, in literally every location where the project has made an impact, the potential for further increasing water conservation and improving the quality of available drinking water continues to be significant. The *Water for Life* project has proven to be a catalyst for local collaboration, community engagement, and changing long held practices around water retention and use. There have been many challenges over the past five years, and the project team has continued to work through these challenges by experimenting with various models for informal science message delivery and public engagement. Investments in on-the-ground infrastructure have also been a hallmark of the project, including improving existing water catchment systems, natural springs, and introducing new technologies and methodologies for water collection, retention and ensuring safe drinking water quality. The project has also focused on monitoring and testing of drinking water sources, and has laid the foundation for ongoing engagement of local youth and other residents in this work.

Two of the more persistent challenges faced by the project were the tendency for local residents to prefer traditional water sources, even when they are at risk for contamination, and the tendency for residents (and government agencies) to ignore the need for regular maintenance and repairs of water-related infrastructure. Together, these two conditions create a number of related issues regarding water conservation and safe drinking water. In 2016 a number of islands in the Pacific experienced severe drought conditions, which amplified the need for better water conservation practices and infrastructure. The tendency for government agencies to be lax in their monitoring and maintenance of public water supplies led to some rather challenging situations as reservoir levels declined and water consumption was not decreased accordingly. This was especially true in Palau.

During the project's final year, the *Water for Life* sites continued making progress addressing recommendations made in the third and forth year evaluation reports—increasing public awareness and understanding of local water issues and the *Water for Life* project through informal science education events, signage, and water-related workshops; and through model projects designed to improve water-related infrastructure and water quality on each participating island. Core Team members at each site continued to be engaged and to leverage their home organizations to contribute to *Water for Life* initiatives.

During the 2016 site visits, DHA was able to identify 1-3 signature activities at each site that were emerging as *Water for Life* models, suitable for implementation at other project sites or in other island communities across the Pacific. Educational signage has been developed and distributed to each of the four project sites to ensure ongoing, community-based informal science learning and provide a vehicle for promoting improved water catchment systems,

improved surface and spring water resources, and effective temporary installations of Bob Bags. Majuro made the most progress in training local teams of youth and adults (called Water Quality Management Teams – WQMT) on how to properly monitor and test local water sources, primarily at local schools as well as the communities where students live. This approach has now been adopted by two of the other WfL sites. The *Water for Life* handbook has proven to be a popular and valuable resource for trainings and has been distributed to educators and other stakeholders in each of the four project locations. In 2016 DHA developed a suite of forms and scoring rubrics for assisting project staff in identifying and assessing potential new investments in infrastructure, events, and specific products like classroom curricula. These forms were first introduced during the February 2016 site visits but were used specifically by Core Teams from each site during the All Team Meeting to develop plans for the final year of the project.

In this report, as in previous reports, DHA has referenced a variety of examples of local *Water for Life* project activities and collaborations. Collectively, they make up a representative sample of the larger roster of site-specific activities initiated during the past five years. Based on the evaluation findings in this report, as well as previous findings in years 1-4, the following recommendations are provided to focus the project staff's attention on key lessons learned over the past five years, as well as areas that show significant potential if additional funding were secured and/or the models developed and tested during this five year project were to be expanded to other island locations across the Pacific.

Recommendations

1. Collaborate with local partners for planning, implementation, and follow-up
2. Establish accountability across all project channels
3. Include maintenance, repair, and replacement costs in any future project budget
4. Document project activities and lessons learned early and often
5. Actively engage both youth and adults in project planning and implementation
6. Incorporate educational messages and materials into all project activities
7. Use a uniform rubric for selecting suitable project activities
8. Seek additional funding to introduce WfL model on other water insecure islands

INTRODUCTION

Funded by the National Science Foundation (NSF), *Water for Life* was a five-year full-scale development project designed to create and implement a community-based informal science education (ISE) program for youth and adults. Through on-the-ground infrastructure investments, professional development, education and community service learning, the project sought to meet some key challenges faced by residents of four Pacific Island entities in the Freely Associated States (FAS): Marshall Islands (Majuro), Chuuk, Yap and Palau. Key challenges in these locations included the scarcity of fresh water, limited access to consistently clean and safe drinking water, persistent patterns of little or no maintenance of infrastructure, and the lack of a capacity for sustainable ISE in the FAS.

During the first year of the project, a Core Team of regional education and community leaders was identified to serve as key advocates and promoters of water-related ISE and service learning projects in their region. Most of the Core Team members participated in an intensive professional development workshop in May of 2013, and subsequently were asked to help lead ISE 'short courses' and extended ISE around water for cohorts of other educators and community professionals. Pairs or teams from these cohorts were to identify local water needs and engage community and youth groups in locally developed and delivered ISE, as well as develop local service learning projects addressing those needs.

In the second year of the project, progress was limited to a few community meetings, participation in community-based water-related celebrations and festivals, and a couple of on-the-ground water source improvements and/or installations of innovative devices for helping keep drinking water clean and safe. Near the end of Year 2, the project director requested that each site identify a few key projects that could be invested in over the next 3-6 months. Project staff submitted brief plans for each project and PREL released project funds for equipment, materials, contract services and boat rental to access remote island project sites. In addition, the project director designed and printed *Water for Life* branded large format colored posters for distribution across each island where *Water for Life* was engaged. These posters have proven to be both visible evidence of the *Water for Life* footprint, and an educational resource for these communities with very limited vehicles for information dissemination. Even in the fifth year of the project, there are still posters visible in some schools and community locations.

In the fall of 2014, each site had 2-3 on-the-ground projects in progress and the level of community engagement was increasing, mostly around the designated projects. Posters were distributed to each site and plans were being made for creation of a manual for water conservation to be authored by Ethan Allen, *Water for Life* Project Director and Danko Taborosi, a co-PI and expert consultant on the *Water for Life* project. This publication was completed in 2015 and printed as a *Water for Life* handbook, and has proven to be a very valuable and well-received resource wherever it has been introduced.

In order to capture formative evaluation data and observe *Water for Life* project activity directly, David Heil, President of David Heil & Associates, Inc. (DHA), the independent evaluator on the project, and Ethan Allen, *Water for Life* Project Director, made a two-week site visit trip in early 2015. The content of the third year evaluation report was based

primarily on the insights and observations acquired during this trip, which was conducted January 28–February 9, 2015.

To further evaluate project activities and progress, David Heil and Ethan Allen made a second trip together in early 2016 (February 8–19, 2016) to all four of the project sites. The Year 4 Evaluation Report was based on observations and data collection from this trip. In addition, the NSF funded a Supplemental Award titled *Food, Energy, & Water: Leveraging and Organizing Toward Self-Sustainability* (FEW-LOTS) that got underway in late 2015. While in Majuro in February, initial observations and interviews were conducted in conjunction with this pilot effort. David Heil joined Ethan Allen and Ming Wei Koh, the FEW-LOTS project coordinator, in Majuro from May 11-13, 2016 for additional observations and data collection in relation to the FEW-LOTS pilot. The last section of the Year 4 Report focused specifically on FEW-LOTS, including program goals, evaluation methodology, findings, and recommendations.

WfL Program Goals

Water for Life program goals are presented in the program logic model below. Short-term and medium-term goals of the project were to engage learners and enhance their understanding of water science and their use of scientific reasoning and the tools and language of science; heightened awareness of community needs and ability to take meaningful action to address those needs; increased capacity for ISE opportunities for island youth; and more efficient use and less waste of water resources. The key long-term goal of *Water for Life* was to improve the quality of life in these island states through increased community-based water literacy, stewardship, safe collection and storage of drinking water, monitoring for water quality, and conservation of water resources.

Essentially, the broad program goals were three-fold. Through partnerships with existing programs:

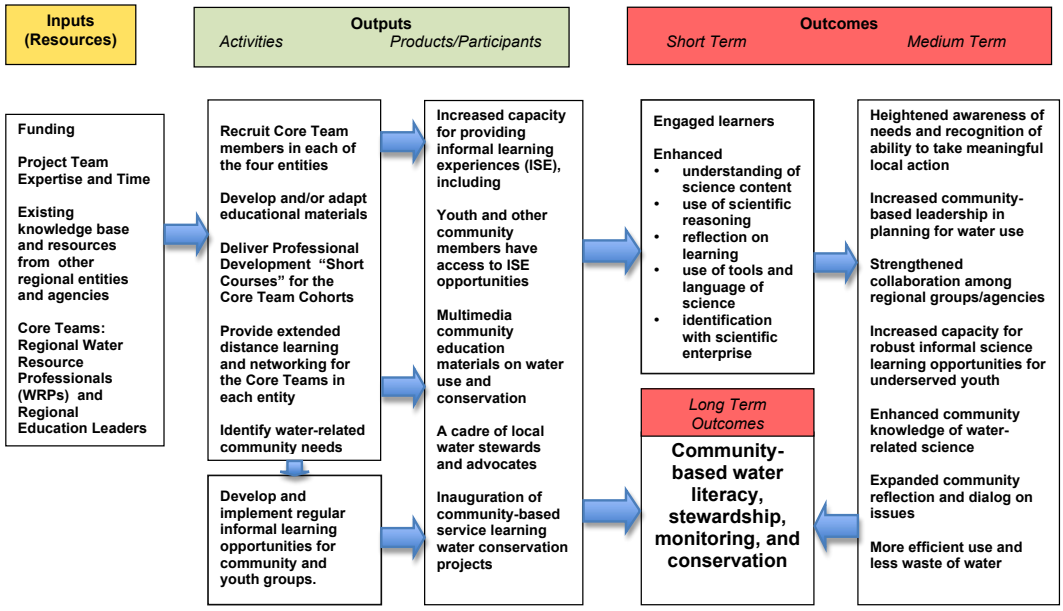
1. Develop infrastructure to increase informal science education opportunities for island populations
2. Promote understanding of water science and water issues within these populations
3. Promote conservation and increased availability of quality water resources in the participating island communities.

The following logic model summarizes the inputs, outputs, and intended outcomes from the project.

Water for Life Logic Model

David Heil & Associates, Inc. (DHA) will serve as the external evaluator for the PREL/NSF project *Water for Life.* DHA offers a utilization-focused approach to evaluations and will work closely with the *Water for Life* project team to assist with evaluation planning and implementation in a way that best meets project needs. To ensure that evaluation activities support project development and are appropriately designed to measure the project's impacts, DHA has developed a detailed evaluation plan for the project that includes the logic model shown below.

Program Goal: The primary goal of *Water for Life* is to help Freely Associated States (Pacific Islands) individuals and organizations build ISE capacity by developing locally-relevant, broad-based, self-sustaining "water literacy" among both youth and adults.



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Methodology

During each site visit, including a final visit in May/June 2017, the DHA evaluator conducted on-site observations; interviews with key project staff, Core Team members, partners, and other local stakeholders; small group facilitated meetings with partners and stakeholders; and visited on-the-ground project sites and installations. Photos were taken at most of the project sites, with special emphasis on capturing the nature of project work in locations with limited resources and, often, remote locales. Interviews and facilitated meetings were conducted using a set of questions designed to capture both the participant perspectives, but also key lessons learned and challenges remaining as the project moved forward each year, and in 2017, began its final few months of activity.

Questions for *Water for Life* project staff:

1. What are your primary responsibilities related to the *Water for Life* project?
2. What were the major activities/accomplishments in the past year?
3. How have you engaged local Core Team members and other partners in your work?
4. How have recommendations articulated in the Year 3 and 4 Evaluation Reports been addressed and/or advanced in the past year?
5. What were the major challenges in Year 5, and how were these overcome?
6. What are your plans for sustaining the activities and impacts of this project?

Questions for *Water for Life* Core Team members:

1. How often has the Core Team met in the past year?
2. In your opinion and perspective as a Core Team member, what were the major activities/accomplishments in the past year?
3. In your opinion and perspective as a Core Team member, what were the major challenges faced in the past year and how were these overcome?
4. How have local partners been engaged in the past year?
5. Any new partners?
6. From your perspective as a Core Team member, have project resources been adequate to accomplish local activities in the past year?
7. How have Year 3/4 recommendations been addressed/advanced in the past year?
8. What are the Core Team's plans for sustaining the project's activities and impacts?

