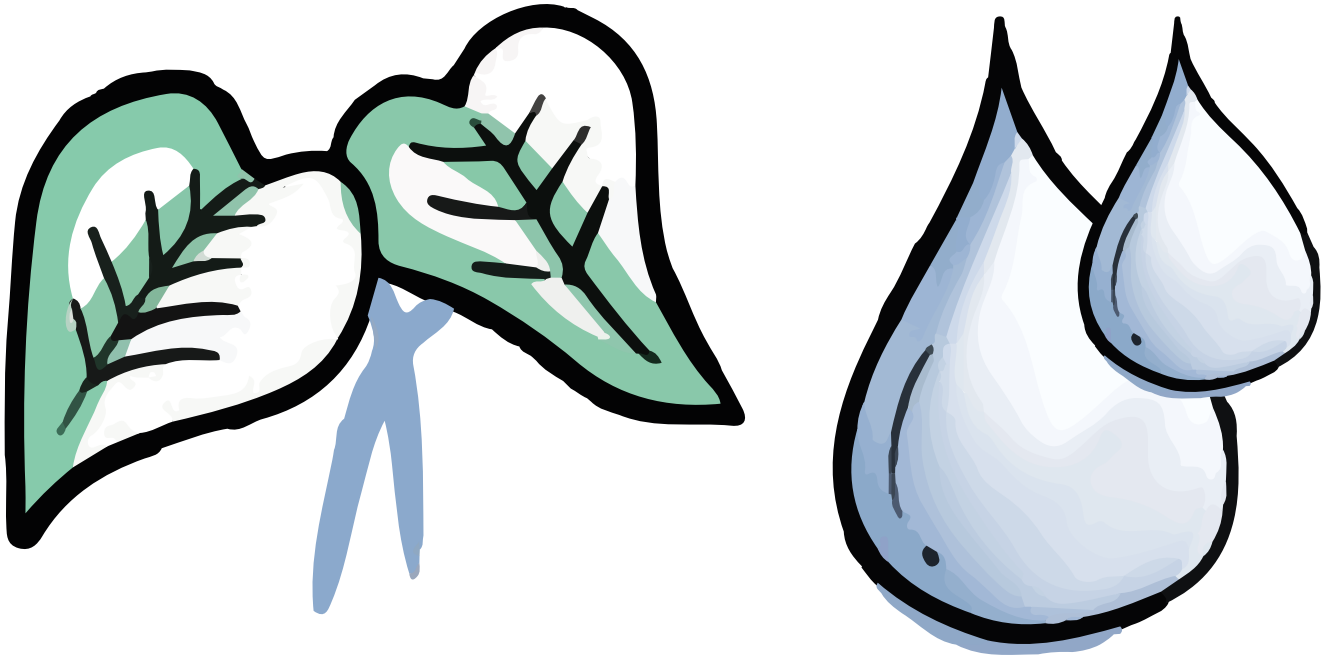
GCCA+

THE GLOBAL CLIMATE CHANGE ALLIANCE PLUS INITIATIVE

Funded by the European Union

SCALING UP PACIFIC ADAPTATION (SUPA)



SNAPSHOT 2021:

Agriculture & Water Security Measures, Palau

ASSESSING IMPACT AT INTERVENTION LEVEL

Funded by the European Union

Pacific Community
Communauté du Pacifique

SPREP
Secretariat of the Pacific Regional Environment Programme

USP
THE UNIVERSITY OF THE SOUTH PACIFIC

GOVERNMENT 1981 REPUBLIC OF PALAU

© Secretariat of the Pacific Regional Environment Programme (SPREP) 2022

Reproduction for educational or other non-commercial purposes is authorised without prior written permission from the copyright holder and provided that SPREP and the source document are properly acknowledged. Reproduction of this publication for resale or other commercial purposes is prohibited without prior written consent of the copyright owner.

SPREP Library Cataloguing-in-publication data

Snapshot 2021: agriculture & water security
Measures – Palau: assessing impact at intervention
level. Apia, Samoa : SPREP, 2022.

13 p. 29 cm.

ISBN: 978-982-04-1149-4 (print)
978-982-04-1150-0 (ecopy)

1. Agriculture – Economic aspects – Palau.
2. Territorial waters – Security measures – Palau.
I. Pacific Regional Environment Programme (SPREP). II. Title.

333.760966

Supported by the European Union through the Global Climate Change Alliance Plus Scaling up Pacific Adaptation (GCCA+ SUPA) project delivered jointly by the Pacific Community, Secretariat of the Pacific Regional Environment Programme and The University of the South Pacific.