Questions for *Water for Life* partners and other stakeholders:

1. What has been your involvement/role with *Water for Life* this past year?
2. What local interests/needs are being addressed by the *Water for Life* project?
3. In your opinion, what were the major project accomplishments in the past year?
4. In your opinion, what were the major challenges faced in the past year and how were these overcome?
5. From your perspective, have project resources been adequate to accomplish local activities?
6. What would you like to see happen during the final few months of the *Water for Life* project?
7. How will you and/or your organization help sustain *Water for Life* activities and impact in the community?
8. Have you shared your Water for Life experiences with others?

For each of the evaluation trips, DHA relied on the *Water for Life* project director and local PREL staff assigned to the project to assist in setting up interviews, small group meetings, and site visits in each location. During the course of each two-week trip, numerous schedule adjustments were made to accommodate local stakeholder availability and/or access to project sites, as well as a few spontaneous meetings and field excursions to take advantage of a particular stakeholder's availability or access to a site. In most settings, DHA used a digital audio recording device to record the discussions and took written notes to augment the recordings and/or document certain aspects of the discussion. Following the site visits, audio recordings collected in the field were then transcribed by a professional firm, which produces typed transcriptions for evaluator reference. Digital photos taken in the field were stored for evaluator reference and reporting.

Scheduling the first evaluation trip so that the DHA evaluator and the *Water for Life* project director could travel together facilitated formative evaluation on multiple fronts, and this arrangement was repeated in subsequent years to capitalize on these benefits. First, the evaluator and project director were able to debrief each day of the trip, reflecting on what both had heard, seen, and understood from the day's activities. Second, the project director's

familiarity with local project personnel, locations, and activities helped ensure efficient use of the evaluator's time in the field. And third, it was possible to make observations on one day and suggestions to team members the next, greatly facilitating the formative process of taking lessons learned and making project improvements based on those lessons. Given the significant distance the *Water for Life* sites are from PREL headquarters in Honolulu, and the infrequent direct contact that local project staff have with the project director, it has proven to be both efficient and effective to make some recommendations and suggestions to project staff during each site visit. Over the course of this project, it has become increasingly clear that face-to-face time with *Water for Life* project staff and site coordinators in the field has been the most effective way to collect data and observe on-the-ground project activities for evaluation. DHA applied this approach for documenting project activities and impacts over the course of the project.

All Teams Meeting – September 5-9, 2016

In September 2016 an All Teams Meeting was held in Palau. This gathering included project staff, Core Team members from each site, and a few of the project's advisors. The focus of the agenda was to share WfL progress-to-date and develop work plans for the fifth and final year of the project. David Heil, lead project evaluator, attended the five-day meeting to observe, conduct select attendee interviews, and to facilitate data collection during the meeting as well as orient attendees to future data gathering tasks in year 5.

Each project site reported on their accomplishments to-date, and key lessons learned. Site Coordinators also spent time with their Core Team members to identify, prioritize, and develop work plans for their remaining project activities. Teams used the Assessment Forms developed by DHA in Year 4 to document their plans and estimate budgetary needs.

On the second day of the All Teams meeting, DHA facilitated a focus group discussion with three of the project's Advisors attending the meeting. During this discussion, they shared some of their own observations of project progress to-date, acknowledged some of the challenges facing water quality improvements in the islands, and offered some suggestions for future investment. All of the advisors agreed that local partnerships have been integral in advancing the WfL goals. While the Ministries of Education in most sites have been supportive and in some cases even joined in helping implement WfL activities, one advisor pointed out that another agency that should be involved more is the Ministry of Health. This was seen as a way to further leverage WfL's emphasis on safe drinking water with an agency that deals with many of the health-related problems associated with poor quality water. The advisors also agreed that if water quality and conservation efforts were to be undertaken on more outer islands, the budgets would need to reflect additional costs for safe and secure materials storage, transportation (usually by boat), as well as personnel responsible for on-site project planning and supervision. If training local residents on water testing is planned, then getting a qualified trainer to the outer islands is a necessity, but this can be a time-consuming and costly investment.

"I want to stay away from politics….when one party is in control they control the materials and water sources. Later it's another party. I want to deal with lay people who live on the island all year. They will take care of a water source and share it with others."

WfL Advisor

When asked to rate WfL progress to-date, all three advisors offered scores in the 5-7 range. While some great things have happened over the past five years, they are keenly aware that much more needs to be done to ensure sustainably clean water for all island residents.

When pressed to identify the most important area for future investment, all three agreed that education was key, and that training teachers to be on-going advocates for water quality and conservation was critical. Second priority was ensuring that there be funds to support designated personnel to this effort – for coordinating activities, managing collaborations, and "just getting all the work done!" Maintaining and even expanding the partnerships that have been forged as a part of the WfL initiative was also a high priority. Advisors acknowledged that little could be accomplished without partner involved, especially as NSF support comes to an end. In particular, Ministries of Education, the EPA, and other local agencies responsible for water resources on each island need to be continually re-engaged, and they will need to assign staff time and budgeted dollars for on-going public education and monitoring of water quality at locations where WfL has already invested in infrastructure. One memorable quote from the discussion was, "It's important to have people in positions of authority on board, so they can leverage local resources." Finally, for those sites where infrastructure investments have been made, the advisors felt it was essential to have a Memorandum of Understanding (MOU) with local authorities, agencies, and land-owners about who would maintain the sites and ensure that the public would have access at all times.

At the completion of the 5-day meeting, DHA administered a survey to all attendees. Table 1 below summarizes their responses. All of the attendees agreed that the WfL project is addressing important island water issues. There was also a high level of agreement that WfL has both created new partnerships and strengthened existing partnerships around water quality, conservation, and education. There was less agreement on whether WfL financial resources had been adequate for accomplishing local project activities as well as travel and lodging for the All Teams meeting. And there were mixed responses regarding the role that Internet connectivity (or lack thereof) had on communication during the WfL project. It should be noted that Internet connectivity in the islands is still quite slow compared to mainland US speeds, and inconsistent coverage and/or power outages lead to additional challenges for both Internet and phone communications. In general, the attendees felt that the All Teams meeting was a valuable opportunity to learn more about the WfL project, network with other WfL staff, Core Team members and advisors, and to plan with their local project teams. Most attendees also felt that WfL programs, products and services would be valuable resources for other Pacific Islands and rural populations.

Table 1: All Teams Meeting Attendees. 1 = Strongly Disagree and 5 = Strongly Agree (n=21)

Level of agreement with the following statements	NA	1	2	3	4	5
The WfL project is addressing important island water issues	0	0	0	0	10	11
The WfL project is creating valuable new local partnerships and collaborations around water quality, conservation, and education	0	0	0	1	6	14
The WfL project has strengthened existing local partnerships and collaborations	0	0	0	2	9	10
WfL educational programs, products, and services are valuable resources for supplementing local school science resources and curricula	0	0	0	2	8	11
WfL educational programs, products and services are valuable resources for community outreach and informal science education	0	0	0	1	12	8
WfL grant funds have allowed investments in local infrastructure for informal science education and improving water quality that would not otherwise be possible with only local funds	0	0	0	2	13	6
WfL financial resources have been adequate for accomplishing local project activities	0	1	3	5	9	3
I have a good understanding of all WfL programs, products and services	0	0	0	4	11	6
Local island Internet connectivity makes online posting and digital communication about the WfL project difficult	0	1	2	7	6	5
WfL programs, products, and services would be valuable resources for other Pacific Islands and rural populations	0	0	0	3	4	14
The 2016 WfL All Team meeting has been a valuable opportunity to learn more about the WfL project	0	0	0	1	2	18
The 2016 WfL All Team meeting has been a valuable opportunity to network with other WfL project staff, core team members, and advisors	0	0	0	2	4	15
The 2016 WfL All Team meeting provided valuable time for me to plan Year 5 project activities with my project team	0	0	0	2	8	11
Local travel, lodging for the 2016 WfL All Team meeting were adequate	3	0	1	1	6	10

Since each of the four main sites for WfL implementation and coordination are unique in many ways, the same data has been presented *by island* in Figure 1 below. While the attendees from Palau had a high degree of agreement with most statements, unfortunately only three from Palau were present to complete the survey. The Yap team was also small, but it included their local site coordinator as well as three Core Team members. Variations by island may be a reflection of the types of WfL activities implemented on their particular island, or the nature of their local island communities and collaborations. Variation in response may also be a factor of the specific role played by any one attendee – staff, Core Team member, advisor, etc. To assess perspectives by role, see Figure 2 below.

Figure 1: Attendee Responses By Island. Percent selecting "Strongly Agree" or "Agree" (n=21)