DISCLAIMER
This document was made possible with the financial support of the European Union. Its contents are the sole responsibility of SPREP and do not necessarily reflect the views of the European Union.

SPREP
Secretariat of the Pacific Regional Environment Programme

PO Box 240
Apia, Samoa
T: +685 21929
E: sprep@sprep.org
W: www.sprep.org

Our vision:

A resilient Pacific environment sustaining our livelihoods and natural heritage in harmony with our cultures.

TABLE OF CONTENTS

COUNTRY	PALAU
Capital	Ngerulmud, Melekeok
Population	17,661 (2015 census)
Inhabited islands	Kayangel, Babeldaob, Koror, Peleliu, Ngercheu, Angaur, Sonsorol, Hatohobei
Land area	For the Republic of Palau: 415.58 sq.km
Areal extent of wetlands agro-ecologically farmed	1,040,270 sq. meters
Areal extent of dry lands agro ecologically farmed	34,919 sq. meters
Max. height above sea-level	230 meters, Ngerchelechuus
Geography	Four distinct island types are found in Palau: atoll islands, high limestone islands (the Rock Islands), low platform islands, and volcanic islands. **Babeldaob**: (volcanic island) 328.14 sq.km, **Koror**: (volcanic island) 57.81 sq.km, **Peleliu**: 16.57 sq.km, **Ngerukeuid**: (high limestone island) 11.39 sq.km
Location	Latitude: 07°28'52.63"N Longitude: 134°33'54.53"E
EEZ	617.400 sq.m
Climate	Tropical moist climate
Rainfall	3160 mm | 124.4 inch per year.
Mean temperature	With an average of 27.1 °C | 80.9 °F, April is the warmest month. The lowest average temperatures in the year occur in February, when it is around 26.7 °C | 80.0 °F.
Wet season	**May to November** The greatest amount of precipitation occurs in June, with an average of 360 mm | 14.2 inch.
Dry Season	**December to April** The driest month is March. There is 170 mm | 6.7 inch of precipitation in March
Economy	GDP 295mil. (Palau/ADB public sector briefs 2018)
GDP per capita	$15,982 (Palau/ADB public sector briefs 2018)
GNI per capita	$12,530 (2017) (Palau/ADB public sector briefs 2018)
Resource Base	Tourism = 88% of GDP (adventure tourism/marine tourism) Construction = 9% of GDP Agriculture/Fisheries = 3% of GDP (Palau/ADB public sector briefs 2018)
Currency	US dollar
Exchange rate	-
Languages	Palauan and English
Government	Democratic Republic
National focal point	Mr. Xavier Matsutaro, Climate Change Coordinator

Figure 1. Country profile for Palau.

In Context

The story of resiliency for communities in Palau requires looking back in time to examine and learn from results of previous climate change adaptation work to inform future planning. Palau is one of four countries that cooperated with the field testing of an impacts analysis methodology as part of the European Union funded Global Climate Change Alliance Plus – Scaling Up Pacific Adaptation (GCCA+ SUPA) project.

Like many island countries, Palau is experiencing the impacts of climate change. These include rising temperatures, varying rainfall patterns and changes in the frequency of droughts. These impacts exacerbate the vulnerability of local communities to water and vector-borne diseases as well as water scarcity and food security.

The Palau National Climate Change Policy (2015) identified agriculture and water security among the areas requiring priority action. In 2021 a suite of impact methodology tools, including field assessments, social surveys, spatial detection tools and climate profiles, was field tested in selected trial communities in Palau.

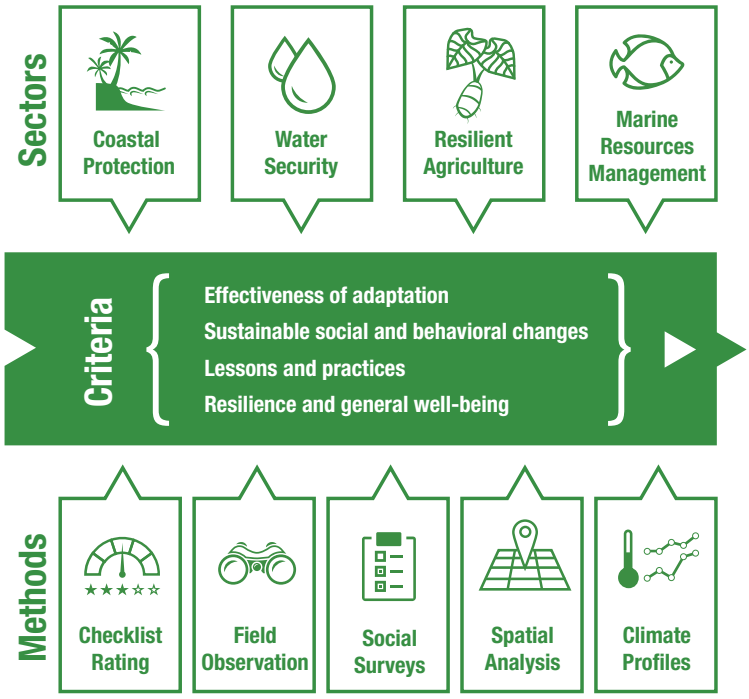


Figure 2.
Pathway for Adaptation Impacts Analysis Methodology.

In Angaur, one of the island states of Palau, interviews were held with 22 households to understand the impact of past water security measures. The data generated provided a baseline for the island's water supply capacity and will help inform the national government's plans for water supply.

At the end of the field trial of impact assessment and engaging with a working group from key government agencies, led by the Office of Climate Change in Palau, the group outlined a set of pre-conditions needed to achieve resiliency at the community level. With support given to the national consultant, Palau Conservation Society team worked with the adaptation focal point of contact at the Office of Climate Change Office to review, plan and field test the drafted Impacts methodology.

CRITERIA	AGRICULTURE – AGROECOLOGICAL PRACTICES
Effectiveness	Soil capability. Percent of land available for food production. Percent of farmers who promote soil health practices. (A1) Crop productivity. Percent change in crop production yield. Percent of farmers with access to crop varieties. (A2)
Social-behavioural change	Soil training program. Percent increased access to crop varieties. (A3) Farming practice. Number of families with farms and composition of farmers (A4)
Lessons and practices	Level of awareness. Percent of families with subsistence farms. Noted change in farmers' household income with an improved crop yield. (A4)
Sustainability	Percent farming households with improved/diversified crop productivity. (A5)
CRITERIA	**FRESHWATER SECURITY**
Effectiveness	In improving drinking water coverage. Water source and condition as proxy to measuring improved drinking water coverage. (W1). Assess the improved state of water facilities and increase in water availability (W2).
Social-behavioural change	Level of improvement to existing water harvesting storage systems. (W3). Tracks the capacity to either operate, maintain and or local management of the water supply system. (W4). Level of participation, awareness, and sense of improved sanitation standard. (W6).
Lessons and practices	Ascertains if there is improved access to safe water by households, the special needs vulnerable groups: persons with disabilities, the elderly, widows, single mothers, and children. (W5).
Sustainability	If structural measure is still intact, the extent to which it has/not been maintained, and whether natural assets were enhanced or damaged. Water treatment options available. Tracks investment in water security measures at one place over time. (W7)

Figure 3. Criteria for measuring impact of adaptation interventions.

This snapshot describes the field experience in-country and results from tested tools. It is relevant to note that not all elements of the criteria (in Figures 2 & 3) be captured cause of data limitations, scientific uncertainty, or a lack of robust monitoring program in place since completion of these adaptation interventions. Selection of interventions to be assessed were based on relevance and available data from archived record of projects that implemented these adaptation actions.

Selection of sites

Factors considered in the selection of benefited areas from a history of adaptation interventions were based initially on the availability of relevant information and data archived from past projects, in-country consultation with key people directly involved in those actions who may be able to shed institutional memory. Palau Conservation Society is the national consultant engaged and together with the national climate change coordinator and the focal point for UNFCCC, at the Office of Climate Change, Republic of Palau mapped recent history of completed, project-funded interventions with data search for ease of tracking its measured results.

Adaptation measure	Title of project	Funding agency	Year completed
WATER SECURITY MEASURES			
Enhancing livelihood through demonstration of environmentally friendly integrated food production systems on Babeldaob island.	ACSE: Enhancing Sustainable Livelihoods	European Union (EU)	2018
Improving rainwater infrastructure on Angaur island.	GCCA PSIS -Improving rainwater infrastructure	European Union (EU)	2015

Figure 4. Sample of past interventions treated with the impact assessment methodology.

Impact Indicators

The indicators are varied in nature. With the use of a checklist structure to conduct a first level impact assessment, there are several caveats which concern the validity of the assessment results. Some responses were qualitative and took the form of 'yes' or 'no' answers or graded from 'low' to 'some' to 'a large amount'. For others, numerical data were available which could have been used in their raw state. But even for the numerical data, scales were heterogeneous occurring on a sliding linear or non-linear scale or having different maximum and minimum values. To deal with this heterogeneity, we chose to map the possible responses to each indicator on a simple scale to allow for a reasonable amount of spread among the possible values of the data.