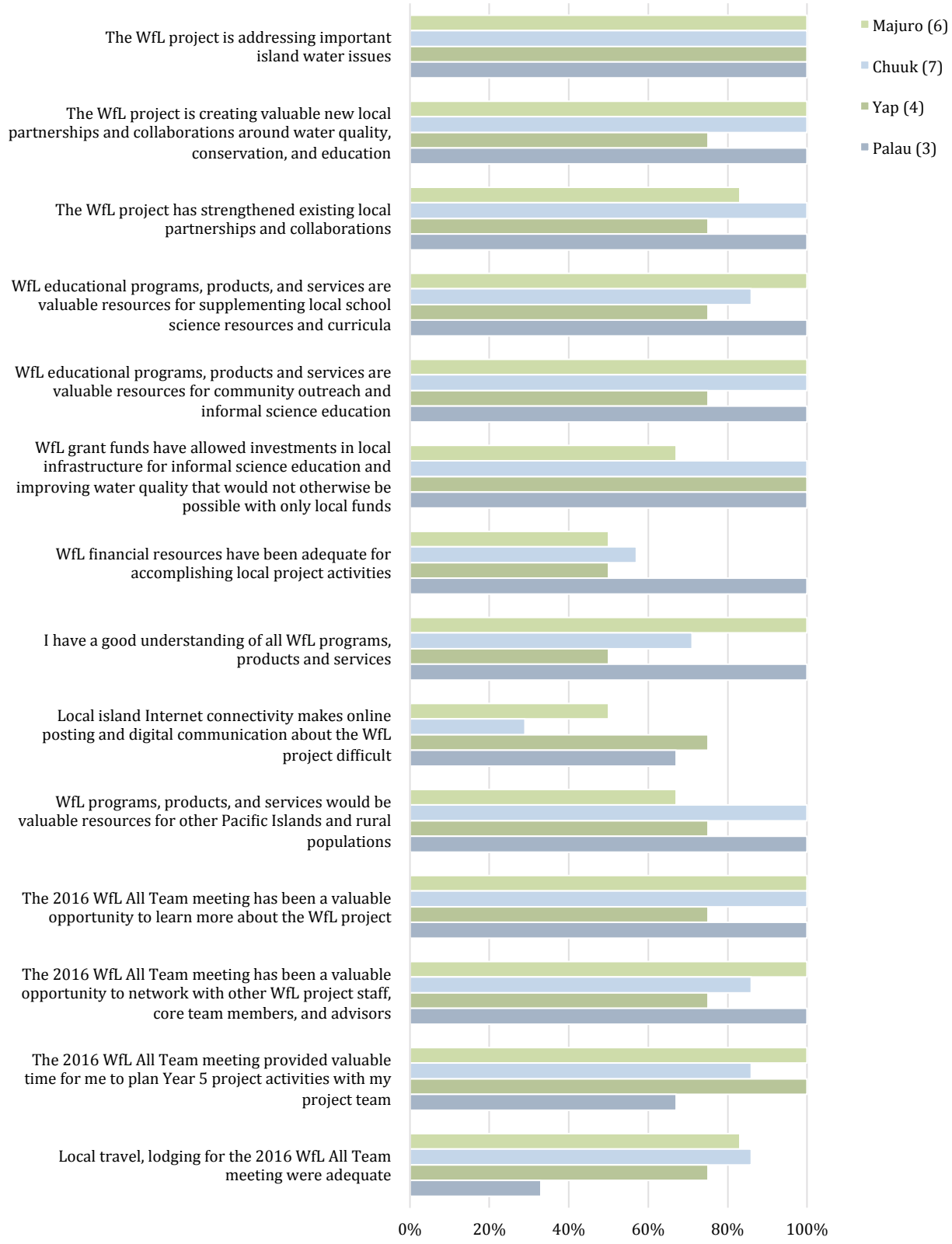
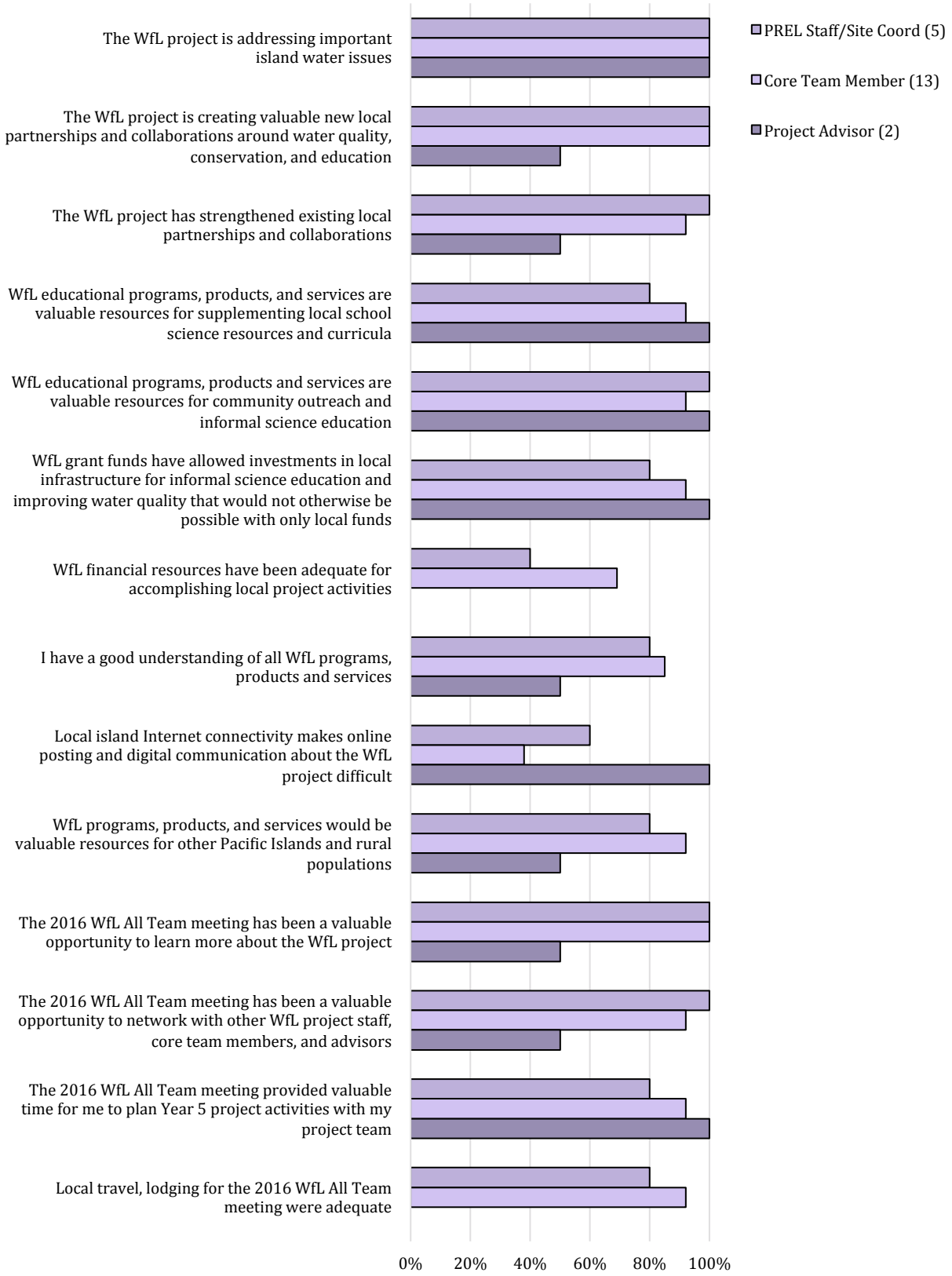


Figure 2: Attendee Responses Divided By Role. Percent selecting "Strongly Agree" or "Agree" (n=21)



Water For Life Handbook Trainings

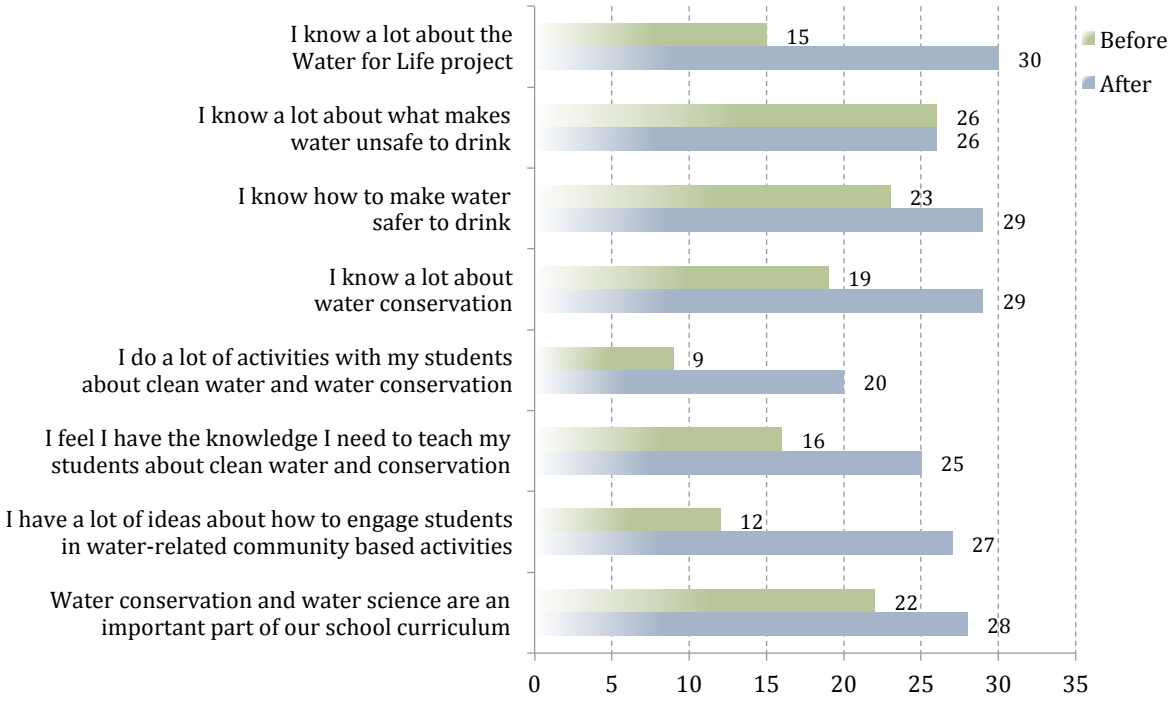
As part of the All Teams meeting, Palau invited local educators to join the meeting attendees in a four-hour hands-on workshop using the Water For Life Handbook. Ming Wei, a PREL staff member actively engaged in water related projects, facilitated the workshop. This was an excellent opportunity for a broad spectrum of WfL stakeholders to interact together in a training environment. At the completion of the workshop, DHA administered a survey to all participants. Table 2 below summarizes the responses.

Table 2: WfL Handbook Workshop Participants - Palau - September 2016 (n=35)

Statements	N/A or Blank	Strongly Disagree	Sort of Disagree	Neutral	Agree	Strongly Agree
The quality of my water source is very good and safe to drink	0	2	9	5	12	7
Where I live we have municipal water that is safe to drink	1	4	12	5	8	5
I know a lot about the water quality on my island	0	0	1	10	11	13
The workshop was well organized	0	0	0	4	13	18
The workshop materials were well designed and will help me in my work	7	0	0	3	7	18
The workshop presenters interacted with me and other participants	6	0	0	3	3	23

Participants were also asked to rate their level of agreement before and after the workshop to a series of statements about their knowledge of the WfL project and water conservation and education. Figure 3 below shows significant gains in overall understanding.

Figure 3: Palau Workshop - Number of Respondents Selecting "Strongly Agree" or "Agree" (n=34)

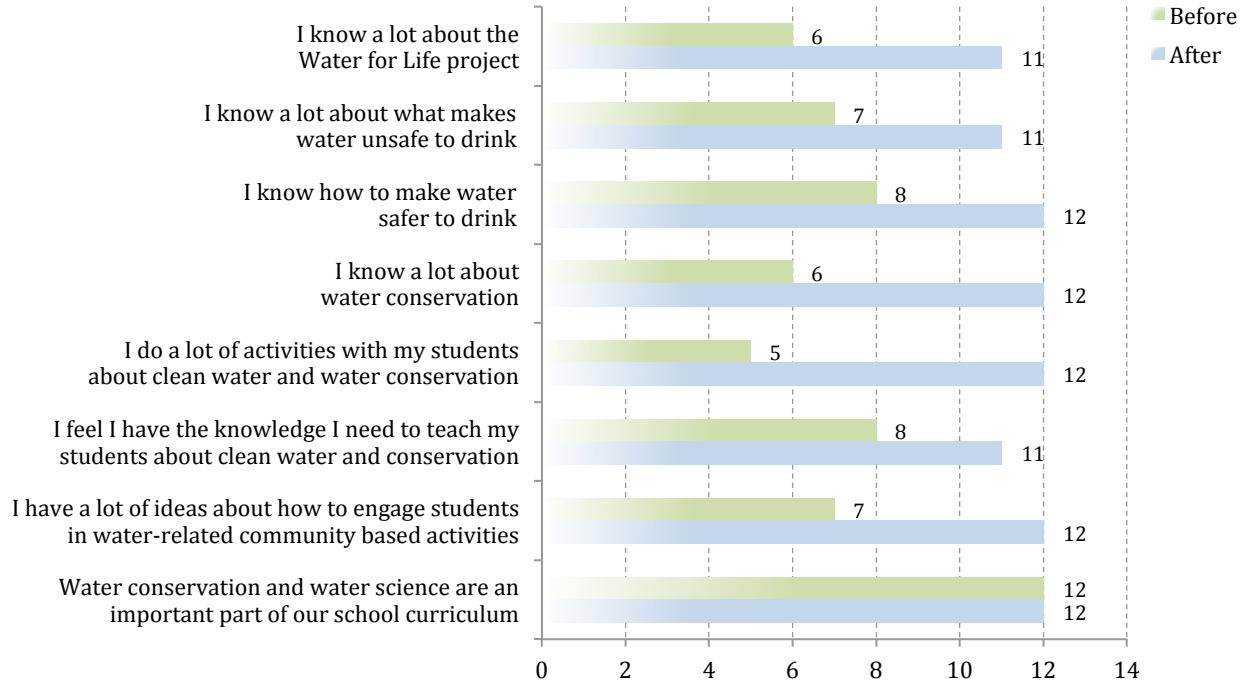


In October of 2016 another Water For Life Handbook Workshop was conducted in Chuuk. This was also facilitated by Ming Wei and served primarily local educators. Table 3 below summarizes the participants' feedback on the workshop itself as well as the quality of their drinking water. Figure 4 shows, again, the significant change in participant knowledge and confidence teaching about water quality as a result of the workshop.

Table 3: WfL Handbook Workshop Participants - Chuuk- October 2016 (n=13)

Statements	Strongly Disagree	Sort of Disagree	Neutral	Agree	Strongly Agree
The quality of my water source is very good and safe to drink	2	1	3	5	2
Where I live we have municipal water that is safe to drink	5	0	1	5	2
I know a lot about the water quality on my island	0	0	2	8	3
The workshop was well organized	0	0	1	4	8
The workshop materials were well designed and will help me in my work	0	0	0	3	10
The workshop presenters interacted with me and other participants	0	0	0	3	10

Figure 4: Chuuk Workshop - Number of Respondents Selecting "Strongly Agree" or "Agree."



Site-Specific Observations and Findings

As in past evaluation reports, in this section DHA will highlight site-specific observations and findings for the four main project locations. For this final report, the focus will be on key activities that are representative of the work in each site, or illustrate progress that has been made toward implementing a particular signature element that has potential for broader dissemination and impact.

MAJURO (Marshall Islands)
PREL *Water for Life* Coordinator: Evelyn Joseph.

Majuro continues to demonstrate the most consistent execution of their WfL activity plans. Since the first year of the project, Evelyn Joseph, the PREL staff coordinator in Majuro, has worked closely with the Ministry of Education to assist schools with infrastructure installations and trainings to ensure sustainably safe drinking water resources for students, faculty, and even the families that live nearby. She has also done an excellent job of documenting her work, taking photos, and reporting progress to the project director.

In the photo above, she is showing WfL Project Director Ethan Allen a large project photo board that is located in the hallway between her office and the Ministry of Education's offices, a proximity that has proven to be an asset in nurturing and sustaining the collaborative work with the local schools.

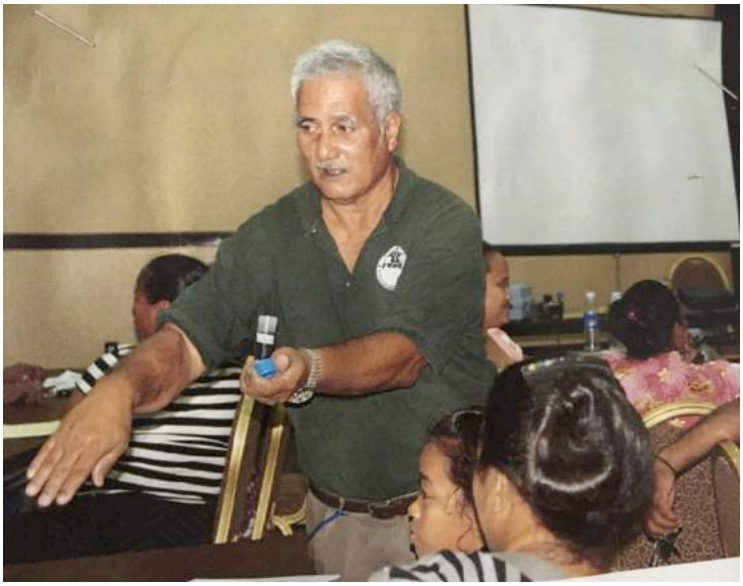
To-date, over a dozen schools have benefited from a range of infrastructure investments - from cleaning out old water catchment tanks, roofs and gutters; to installation of First Flush Diverters, new tanks, and in one case a UV filter device for a High School kitchen.

Above and below are a series of photos showing one of these school installations. Notice the clean metal roof, new white gutter, and the long pipe flowing toward the new green holding tank. In the close-up you can see the First Flush Diverter (FFD) device with its drain near the base of the tank. Also, affixed to the side of the tank is WfL signage that explains how this water catchment system works, so that children at the school and families that draw water from this tank will have on-going informal education about clean water catchment systems.

The photo on the right is a close-up of the signage explaining the science and technology applications associated with a First Flush Diverter installation.

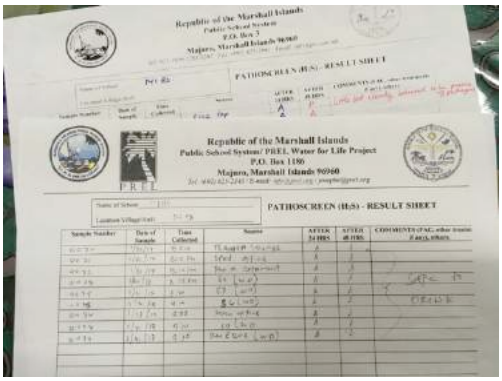
In the photo below, Evelyn is standing next to another school water catchment installation with FFD that was started in the third year of the project, has been properly maintained for the past three years, and now is complete with informal education signage.

One of the greatest challenges identified early in this project was the persistent lack of regular maintenance and monitoring of clean water sources. This was not just an issue for Majuro, but is prevalent on literally every island location where WfL has been involved. Recommendations were made in previous evaluation reports to actively engage students and local citizens in helping maintain and monitor their water systems once improved. Evelyn has done a remarkable job of advancing this recommendation by first helping to establish WfL Science Clubs at the Middle and High School level where students learned water science and water testing techniques and then applied their knowledge to begin testing water sources at their school. This evolved into the formation of Water Quality Management Teams (WQMT) at each of the schools that have received WfL assistance. Each team is made up of students, teachers, and local residents who benefit from the improved water resource. In collaboration with the EPA, these teams have been trained on how to properly maintain their water systems, and on monitoring the quality of their water using a HACH water testing kit (see photo above). In the photo below a local WQMT proudly displays their training certificates following the completion of their training.

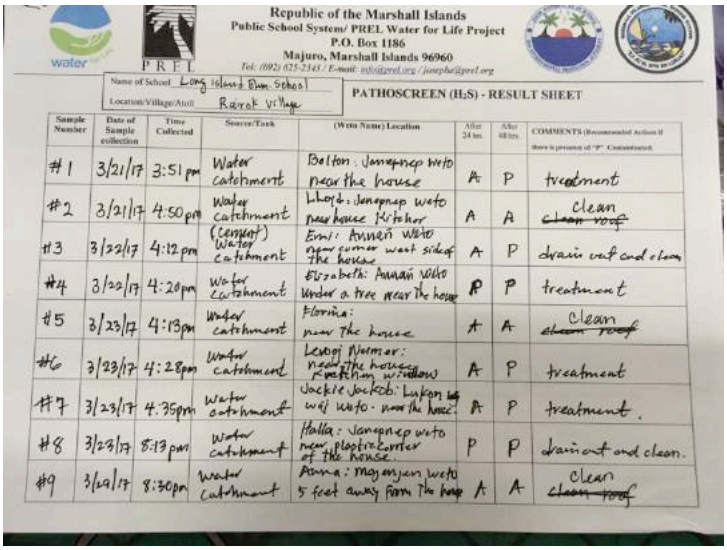


While DHA was visiting Majuro in May 2017, some of these teams were invited to present their work and share some of the lessons learned to-date. Principals from each of the schools were also on hand to report on their water quality efforts. The photos below show this gathering as well as one of the reporting teams with their principal.

Now that these WQMT are in place, they are regularly testing the water quality in the schools. This includes both the water directly from the tanks, as well as tap sources within the building. Data from these tests are being compiled and reviewed and when a water source appears to be contaminated, action is taken to clean the source and re-test.


Republic of the Marshall Islands
Public School System/ PREL Water for Life Project
P.O. Box 1186
Majuro, Marshall Islands 96960

PATHOSCREEN (H_2S) - RESULT SHEET


Republic of the Marshall Islands
Public School System/ PREL Water for Life Project
P.O. Box 1186
Majuro, Marshall Islands 96960

Name of School: Long Island Elem. School
Location/Village/Atoll: Rarok Village

PATHOSCREEN (H_2S) - RESULT SHEET

Sample Number	Date of Sample collection	Time Collected	Source/Tank	(Write Name) Location	After 24 hrs.	After 48 hrs.	COMMENTS (Recommended Action if there is presence of "P" Contamination)
#1	3/21/17	3:51 pm	Water catchment	Bolton: Jamepnep weto near the house	A	P	treatment
#2	3/21/17	4:50 pm	Water catchment	Lhoyd: Jamepnep weto near house Kitchen	A	A	clean ~~clean roof~~
#3	3/22/17	4:12 pm	(cement) Water catchment	Emi: Annein weto agaw corner west side of the house	A	P	drain roof and clean
#4	3/22/17	4:20 pm	Water catchment	Elizabeta: Annain weto under a tree near the house	P	P	treatment
#5	3/23/17	4:13 pm	Water catchment	Florina: near the house	A	A	clean ~~clean roof~~
#6	3/23/17	4:28 pm	Water catchment	Lesloj Normor: near the house Kwathan window	A	P	treatment
#7	3/23/17	4:35pm	Water catchment	Jackie Jacksb: Lukon ko wei weto. near the house.	A	P	treatment.
#8	3/23/17	5:13 pm	Water catchment	Hallia: Jamepnep weto near plastic corner of the house.	P	P	drain roof and clean.
#9	3/29/17	8:30pm	Water catchment	Anna: Majanjan weto 5 feet away from the house	A	A	clean ~~clean roof~~

The impact from these school-site investments has been significant. Nearly 8,000 youth and an additional 700 faculty and staff now have access to regularly monitored drinking water. And, their catchment systems and holding tanks are being kept cleaner, so there are fewer instances of poor quality water. In addition, families that live near the school also have access to these water sources, extending the impact even further. Local teachers have been trained using the Water For Life Handbook, and are now incorporating water science and clean water technology topics into their curriculum so future generations of island residents will have the knowledge and the capacity (through their WQMT) to maintain their clean water sources. This hallmark of the RMI project has been so successful that versions of the WQMT model are being implemented in two of the other WfL sites – Yap and Palau.

Evelyn has also spear headed incorporation of water-related topics and displays into the annual Science Fair. All Majuro schools participate, and parents and the general public are invited to tour the fair to see the students' work. In just the past three years the number of youth impacted through these fairs has climbed from 5,500 to over 6,500. Adult exposure has gone from 900 in 2015 to nearly 1,140 in 2017.

This site also is heavily involved in helping support and host World Water Day events and activities. Since 2014 the number of participants in these events has nearly doubled, with youth participation climbing from 2,670 in 2014 to 5,140 in 2016. In 2017 WfL sponsored a water awareness radio announcement that reached approximately 30,000 RMI residents of all ages.

Two more efforts by the WfL team in Majuro have resulted in even greater public impact. First, arrangements were made to hang large-format signage on bus stop shelters around town. These bus stops are used frequently by students, as well as the general public. It is estimated that over 22,000 youth and over 33,000 other island residents are being exposed to these messages, with WfL branding in conjunction with other collaborating agencies and clean water advocacy organizations. See photo at left.

Second, a very large-format mural was commissioned by WfL in cooperation with a handful of other RMI water projects, that was installed with student labor and art at the largest high school on the island. The mural illustrates a number of key clean water messages, including how to sterilize drinking water with mild bleach solution (the recipe of which is depicted in the mural itself) and how a clean rainwater catchment system works. This mural is seen daily by nearly 4,000 youth, as well as other island residents passing by the high school on their way to work, shopping, etc. See photos below.

On a much smaller scale, during the 4th year of the project a new water purification material became available called MadiDrops. These are micro porous, water permeable ceramic tablets that are then infused with microscopic silver clusters, which serve as an effective prevention from waterborne illness and disease, without changing the taste or smell of the water. During the drought each WfL site was provided a small stock of these tablets primarily for emergency use in water stressed settings. The outer islands were particularly vulnerable, so most of these supplies were distributed to small villages on these islands. Since it was a relatively new technology, Evelyn chose to set up a MadiDrop station at her office using a standard office water carboy to help inform staff and guests about the material. It has been in place for almost a year and not only provides safe drinking water for 4-6 months per tablet, it also stimulates informal education discussions about clean water!

In conversations with the Ministry of Education representatives, DHA witnessed their enthusiasm for the WfL project, and documented their verbal commitment to incorporate maintenance and supplies into future annual school operating budgets to ensure on-going support for the WQMT and clean water for their schools.

During the site-visit in May, DHA sat down with a few of the Core Team members to discuss the project's progress-to-date and any challenges that still remain. The group included representatives from the EPA and the Majuro Water & Sewer Company, two agencies responsible for supplying and monitoring drinking water in the Marshall Islands. These agencies, along with the Ministry of Education, have also provided in-kind employee labor hours to help clean, refurbish, and/or install new water catchment systems in the local schools. They all commented on how important the collaborations were to making WfL the success that it is. In particular, they were pleased with the training of youth and adults to make up the WQMT and the prospect of on-going monitoring of school drinking water.