The approach permits the processing of binary data, where only a 'yes' or 'no' answer is possible. In this case a 'yes' answer could be assigned the maximum value of the given score range per sector adaptation criteria and a 'no' answer the minimum value of 1, or some values in between. Utilizing a scale of 1-4 or 1-5 also has a central score which means that the well understood concepts of average, maximum and minimum can be used to anchor the responses for non-numerical data as in some results.

CRITERIA	INDICATOR CODE	INDICATOR DESCRIPTION	METHODOLOGY
Effectiveness	W1	Water source and condition as proxy to measuring improved drinking water coverage. Protection of water source, distribution system (& filtration maintenance if any).	• Observations & use impact Checklist that include physical attributes of local environment.
	W2	Assesses the improved state of water facilities and increase in water availability.	• Observations & use of impact Checklist. • Spatial mapping of water infrastructure elements with extent water tanks coverage.
	A1	Soil capability. Percent of land available for food production. Percent of farmers who promote soil health practices.	• Spatial analysis information tool. • Rate uptake of soil health and land-care practices.
Social-behavioural change	W3	Level of improvement to existing water harvesting storage systems.	• Observations & use of impact Checklist. • Meta data from the social surveys of household and focus group be treated for comparative analysis.
	W4	Tracks the capacity to either operate, maintain and or local management of the water supply system.	
	W6	Level of participation, awareness, and sense of improved sanitation standard.	• Observations & use of impact Checklist. • Meta data from the social surveys of household and focus group be treated for comparative analysis.
	A2	Soil training program. Percent increased access to crop varieties.	• Observations & record of scoring for each variable. • Ref. Impact checklist for Resilient Agriculture form. • Focus group interviews with farmers.
	A3	Farming practice. Number of families with farms and composition of farmers.	• Household Survey • Focus group survey
Lessons and practices	W5	Ascertains if there is improved access to safe water by households, the special needs vulnerable groups: persons with disabilities, the elderly, widows, single mothers, and children.	• Focus group interviews. • Observations & record of scoring for each variable. Ref. Impact checklist for Resilient Agriculture form.
	A4	Level of awareness. Percent of families with subsistence farms. Noted change in farmers' household income with an improved crop yield.	• Spatial mapping infor. Analyse records of agriculture census data if available. • Focus group interview results.
Sustainability	W7	If structural measure is still intact, the extent to which it has/not been maintained, and whether natural assets were enhanced or damaged; derived co-benefits if any. Tracks investment in water security measures at one place over time.	Liaise for with national CC focal point for cost details on fiscal budget of built structures, project expenditure reports.
	A5	Percent farming households with improved/ diversified crop productivity.	Meta data from the social survey eg. people receiving agricultural extension services, training of individuals in communities to develop emergency plans and its use.

Figure 5. Indicator description and tools, for resilient agricultural (A) and water security (W) measures in Palau.

Impacts at glance

Social survey highlighted that most households owned rainwater tanks, so it is not possible to determine where the differences in preparedness and risk perception are because of pre-existing tanks before the ongoing efforts to refurbish with new tanks. However, this survey data will provide a useful baseline to measure the impact of any future intervention in the area.