"Some of the school principals are becoming very good stewards of their own drinking water. This is a definite change in attitude toward water"

RMI Core Team Member

When asked to identify remaining challenges associated with water quality, there were a number of areas of agreement. First, the investments already made will need to be maintained. This was considered critical on all levels. Two examples of maintenance challenges are illustrated in the photos below. On the left is a photo of four catchment tanks at the High School, the two in the center are relatively new. WfL installed a FFD on this group of tanks a year ago, but the water kept testing contaminated due to dirty tanks. After a year of bad test results the tanks were simply abandoned for drinking water and the FFD removed. The photo on the right illustrates a small but significant maintenance issue. The small plug that goes at the bottom of the vertical pipe on a FFD installation needs to be in place in order for the system to work properly. Unfortunately that plug is a temptation and has been removed, most likely by a student at the school. Without a replacement plug, the system simply drains all the water out on the ground, preventing the school from collecting any of the water from their roof. If the plug is not replaced it's likely this system will be dismantled, removing the FFD in favor of collecting water, even if it ends up being contaminated.

Second, the group would like to see more households have access to clean water. Currently in Majuro only 25% of the households are on the municipal water system. So, they see education and role modeling through the schools as an essential vehicle for educating the next generations about the importance of clean, safe drinking water. They greatly value the collaborations that have been fostered by the WfL project and hope that these can remain active and productive in the future. One Core Team member summed it up by saying "It's like the water cycle itself….we need to sustain the multi-generational values of clean water"

During each site visit in 2017 DHA had various stakeholders complete a short survey form related to the WfL project. Respondents ranged from Core Team members to cooperating agency personnel. Table 4 below summarizes survey response in Majuro. As the numbers indicate, most respondents felt that the WfL project has addressed important water issues and provided valuable resources to both the schools and the community. There was less agreement, or perhaps simply less awareness, of the level of financial support necessary to

accomplish local project activities (eleven of the respondents left this item blank). And confidence declined a bit when asked to assess the likelihood that project activities would continue after current grant funding had ended.

Table 4: Majuro Stakeholder Survey Responses (n=17)

Statements	Blank	N/A	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
The WfL project addressed important island water issues	0	0	0	1	0	2	14
The WfL project created valuable new local partnerships and collaborations around water quality, conservation, and education	0	0	0	0	1	3	13
The WfL project has strengthened existing local partnerships and collaborations	0	0	0	0	1	5	11
WfL educational programs, products, and services are valuable resources for supplementing local school science resources	0	0	0	0	0	3	14
WfL educational programs, products, and services are valuable resources for community outreach and informal science education	0	0	0	0	0	4	13
WfL grant funds have allowed investments in local infrastructure for informal science education and improving water quality that would not otherwise be possible with only local funds	0	0	0	0	3	4	10
WfL financial resources have been adequate for accomplishing local project activities	11	0	1	0	0	2	3
I have a good understanding of all WfL programs, products, services	1	0	0	1	1	6	8
Local island internet connectivity makes online posting and digital communication about the WfL project difficult	1	0	2	1	4	6	3
WfL programs, products, and services would be valuable resources for other Pacific Islands and rural populations	0	0	0	0	0	3	14
The local site coordinator for WfL has been effective in building community connections and communicating about the project	0	0	0	0	1	3	13
The WfL project has been a valuable opportunity for me to network with other island citizens and leaders on water related issues	0	0	0	1	0	4	12
I am confident that the WfL activities started during grant funding will continue once funding has ended in 2017	0	0	0	0	2	3	12
I am confident that new water conservation activities will be initiated using local funds, once the current WfL funding ends in 2017	0	0	0	1	4	0	12

CHUUK (Truk) Federated States of Micronesia
PREL *Water for Life* Staff: Dorsalina William and Diana Manuel

As mentioned in earlier DHA evaluation reports, each WfL implementation site has presented its own unique set of opportunities and challenges. While the island of Chuuk has installed some First Flush Diverters, distributed BOB bags and MadiDrops as other sites have done, the Chuuk Core Team decided early on that their greatest opportunity for impact was to make improvements to existing natural spring water sites already frequented by local residents.

Dorsalina William is the WfL site coordinator for Chuuk. She is pictured here with Ethan Allen, WfL Project Director, and David Heil, lead DHA evaluator. They are sitting on a small boat in route to visit three of their ground water improvement installations. Traveling to these sites located on outer islands presented part of their challenge. The locations are remote, which make communications a challenge as well as delivering supplies and regular maintenance to these locations. So, the installations needed to be robust and the local community needed to "own" the improvements, meaning they needed to value them enough to maintain them on their own once WfL made the initial investment. That was one criterion for their selection. A second criterion was that they needed to be reliable enough that once improved the water supply could be counted on, even in drought conditions. Third, they should serve a population of area residents, and sometimes make water available to residents of nearby islands who may not have their own reliable water resources. A forth and final criterion was having someone take the lead in being responsible for facilitating the improvements and maintaining the site. In all of the Chuuk sites, a Core Team member took the lead, connecting with family members and communities where they had long-standing relationships already established. After initially identifying a potential site, one or more Core Team members reached out to the community to secure their commitment and help facilitate the improvements with WfL support including materials, construction design and oversight. In all cases, community members volunteered their labor, and in some cases additional materials, to complete the improvements. In this way, the community has ownership in the site, and will take better care of the resource, sharing it with neighboring residents as needed.

Since most of the natural water sources are on private land, a Memorandum of Understanding (MOU) has been developed between PREL and the landowner that spells out the partnership agreement, specifies who will be the lead resident to oversee the site and ensure it's safety and regular maintenance, and provides permission for local and neighboring island residents to have access to the water source as needed. Chuuk was the first site to develop such an agreement and other WfL sites, with the exception of Palau, are in the process of adapting the agreement to fit their own site-specific criterion. The site coordinator on Palau has resisted implementing such an MOU and to-date has not adopted this level of accountability.

In previous evaluation reports, DHA has documented progress on two spring water sites – Tol and Mwan. To advance these projects, WfL hired a third-party contractor to coordinate design and construction for the sites. This proved to be an important decision given the remote locations and unique features of each site. While the sites are functional at this time, there is still the need to install a dockside water faucet on Tol to allow neighboring islander's access to the water in time of need. And, in Mwan, the small holding pool at the spring site proved to be too small to provide enough gravity flow to the homes below, so a small tank was to be ordered and installed to increase water flow below.

In 2016 a new hire was made to oversee the design and construction of four new sites, all on outer islands in Chuuk lagoon. This contractor, Bernard, has done a marvelous job of designing suitable improvements at each site, ordering the necessary materials, arranging for delivery of the materials by boat to each location, and coordinating with the local landowners and community members to build and secure the sites. In the case of one location, on the island of Fanapanges, the local landowner working with WfL passed away before the project could be completed. Since materials had already been delivered, it was not clear how or when this site would be completed, but one of the Core Team members agreed to take the lead in working with the community to advance the effort.

By 2017 the Chuuk team had completed three additional installations, so during the June evaluation site-visit a day was spent traveling by boat to each of these locations. The first one was on the island of Romalum, where an existing spring had been used for years to source drinking water and wash clothes. The red screened-in building above the washing scene is the newly improved drinking water source. Locating it uphill from the original pool was a critical step to ensure cleaner water for drinking and yet preserve access to water for traditional uses such as bathing and washing clothes, as seen in this photo.

The red housing around the well was designed to protect the fresh water source from contamination and provide easy access to drinkable water from the well. As the photos below show, the housing is big enough to surround the enlarged water hole and allow residents to enter the housing to draw water from the cistern using a bucket and rope. The housing is open for access each morning for a few hours, then locked up to allow the well cistern to refill, then opened again mid-afternoon for additional access.

Community members contributed time and some materials to this project, assisting with deepening the well cistern, constructing the housing, and shoring up the open pool below. In the photos below, Dorsa is observing a local girl drawing water from the well.



On the island of Fefen, a ground spring site was identified for improvement on the property of a relative of one of the Core Team members. Once access was agreed to, Bernard proceeded with designing and constructing a suitable housing for this site. In order to ensure clean water at the source, and provide enough gravity flow to reach the residences below, the housing was built far up on the hillside, near the source. Along the way the evaluation team passed remnants of previous water tanks and piping, a memorable reminder that maintenance and durability of these types of installations is a real challenge in these remote locations.

Once on-site, Bernard explained the specifics of this particular installation, which was designed to protect the water source and collect water for gravity flow down to the homes below. Residents do not actually enter the building to draw water from the cistern

instead it is piped down to faucets closer to the homes where washing occurs.

The site required a considerable amount of excavation to enlarge the well and allow for continual refilling of the cistern. The housing is kept locked most of the time to ensure the area around the well and cistern are kept clean.

The third site visited in June 2017 was located on Tonoas, also arranged through a Core Team member's family connections. This site required two housings, one smaller one high on the hill as a first reservoir for the spring water near the source, and a second larger housing fed by gravity flow pipes from the first one where water is stored and then piped down the hill further to the homes below (see hose leaving the housing from the lower right corner in the photo below). Notice also that this cistern is a solid concrete tank with both inflow and outflow piping.



In this last photo Dorsa is standing next to the housing with Bernard, the contractor, and the landowner (with her young son) who provided access, keeps the key to secure the building, and will maintain the site for the community.

While rudimentary in design and materials, these structures are vast improvements to the safe water infrastructure on this island, and will last much longer than previous water retention installations.

Now that these infrastructure improvements are completed, the Chuuk team will set up trainings for the residents in each location on how to maintain and monitor their drinking water going forward. Water test kits will be distributed and test results will be shared with the Core Team and EPA. While the number of residents surrounding each of these improvements may seem small on a municipal water scale, the impact from these investments will be significant. The table below summarizes estimated youth and adults served by each installation.

Table 5: Estimated Number of Residents Served By Chuuk Water Improvement Projects

Spring Water Improvement Site	Number of Youth Served	Number of Adults Served	Total Population Served
Tol	200	100	300
Mwan	500	400	900
Romalum	200	100	300
Fefen	200	100	300
Tonoas	200	150	350
Fanapanges (Pending)	160	200	360

While not a major focus for the Chuuk site, they have invested in a few strategic installations of First Flush Diverters, most notably at a church/school where local residents will fill their water jugs from the Mwan groundwater spring, and the Chuuk Women's Council headquarters. Signage installed at these sites will provide on-going informal science education to residents who access water from these resources. Photos below show the new holding tank, piping and signage at the Chuuk Women's Council location.

An estimated 2,000 residents were also served in 2016 with distribution of Bob Bags, the temporary water retention bags described in earlier DHA evaluation reports. Chuuk also distributed MadiDrops to locations with high need during the drought of 2016/2017.

As with the other locations, Chuuk's WfL staff and Core Team have been instrumental in planning and promoting island-wide events and activities that build greater awareness around water quality and conservation. In particular they started out recognizing World Water Day, as other islands sites have done and in 2013 impacted 500 youth and 30 adults through this effort. One of the most popular elements of their WWD celebration was a Challenge Bowl focusing student teams on water-related subject matter. In 2016 they piloted their first bowl with 30 teachers. In 2017 they targeted 200 students and 100 teachers for a total of 300 participants. A Science Experiment Day has also been planned for 2017 with an estimated 300 participants. Both of these events have been held in collaboration with the Chuuk Department of Education.

Chuuk has also hosted a number of trainings using the Water For Life Handbook, impacting 65 area educators and agency personnel. They estimate that through these workshops and the distribution of the Handbook across the islands that 20,000 students will be exposed to increased instruction on water science as well as water quality and conservation.

In 2014 the Chuuk Team commissioned a billboard, which was installed at a busy intersection in town. This billboard has been seen by nearly every citizen on Weno as well as many outer island residents who visit Weno (nearly 50,000) over the past two years, and while is has now deteriorated a bit in the weather, the team is exploring ways to refurbish it and move it to a new location in late 2017. Earlier distribution of the WfL poster has also resulted in water topic exposure for many local and outer island residents.

In conversations with a few of the Chuuk Core Team members, priorities for sustaining the impact of WfL at this location were as follows:

- Addressing issues of infrastructure maintenance, especially were WfL has made an investment to improve a community water source
- Increased engagement of local youth and adult residents in monitoring and maintaining their improved water resources. Basically setting up Chuuk's version of the WQMT.
- Being better prepared for the next drought or storm that could impact water security.