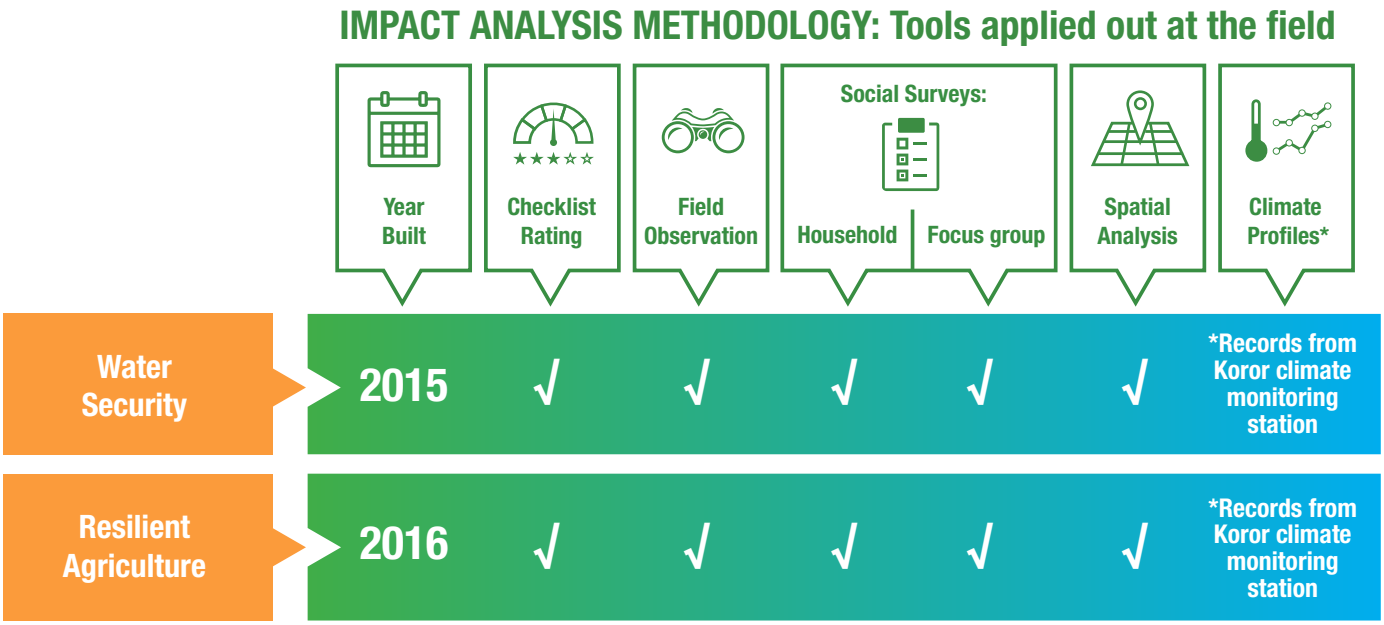


Figure 6. Overview of applied tools: field observation, surveys, interviews, mapping with additional data layer from the nearest climate monitoring station.

Spatial imagery analysis has been conducted to map coverage and distribution of piggery farms in Babeldaob. The same Mapping activity will be conducted to map coverage and distribution of water tanks and infrastructural elements of water storage for the community in Angaur

Climate profiles sourced from the Pacific Meteorological Desk (situated at SPREP) demonstrable of available climate data and knowledge tools, which adds value in adaptation planning. For the period, 2013-2021, Palau experienced 3 major drought events with the most extreme occurred in May 2015 until April 2016. Rainfall amount during that dry period was 2289.6mm *(https://www.pacificmet.net/products-and-services/seasonal-climate-outlooks-pacific-island-countries-scopic)*