Although only three Core Team members were available during DHA's site visit, they all completed the short survey summarize in Table 6 below. Such a small sample makes it hard to draw hard conclusions, but it is worth noting that these respondents showed some level of concern for sustaining the impacts from their WfL investments down the road.

Table 6: Chuuk Stakeholder Survey Reponses (n=3)

Statements	Blank	N/A	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
The WfL project addressed important island water issues	0	0	0	0	0	0	3
The WfL project created valuable new local partnerships and collaborations around water quality, conservation, and education	0	0	0	0	0	0	3
The WfL project has strengthened existing local partnerships and collaborations	0	0	0	0	0	1	2
WfL educational programs, products, and services are valuable resources for supplementing local school science resources	0	0	0	0	0	0	3
WfL educational programs, products, and services are valuable resources for community outreach and informal science education	0	0	0	0	0	1	2
WfL grant funds have allowed investments in local infrastructure for informal science education and improving water quality that would not otherwise be possible with only local funds	0	0	0	0	0	1	2
WfL financial resources have been adequate for accomplishing local project activities	2	0	0	0	1	0	0
I have a good understanding of all WfL programs, products, services	0	0	0	0	1	0	2
Local island internet connectivity makes online posting and digital communication about the WfL project difficult	1	0	0	0	1	0	1
WfL programs, products, and services would be valuable resources for other Pacific Islands and rural populations	0	0	0	0	0	0	3
The local site coordinator for WfL has been effective in building community connections and communicating about the project	1	0	0	0	1	1	0
The WfL project has been a valuable opportunity for me to network with other island citizens and leaders on water related issues	0	0	0	0	0	1	2
I am confident that the WfL activities started during grant funding will continue once funding has ended in 2017	0	0	0	0	0	1	2
I am confident that new water conservation activities will be initiated using local funds, once the current WfL funding ends in 2017	1	0	0	2	0	0	0

YAP – Federated States of Micronesia

PREL *Water for Life* Staff: Pam Legdesog and Chris Ithelmal

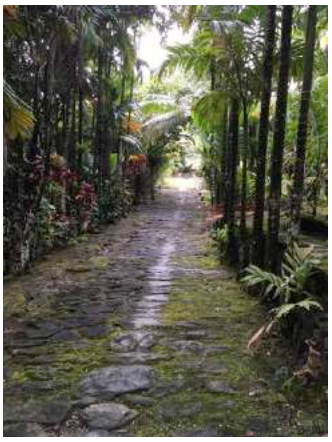
As has been mentioned in previous DHA evaluation reports, Pam Legdesog, the lead WfL Coordinator for Yap lives in Guam. While she does visit the island frequently, she has never been on–site during one of DHA's visits. Instead, the DHA evaluator has met with her and Ethan Allen in Guam either prior to, or immediately following a site visit to Yap. In 2016 PREL hired Chris Ismael as a second project coordinator and since he does live on the island, he is able to handle most of the day-to-day coordination necessary to keep things moving forward. Having an on-site coordinator has proven to be a critical element of project success for all four of the WfL project sites. In addition to Chris, Aden Sewel from the Yap Department of Education has been instrumental in coordinating WfL activities on-site, and helping facilitate meetings and site checks during the evaluation trips.

In 2017, DHA sat down with a few members of the Yap Core Team (Department of Education and EPA staff pictured here completing their stakeholder surveys) at the beginning of the site-visit to discuss project progress-to-date and remaining challenges. Unfortunately, Dr. Muru, another very active member of the Core Team, was off island during this year's trip.

There was only one new project underway in June, so Aden arranged to visit that site (described in more detail later) along with revisiting a few of the earlier sites to inspect final installations and hang educational signage. The first of these was a First Flush Diverter installation at a public office building just down the hill from the Department of Education. Signage explaining how the FFD works and the importance of clean gutters and tank was installed on the tank, visible to anyone drawing water directly from the tank.

A second site was on private property owned by a local legislator. While this tank location appears to be buried in the forest, it is a large tank that provides water to a small compound of homes nearby.

As mentioned earlier, one day was dedicated to visiting a water source improvement project on the outer island of Rumung. This installation was in-progress in June 2017 and should have been completed by mid-summer. Rumung is an interesting and beautiful island, with two main villages connected by a network of amazing stone roads and bridges. The pride shown in maintaining these old pathways was a positive indicator to the Yap Core Team that this island will take good care of the new water infrastructure provided by WfL.



A very old (and inoperable) water tank is being replaced with a new tank (delivered and on-site) at a location between the two villages so that eventually water can be piped to both communities from this central location. The roof and gutters of the old building on-site will be replaced to provide a clean surface and channel for water catchment into the new tank. A First Flush Diverter will be added to help keep the collected water clean.

Aden also arranged to visit two year-old Bob Bag installations (photo on next page). These were encouraging to see, since in other locations Bob Bags have often not held up well over time. In these two locations, the inclusion of a strong, level base has proven to be a factor in their longevity and sustained usefulness. This is the type of base recommended for Bob Bag installations, but in most other sites residents have not followed that advice, or simply have not had access to available materials to construct such a base for the bags.

Even though the base of the second Bob Bag site was sound, one can see the disconnected pipe next to the gutter, which makes it inoperable in a different way, once again illustrating how important on-going maintenance is for these infrastructure improvements.

While these are the only sites visited in 2017, the Yap WfL team has a diverse roster of completed infrastructure projects, often in collaboration with other aid organizations. These include a relatively large community water catchment and storage system along with five additional FFD installations and one Bob Bag installation on the outer island of Ulithi; a total of ten FFD installations on Yap proper; and a yet-to-be completed installation of a new water catchment system at the College of Micronesia where a newly poured concrete foundation awaits the placement of new tanks (photo to the right).

In addition to their infrastructure projects, the Yap WfL team has collaborated and/or hosted a range of educational events and trainings in support of their work. Since 2014 Yap has contributed to Water Week celebrations, which have included school contests and radio broadcasts among other activities. Annual participation varies, but range from 200-500 youth and 200-1,000 for a four year total estimated impact of nearly 4,000 residents. Their college-student developed radio broadcasts have had the broadest impact, with an estimated multi-age population of 1,100 reached annually. In addition, distribution of WfL brochures and Posters has resulted in many more students and other residents being exposed to water-related science, water quality and conservation messages.

The Yap team has hosted multiple workshops and trainings for educators and local agency personnel using the Water For Life Handbook, impacting over 100 classroom teachers and principals who serve nearly 700 students. Their community-based workshops have focused on water awareness and testing and have reached 400 youth and over 800 adult residents of Yap as well as community members on the outer islands of Fais and Ulithi.

While in Yap, the DHA evaluator met with a few key WfL stakeholders and partners, including the Director of the Yap Department of Education, and the Director of the EPA, and two local educators who have been integrating water science into their classroom curricula since attending a Water For Life Handbook workshop in 2016. The Director of the DOE feels strongly that WfL has been very beneficial to the island's youth.

"We take water for granted in the islands. But climate change awareness has increased. Sometimes it is hard for Yap to see itself in the bigger world-view. Water for Life has helped that happen."

Director, Yap Department of Education

The department is committed to continuing to have WfL messages a part of their annual teacher training summer institute as well as integrated into their school curricula. They can disseminate information to the outer islands, as well as share successes and lessons learned with other education agencies across the Federated States of Micronesia (FSM).

The Director of the EPA has been a long-standing supporter of the WfL vision and mission, assigning staff time to sit on the Core Team, plan and conduct water testing workshops, helping to deliver water test kits to the outer islands, and reviewing test data compiled by students at the Catholic High School who are now coordinating data collection on behalf of a number of sites on the island. For the EPA, the primary motivation for their engagement with WfL was the opportunity for collaboration, and the impact of educational outreach.

"I had the opportunity to listen to a team of students from the Catholic High School talk about their water testing data collection. I was very happy to see them really super excited about their work and I said 'Wow!'"

Director, Yap EPA

While local high school students are engaged in data collection and compilation, Yap has not put into place the same level of structure that Majuro has with their Water Quality Management Teams (WQMT). This may still come, over time, with additional students and local citizens being trained on water testing techniques and data reporting. Below is a sample Yap data collection form put into use during the 2016-2017 school year.

YAP STATE WATER FOR LIFE PROJECT/ PREL YAP OFFICE
Yap Department of Education
350-4382 E-mail: legdesop@prel.org

Name of School North Fanif School
Location/Village/Atoll Gilfith

WATER TEST KIT RESULT SHEET

Sample Number	Date of Sample	Time Collected	Source (water catchment, well, etc)	AFTER 24 HRS	AFTER 48 HRS	COMMENTS (other treatments if any), others.
Sample 1	9/19/16	8:30	water dispenser		A	
sample 2	9/19/16	8:30	Faucet		A	
Sample 3	11/15/16	10:30	water dispenser		A	
sample 4	11/15/16	10:30	Faucet		A	
Sample 5	01/31/17	3:30	water dispenser		A	
sample 6	01/31/17	3:30	Faucet		A	
Sample 7	04/07/17	8:30	water dispenser		A	
sample 8	04/07/17	8:30	Faucet		A	

P/A means Presence/Absence of Pathogens: The method utilizes Presence/Absence (P/A) method.
If Pathogens are detected "P", the water is not safe for human consumption without pretreatment or boiling.

Tests Conducted Monthly (at minimum). Forms submitted to PREL YAP Office but please contact EPA for immediate response if any positive results are observed.

Analytical Comments: (EPA Action for the Month) none

Date of submission: 4/21/17

Signed:
School Principal/Test Kit Admin

In discussions with two local educators who participated in the first Water For Life Handbook training, they spoke highly of the value of their training and what a wonderful resource they feel the handbook has been for enhancing their curriculum. It has even inspired some students to try water-related experiments at home!

"I think all teachers should use the Water For Life Handbook. It has both science and general water content". Yap Classroom Teacher

As with the other island sites, DHA asked Yap WfL stakeholders to complete a survey during this year's site visit. As was the case in Chuuk, there is some disagreement on the capacity for sustaining WfL activities and impact once current funding has ended. See the table on the next page.

Table 7: Yap Stakeholder Survey Responses (n=7)

Statements	Blank	N/A	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
The WfL project addressed important island water issues	0	0	0	0	0	2	5
The WfL project created valuable new local partnerships and collaborations around water quality, conservation, and education	0	0	0	0	0	4	3
The WfL project has strengthened existing local partnerships and collaborations	0	0	0	0	2	4	1
WfL educational programs, products, and services are valuable resources for supplementing local school science resources	0	0	0	0	0	3	4
WfL educational programs, products, and services are valuable resources for community outreach and informal science education	0	0	0	0	0	1	6
WfL grant funds have allowed investments in local infrastructure for informal science education and improving water quality that would not otherwise be possible with only local funds	0	3	0	0	0	0	4
WfL financial resources have been adequate for accomplishing local project activities	0	2	0	0	0	4	1
I have a good understanding of all WfL programs, products, services	0	0	0	1	0	4	2
Local island internet connectivity makes online posting and digital communication about the WfL project difficult	0	0	0	1	2	4	0
WfL programs, products, and services would be valuable resources for other Pacific Islands and rural populations	0	0	0	0	0	1	6
The local site coordinator for WfL has been effective in building community connections and communicating about the project	0	0	0	0	2	4	1
The WfL project has been a valuable opportunity for me to network with other island citizens and leaders on water related issues	0	1	0	0	1	1	4
I am confident that the WfL activities started during grant funding will continue once funding has ended in 2017	0	2	0	0	0	4	1
I am confident that new water conservation activities will be initiated using local funds, once the current WfL funding ends in 2017	0	0	0	0	3	4	0

PALAU

PREL *Water for Life* Staff: Destin Penland

Palau is the forth WfL implementation site. The local coordinator is Destin Penland, an experienced educator and community organizer with deep ties to the community's leadership and politics. As a result of these connections, the WfL staff and Core Team provided a major impetus for action during the 2016 drought, contacting local leaders and media outlets to advocate for water conservation and diligence in clean water monitoring.