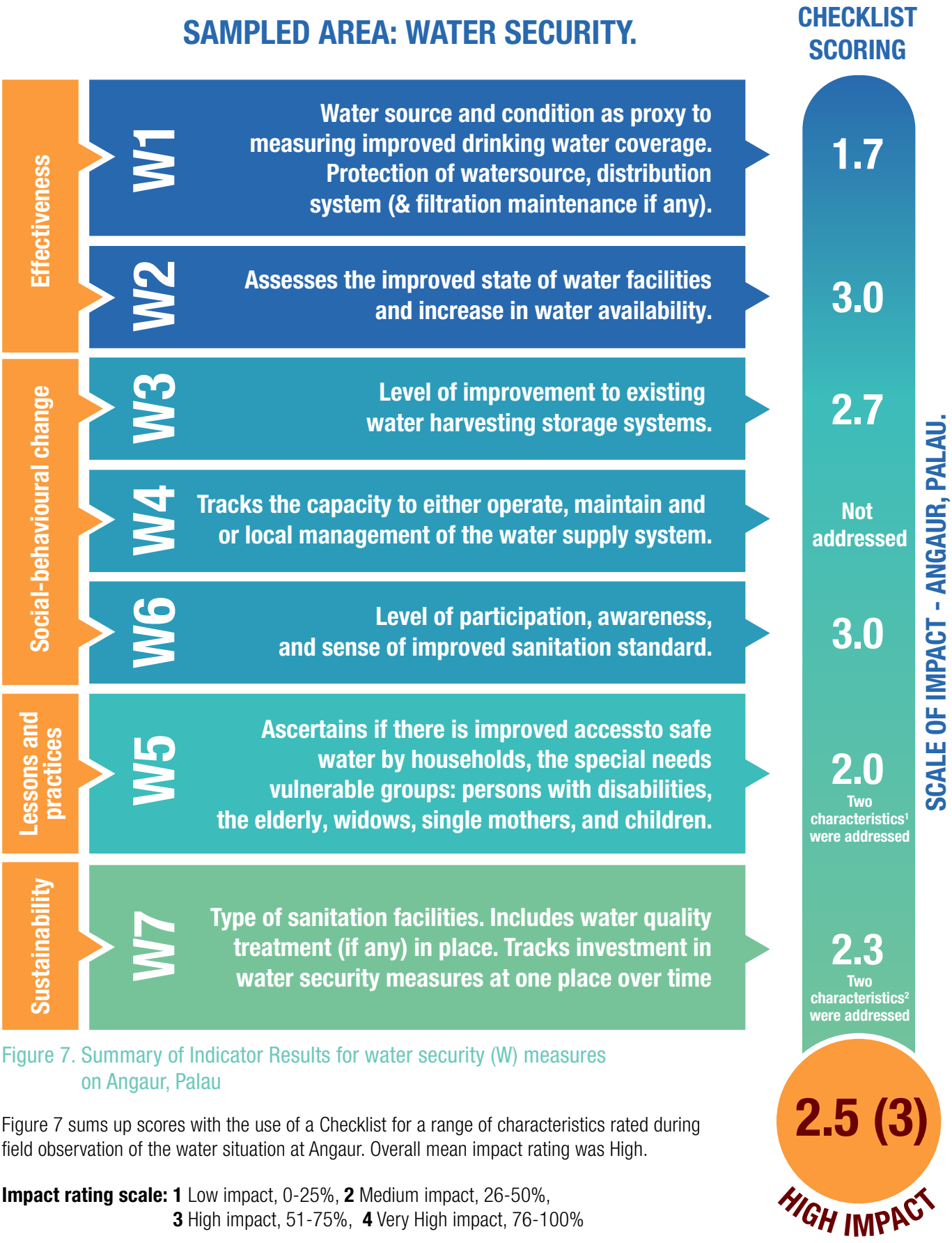


Figure 7. Summary of Indicator Results for water security (W) measures on Angaur, Palau

Figure 7 sums up scores with the use of a Checklist for a range of characteristics rated during field observation of the water situation at Angaur. Overall mean impact rating was High.

Impact rating scale: 1 Low impact, 0-25%, **2** Medium impact, 26-50%, **3** High impact, 51-75%, **4** Very High impact, 76-100%

Using the impact rating approach permits a quick assessment of and comparison between different sector-based adaptation interventions. Checklist datasets provides a rapid summary of different elements and characteristics to measure impact of an intervention that typically categorize information along geographic, sector, people's perspectives, or some combination of the three.

1 Increase in number of households with water tanks; Access to water by vulnerable groups- disability and elderly
2 Treated water for drinking; Water treatment methods

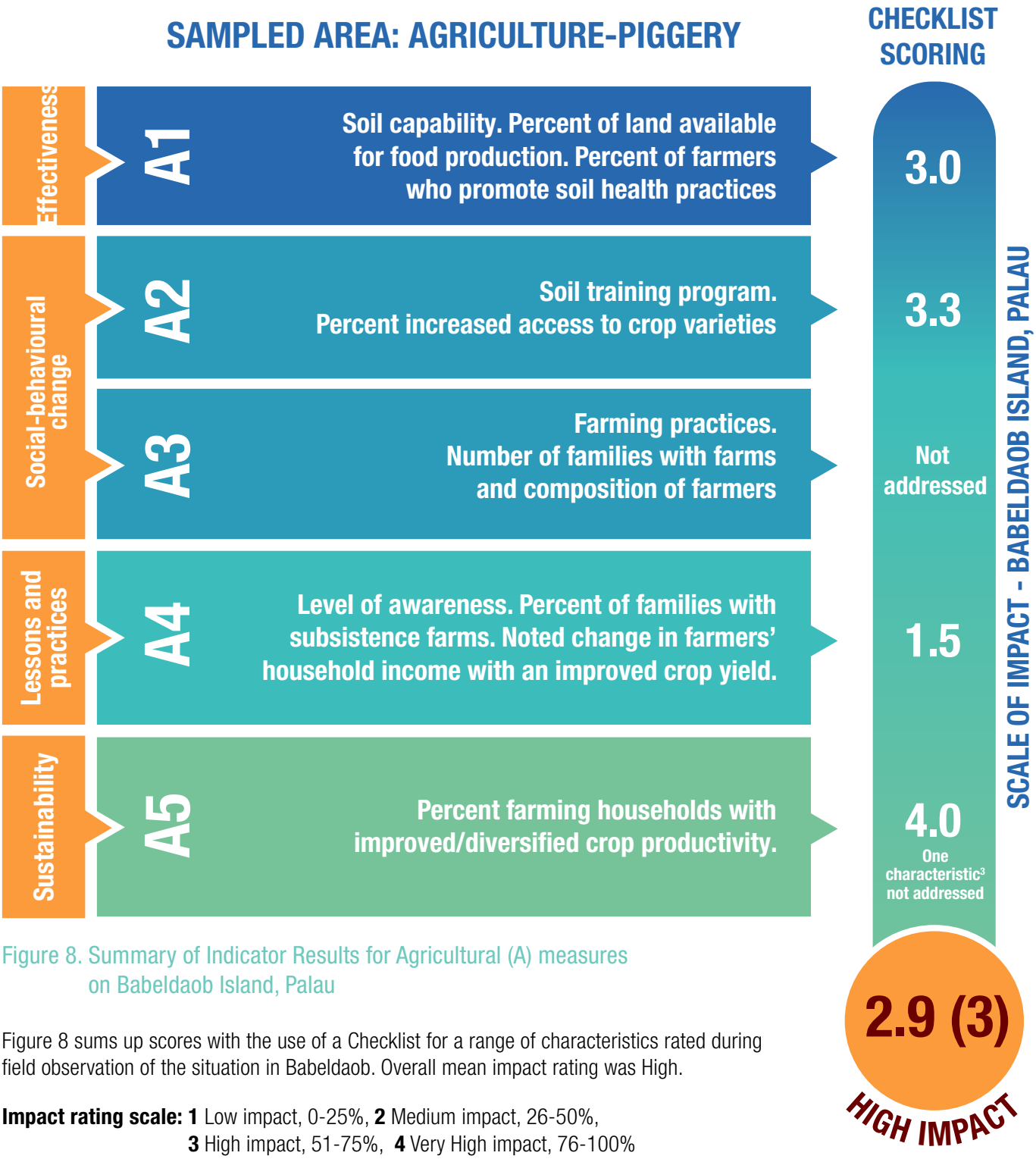


Figure 8. Summary of Indicator Results for Agricultural (A) measures on Babeldaob Island, Palau

Figure 8 sums up scores with the use of a Checklist for a range of characteristics rated during field observation of the situation in Babeldaob. Overall mean impact rating was High.

Impact rating scale: 1 Low impact, 0-25%, **2** Medium impact, 26-50%, **3** High impact, 51-75%, **4** Very High impact, 76-100%

3 Change in crop production yield

In Summary

Figure 9. Palau Impact asessment trial experience

Annex I.
Key Reference Documents for Palau

1. PACC Project brief
2. PACC Project proposal, In country consultations
3. PACC Midterm review
4. PACC Benefit Cost Analysis report
5. Palau crop production and food security project workshop, 2010. Reporting on status.
6. National policy for strengthening food security in Palau as a priority climate change adaptation measure
7. GCCA PSIS Addressing water sector climate change vulnerabilities in the outlying island states of Palau Factsheet
8. GCCA PSIS Report on Palau Capacity Development in Proposal Preparation Using the Logical Framework Approach Workshop 10-13 March 2014
9. GCCA PSIS Report on Palau adaptation project planning workshop 1-2 may 2013
10. GCCA PSIS Addressing Water Sector Climate Change Vulnerabilities in the Outlying States of Palau Project design
11. GCCA PSIS Palau Impact evaluation Report
12. GCCA PSIS country evaluation report – Palau
13. ACSE Palau project brief
14. ACSE Project concept note
15. ACSE Palau project presentation
16. ACSE Project PDD