This location has invested heavily in school-based programming, large-scale public events, workshops and trainings, and a range of infrastructure projects improving both surface water systems and traditional Rain Water Catchment Systems (RWCS).

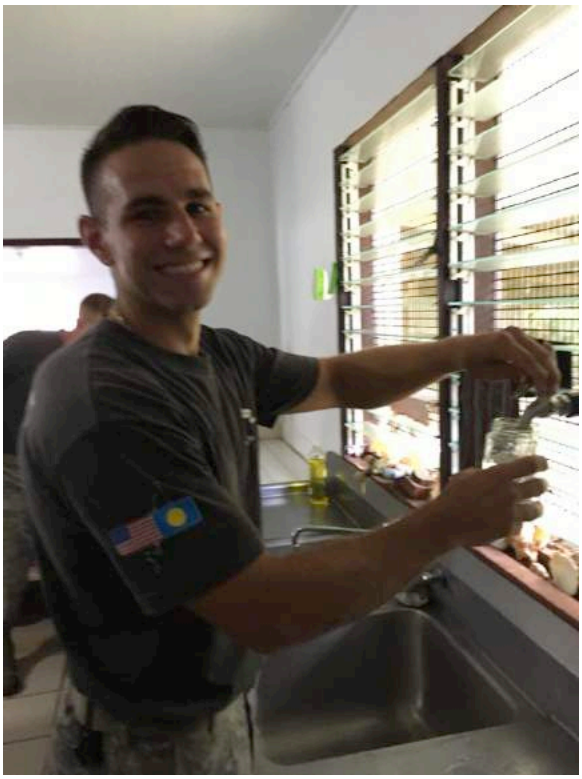
Unfortunately, just prior to DHA's arrival in Palau, Destin suffered a physical accident preventing him from participating in any scheduled meetings or project site visits. He did arrange for meetings with key partners and Core Team members though who provided adequate updates and assistance in viewing recent site improvements.

One site that had begun making improvements two years earlier was a surface water dam in Meyuns. Working with the Meyuns Youth Group, WfL helped facilitate a major cleaning of the dam reservoir, allowing for cleaner water retention and flow. In 2016-2017 the community installed a roof, screening, and designated shower stall to further enhance the site. The photos below illustrate how valuable the new roof is in keeping leaf matter from falling into the reservoir. This is a well-used and reliable water source for the community.

The most exciting new WfL infrastructure project in Palau was a RWCS installation at a school in Aimeliik. Dale Jenkins, a new WfL contact with the International Organization for Migration (IOM) was instrumental in helping to initiate another new collaboration involving the school and a locally assigned Civic Action Team (CAT) from the US military. CAT teams are made available to communities where the US has military presence. The teams are rotated between the Army, Navy, and Air Force, providing skilled recruits for small-scale engineering and construction projects that serve a public need.

In this case, the Aimeliik school principal applied to have a CAT assist with the installation of a new RWCS on the school site. This principal had recently attended one of Destin's WfL trainings along with a team of students from the school and was excited about the formation of a Water Quality Management Team following the model developed in Majuro. The CAT crew designed, coordinated the ordering of materials, and built one of the best catchment system installations DHA has documented in the five years with this project! Pictured below is the CAT team with Dale Jenkins (in shorts) and Ethan Allen the WfL Project Director. While on site, the team showed off their handiwork with details such wooden beams to support the gutter input pipe (often left hanging on island installations), a freshly painted side of the roof for water catchment, an outside shutoff valve pump and faucet, and an indoor filtration system to ensure safe, clean drinking water at all times. The recently trained WQMT of students, teacher and principal will take on the responsibility of regularly testing the water quality.

That said, one member of the CAT group wanted everyone to know the water from this system was safe to drink now! He demonstrated this by filling a glass from tap in the kitchen while we all looked on.



The Palau WfL team had completed some earlier RWCS installations at area residences and community center locations, but this was their first school installation with their new IOM partner and a trained WQMT on site to maintain the system and monitor water quality. The plan is for completing similar installations at 13 rural Palau schools over the next year. By offering community access to these systems, these infrastructure improvements will be serving approximately 25% of the rural populations in these areas. As mentioned earlier, Palau also invested in two surface water sites with small dams and collection reservoirs. These projects serve an estimated 200 youth and 300 adult residents.

While on site, Ethan Allen and DHA both reminded Dale that putting MOU agreements in place with the schools and communities benefitting from these efforts was a key to long-term maintenance and sustainability of the clean water resource. The Project Coordinator in Palau has resisted this type of written agreement in the past, and voiced so at the All Team Meeting held in September 2016, even when all three of the other sites and members of his own Core Team felt they were a reasonable and prudent documentation to have in place. The good news in Palau is that the new collaboration with IOM will ensure that the rural schools have the equipment and training to maintain their new and improved systems, so now would be a good time to formalize agreements with each of the schools and communities receiving these improvements. Dale was encouraged by DHA and Dr. Allen to work with Destin to draw up these agreements, clarifying on-going responsibilities, before the project's funding ends.

Like the other WfL sites, Palau has been instrumental in partnering with other island agencies and non-profit organizations (NGO) to plan and host large-scale events for school age youth and general public audiences around World Water Day (WWD) and Earth Day. In Palau the main focus on WWD has been a water-themed Challenge Bowl where middle school student

teams compete on their knowledge of water science and conservation. Once it was published, the Water For Life Handbook has served as the primary resource for these teams in getting ready for the competition. Each year since 2014 Palau's WWD Challenge Bowl has engaged 75 middle school youth and 25 adult supervisors in the event.

On Earth Day, the Palau WfL team has collaborated with other water-related agencies including the Environmental Quality Protection Board (EQPB), the EPA, and Ministry of Education, among others, to host events that have averaged 2,500-3,000 youth participants and 100 adult participants each year. A very active High School Science Club is often involved in helping host aspects of these events along with other WfL sponsored activities, including an annual Watershed Tour involving 30-50 students and 5 adults each year and tours of the Water and Waste Water Treatment Plant which attracts similar numbers. On Angaur, a small neighboring island, WfL hosted a geology tour (2014) and a hydrology tour (2015) for 15 youth and their adult advisors in conjunction with the launch of a WfL water science curricula produced specifically for that location.

Palau has also hosted a number of workshops and trainings over the years. In 2016 Palau hosted 20 teachers for a Water For Life Handbook training that was attended by 20 local educators, indirectly impacting 500 area students. In the same year, 25 elementary science teachers were trained on use of the HACH water testing kits. And in 2017 WfL and their collaborators hosted Water Quality Management Team training for 15 rural school principals and students (mentioned earlier in this report). Modeled after Majuro's teams of the same name, these individuals will take on the responsibility of maintaining and monitoring water sources and RWCS installations at their schools and eventually in their communities. In the summer of 2017, as part of Palau's Rural Schools collaboration with IOM and the MOE, WfL acquired and distributed 50 Aqus Water Filter kits to be included as part of local school, home, and community emergency management resources. Two workshops were conducted to train local citizens on these kits. Photos below show recent trainees receiving their kits and a group of high school students trying out their filter.

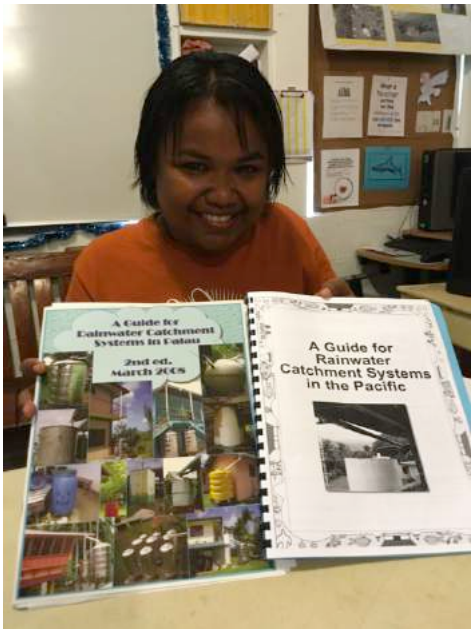
As mentioned earlier, Destin Penland, WfL coordinator in Palau, is actively engaged in advancing better water management practices across the island as well as advocating for sounder water policies. As a part of this effort, he often makes presentations to local communities, clubs, and government officials. He was particularly active during the 2016 drought helping citizens and policy makers understand the need for better water conservation.

While visiting Palau in June, DHA met with a teacher at Ngarchelong Elementary School who had attended a recent Water Quality Management Team training with another teacher and two 7th grade students. She has since recruited two more students from the 8th grade to join their WQMT. During the conversation she showed us the resources the team now has for monitoring and purifying their water.

Republic of Palau
Ministry of Education
Ngarchelong Elementary School

RAIN GAUGE READING/RAIN TRACKER

DATE	TIME OF READING	LEVEL IN INCHES	RAIN TRACKER	COMMENTS
3/28/2017	2:18PM	0.1"	0	
3/29/2017	12:46PM	1.5"	0	
4/12/2017	3:00PM	3.3"	12"	
4/13/2017	8:35AM	0.3"	0	
4/18/2017	10:26AM	1"	0	
5/02/2017	4:09PM	3.3"	11.5"	
5/08/2017	4:11PM	1.5"	0	
5/16/2017	5:45pm	2.4"	4"	



The publication in her hands, *A Guide For Rainwater Catchment Systems In The Pacific* is another example of leveraging WfL's resources and leadership in water conservation. It was produced as part of the new collaboration with Belau Environmental and Health Solutions & Technologies, Inc. (BEHST), and the IOM to advance rural water quality and conservation. This was a great way for WfL's model for water monitoring (the WQMT) to join with a local initiative to improve water resources in rural communities in Palau and Destin, in his role as WFL coordinator, was instrumental in helping get this initiative off the ground.

Rural communities in Palau have been especially vulnerable in recent years. The municipal water supply has either been unreliable, non-existent, or seriously stressed by drought. In 2015 WfL provided some Bob Bags in community locations that were without reliable drinking water resources. While in Palau in June, DHA visited one of these Bob Bag sites and found the two bags completely deflated and no longer serviceable. While an option for emergency water retention and storage, they require a solid base and basic maintenance to remain functional. In this case, it appears that weather and poor maintenance took their toll.

In conversations some of Palau's Core Team members, there was praise for the progress that has been made to-date, but concerns about which agencies in Palau will step up to the plate to sustain this progress once WfL funding has ended. Will the EQPB continue to compile the WQMT test data as they are doing now? Will the WQMTs continue to function? What happens when their test kits run out of chemicals? Who will maintain the RWCS tanks, gutters and roof surfaces? All valid concerns, especially given the tradition of very little attention being given to on-going maintenance and repairs and another reason for having MOUs in place. They noted that the Water For Life Handbook has been a tremendous resource for teachers (and students) as well as local agencies working with water related issues. The high school science club has grown in size and impact, having installed a RWCS for their agricultural program in 2016.

"The good thing about informal learning is that students realize that what they learn in school really IS relevant!"

Palau Core Team Member

As in other WfL sites, Palau stakeholders were asked to complete a short survey, which is summarized in Table 7 below.

Table 8: Palau Stakeholder Survey Responses (n=7)

Statements	Blank	N/A	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
The WfL project addressed important island water issues	0	0	0	0	0	4	3
The WfL project created valuable new local partnerships and collaborations around water quality, conservation, and education	0	0	0	0	0	1	6
The WfL project has strengthened existing local partnerships and collaborations	0	0	0	0	0	3	4
WfL educational programs, products, and services are valuable resources for supplementing local school science resources	0	0	0	0	0	0	7
WfL educational programs, products, and services are valuable resources for community outreach and informal science education	0	0	0	0	0	0	7
WfL grant funds have allowed investments in local infrastructure for informal science education and improving water quality that would not otherwise be possible with only local funds	0	0	0	0	0	4	3
WfL financial resources have been adequate for accomplishing local project activities	1	0	0	0	2	1	3
I have a good understanding of all WfL programs, products, services	0	0	0	0	1	3	3
Local island internet connectivity makes online posting and digital communication about the WfL project difficult	0	0	0	1	0	3	3
WfL programs, products, and services would be valuable resources for other Pacific Islands and rural populations	0	0	0	0	0	1	6
The local site coordinator for WfL has been effective in building community connections and communicating about the project	0	0	0	0	1	1	5
The WfL project has been a valuable opportunity for me to network with other island citizens and leaders on water related issues	0	0	0	0	3	1	3
I am confident that the WfL activities started during grant funding will continue once funding has ended in 2017	0	0	0	0	2	2	3
I am confident that new water conservation activities will be initiated using local funds, once the current WfL funding ends in 2017	0	0	0	0	2	5	0

All Site Stakeholder Survey Summary

Table 9: All-Site Stakeholder Survey Responses (n=34)

Statements	Blank	N/A	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
The WfL project addressed important island water issues	0	0	0	1	0	8	25
The WfL project created valuable new local partnerships and collaborations around water quality, conservation, and education	0	0	0	0	1	8	25
The WfL project has strengthened existing local partnerships and collaborations	0	0	0	0	3	13	18
WfL educational programs, products, and services are valuable resources for supplementing local school science resources	0	0	0	0	0	6	28
WfL educational programs, products, and services are valuable resources for community outreach and informal science education	0	0	0	0	0	6	28
WfL grant funds have allowed investments in local infrastructure for informal science education and improving water quality that would not otherwise be possible with only local funds	0	3	0	0	3	9	19
WfL financial resources have been adequate for accomplishing local project activities	14	2	1	0	3	7	7
I have a good understanding of all WfL programs, products, services	1	0	0	2	3	13	15
Local island internet connectivity makes online posting and digital communication about the WfL project difficult	2	0	2	3	7	13	7
WfL programs, products, and services would be valuable resources for other Pacific Islands and rural populations	0	0	0	0	0	5	29
The local site coordinator for WfL has been effective in building community connections and communicating about the project	1	0	0	0	5	9	19
The WfL project has been a valuable opportunity for me to network with other island citizens and leaders on water related issues	0	1	0	1	4	7	21
I am confident that the WfL activities started during grant funding will continue once funding has ended in 2017	0	2	0	0	4	10	18
I am confident that new water conservation activities will be initiated using local funds, once the current WfL funding ends in 2017	1	0	0	3	9	9	12

Table 9 and Figure 5 present a compilation of stakeholder survey responses from all four WfL sites. Table 9 above shows consensus across most statements with a high percentage of respondents either agreeing or strongly agreeing. When asked if financial resources were adequate there was an obvious drift toward disagreement. Also, responses regarding Internet service are island dependent, so a variation in response would be expected. The last two statements have to do with confidence in both continuation of initial efforts and new initiatives once current funding ends. Here we see another definite drift toward disagreement, suggesting that a number of stakeholders are concerned that the initial WfL investments may be difficult to sustain or replicate in the absence of outside resources.

Figure 5 presents this same data in a slightly different format, allowing for island-to-island comparisons. This figure shows the percentage of respondents who agreed or strongly agreed with each of the statements. Keeping in mind the small sample space for this survey, especially Chuuk with only three respondents, there are still some noticeable trends.

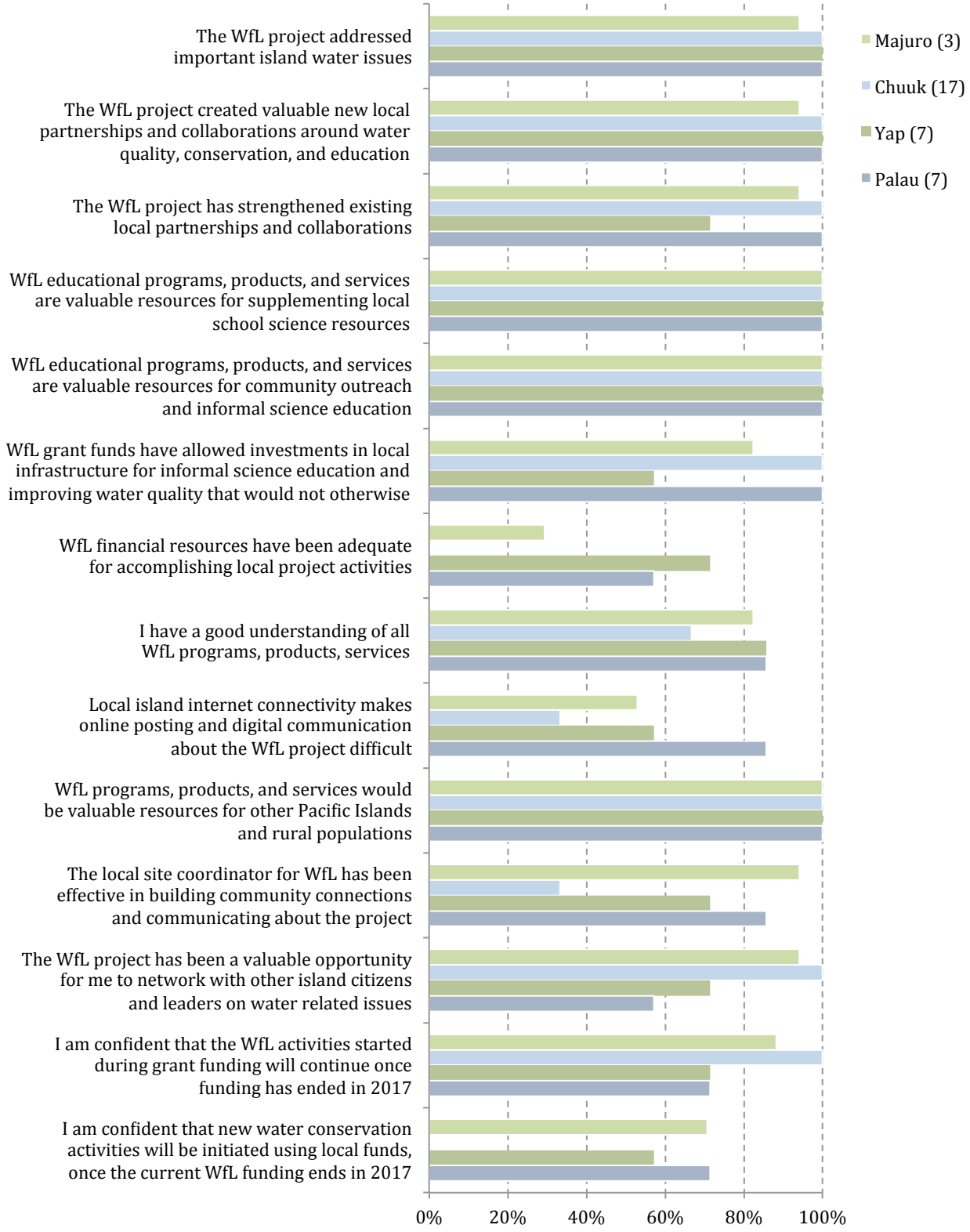
First, there was strong consensus on the overall importance and value of the WfL initiative, especially the building of partnerships and the project's programs and services. Second, this figure shows the drop off in agreement on the adequacy of financial resources. This reflects both the high level of needs in these island states as well as the high costs associated with addressing those needs. While surveyed stakeholders as a group were more likely to have knowledge of the WfL project by nature of their roles, not all respondents felt they had a high level of understanding, which suggests a need for better communication with the organizations partnering with WfL as well as better communication across WfL implementation sites. Sadly, one of the vehicles to support better communications, the Internet, is not a reliable technology in the Pacific with very slow connectivity and frequent down time. This should improve over time, as it has elsewhere across the globe, but it was a definite hurdle at times during this 5-year project.

While all stakeholders acknowledge the importance of having a local project coordinator, the respondents from Chuuk and Yap did not have as much agreement on the effectiveness of their WfL coordinator in building community connections and communicating about the project. Opportunities for networking with other island citizens and leadership was a hallmark of the WfL project and most respondents felt the project provided this opportunity on their island. The lower level of agreement by Palau respondents may be due to the fact that activities at this site were more highly driven by the site coordinator, a well-connected community leader, than relying on the Core Team members and other partners to take the lead.

Overall lower levels of confidence in sustaining initial efforts and initiating new activities in the absence of grant support was discussed above, and is reflected island-by-island in this final figure.

In general, the project has been an effective, and in some cases an essential vehicle for addressing issues around water quality and retention in island settings where water security is an on-going challenge. The focus on local partnerships was a highly valued attribute of the WfL project, and the informal science and conservation education resources produced and disseminated by the project have had a significant impact on these populations. That said, there is much to still be done, and in the absence of outside funding, the local communities may not find the resources to advance this work further.

Figure 5: Island-by-island comparison. Percent of respondents selecting "Strongly Agree" or "Agree"



Recommendations

In this section, DHA has articulated a few key recommendations based on both the final year of the project as well as lessons learned from previous years. The intent of these recommendations is two-fold. First, to provide guidance to the project leadership and staff on any final actions they can take to ensure a strong finish to their work under this current funding cycle. Second, to call attention to specific lessons learned from this project that could contribute to future success if the Water For Life model is expanded to other islands in the Pacific.

1. **Collaborate with local partners for planning, implementation, and follow-up**
   - ❖ Working with local partners was an essential ingredient to WfL's success.
   - ❖ Establish clear understandings of roles and responsibilities in advance of project initiation, reviewing often to ensure all parties remain engaged.
   - ❖ Require cost sharing to advance project goals and to foster local ownership of all outcomes, especially infrastructure improvements that will require on-going investment to sustain impact.
2. **Establish accountability across all project channels**
   - ❖ Begin with written scopes of work and defined responsibilities for project staff. Include expectations for regular communication, documentation, and evaluation.
   - ❖ For all infrastructure projects create agreements signed by relevant parties that clearly delineate short and long-term responsibilities and obligations.
   - ❖ Develop site-specific plans that outline project activities, budgets, timelines, and who is responsible for implementation. Review frequently and adjust if needed.
3. **Include maintenance, repair, and replacement costs in any future project budget**
   - ❖ This is especially important for investments in infrastructure, equipment, new technologies, and consumable items like water test kits.
   - ❖ Because shipping materials to the islands is so costly, purchase maintenance and replacement parts at the same time as original materials. Story securely.
   - ❖ Develop maintenance schedules and procedures in advance of installation.
4. **Document project activities and lessons learned early and often**
   - ❖ Agree in advance on documentation guidelines and vehicles for sharing.
   - ❖ Create suitable vehicles and schedules for project staff to regularly communicate with their own Core Teams as well as with project leadership and each other.
   - ❖ Collect both quantitative and qualitative data.
   - ❖ Implement standardized forms and procedures for all data collection and submission. Require project staff to implement with fidelity.

5. **Actively engage both youth and adults in project planning and implementation**
   - ❖ Water security is a multi-generational concern and responsibility.
   - ❖ While school age youth are a natural audience for impact, they can also provide important perspectives and approaches to addressing community challenges.
   - ❖ Establishing multi-generational Water Quality Management Teams (WQMT) during this initial Water For Life initiative proved to be one of the most reliable vehicles for nurturing and sustaining community engagement in local water security.
6. **Incorporate educational messages and materials into all project activities**
   - ❖ Schools in the islands are a reliable partner and venue for water content delivery.
   - ❖ The Water For Life Handbook was one of the most highly valued WfL products.
   - ❖ Informal education vehicles such as events, signage, radio spots, posters and murals were successful in delivering WfL messages to broad audiences.
7. **Use a uniform rubric for selecting suitable project activities**
   - ❖ Use simple and clear criteria for identifying and selecting all project activities.
   - ❖ For all activities include target audiences and numbers served, budgets, potential partners, and estimated timeline.
   - ❖ For infrastructure investments include ease of access/installation, local commitment to maintain, availability of suitable materials for initial installation as well as on-going maintenance, repair and replacement as needed.
8. **Seek additional funding to introduce WfL model on other water insecure islands**
   - ❖ The Pacific Islands face significant challenges around water quality and security.
   - ❖ WfL is a successful model for addressing water quality and security challenges.
   - ❖ Seek support from regional and global sources to advance WfL goals of education and public engagement around sustainable water quality and conservation.