Annex II. Standardised Rating for Water Security

LEVEL OF IMPACT	RATING SCALE	PERCENTAGE SCALE	STANDARDISED DESCRIPTION
Low Impact	1	0-25%	**Not improved:** *(Water supply straight from unprotected dug wells, unprotected spring, cart with small tank/drum, bottled water)* • Water source protection - low. • If roof is thatched, roof needs repair - no collection of water, state of water source. • Plan developed, neglected state of water system. No water committee. • Low or no participation in water management planning, limited awareness, and no improvement in sanitation standard. • Drinking water coverage - low; SPATIAL distribution of water tanks. • Measure of basic sanitation – all homes share sanitation facilities; still evidence of open defecation.
Medium Impact	2	26-50%	**Somewhat improved:** *Increase in storage capacity for communal use.* • Water source protection: moderate. Well, is walled and tank with roof. • Half of the homes have good roof (needing no repairs) with screen on tanks. • Plan in place with a sustainable financing system on how to manage operation. Inactive water committee. • At least one member of the water committee are women, inclusive of disability persons. • Drinking water coverage- medium; spatial distribution of water tanks, tap stands. • Measure of basic sanitation - Shared sanitation facilities rated high, at least 3-4 homes share a toilet. With at least 25-50% of respondents seem satisfied with their current sanitation standard. • Demonstration of some water safety measures in place.
High Impact	3	51-75%	**Mostly improved:** *Piped supply to half of the homes.* • Water source protection: high eg. roof over well. Buffer zone along source. • Families with disability, elderly, and single mothers own water tanks for direct access • Majority of homes own water storage capacity in good condition. Tank openings are screened. First flush diverters in place with screen on tank. • Plan in place with a sustainable financing system on how to manage operation • Water committee in place but not fully active. At least one member of the water committee are women, inclusive of disability persons. • Drinking water coverage - spatial distribution of water access points. • Measure of basic sanitation - shared sanitation facilities rated medium, for 2-3 homes share a toilet. • With at least 51-75% of respondents seem satisfied with their current sanitation standard. • Safe water quality standards.
Very high Impact	4	76-100%	**Fully improved:** *Standpipes built for drinking stations in community with piped water supply to all homes & < 75% of households own water tanks* • First flush diverters in place with screen on tank. • Plan in place to include training, water safety with financing of repair work. • Water committee is fully active. High participation with equal ratio of men/women, inclusive of disability, youth. • Direct access of piped water into the homes of the elderly & disability. • Drinking water coverage - spatial mapping of water access points. • Measure of basic sanitation - shared sanitation facilities rated low, for majority of homes own a toilet. • More than half of respondents expressed the need to improve sanitation standard with an increased access to water supply. • Safe water quality standards.

Figure 10. Standardised Rating for Water Security.

Annex III. Standardised Rating for Resilient agriculture

LEVEL OF IMPACT	RATING SCALE	PERCENTAGE SCALE	STANDARDISED DESCRIPTION	
Low Impact	1	0-25%	**A1. Soil capability** • At least a quarter of owned land used for planting and other uses Piggery, poultry. • No use of organic fertiliser/sole reliance on inorganic fertilise. • No practice of burning eg. use of bulldozers to clear land. • No fallow period between crops. **A2. Soil training program. Percent increased access to crop varieties** • At least 1 woman represented. • At least 25% of farmers provided with seedlings. • At least 25% of women farmers provided with seedlings. • Only one training carried out. **A3. Farming practices** • At least 25% of all families with farms. • At least 25% of farmers in the area are subsistence farmers. • Crop varieties distributed to at least 25% of total number of families in the area.	**A4. Level of awareness** • At least a quarter of the total number households in the vicinity. • One crop variety available. **A5. State of agriculture planning** • Sector plans in preparation. **A5 a. Crop productivity** • No change in crop production yield since introduced. • One crop farmed (Depending on what crop is farmed). • One crop variety. **A5 b. Progress towards an enabling framework for farmers' increased access to technical support /innovation for increased crop/livestock production & yield** • No general agreements in pace for collaboration.
Medium Impact	2	26-50%	**A1.** • At least half of land owned used for crop farming. • Before planting, apply inorganic fertiliser to enrich the soil. After planting, apply organic fertiliser, use of compost, manure etc. • Partial burn and slash for clearing. • Moderate (rotation of crops during fallow period. **A2.** • At least 50% of participants are women. • At least 50% of farmers issued with seedlings. • At least 50% of women farmers provided with seedlings. • 2 trainings carried out. **A3.** • 50% of families of all families with farms. • 50% of farmers in area are part time subsistence farmers. • Crop varieties distributed to at least 50% of total number of families.	**A4.** • At least half of total number of households in the vicinity. • Two crop varieties available. • Farm produce two more crop varieties. • Moderate change in household income from an improved crop. **A5.** Parts of the Sector plan operational with Monitoring and Evaluation framework. **A5 a.** • Slight increase in production. • Mix cropping. • Two crop varieties. **A5 b.** • Standard agreements for subsector plan operational.

LEVEL OF IMPACT	RATING SCALE	PERCENTAGE SCALE	STANDARDISED DESCRIPTION	
High Impact	3	51-75%	**A1.** • More than half of land owned used for crop farming. • Before planting, apply inorganic fertiliser to enrich the soil. After planting, apply organic fertiliser, use of compost, manure etc • Burning to clear land for planting. • Moderate (rotation of crops during fallow period. • Fallowing of at least one season between crops. Use best practice guidelines according to crop variety **A2.** • At least 65% of participants are women. • At least 65% of farmers issued with seedlings. • At least 65% of women farmers provided with seedlings. • 3 trainings carried out. **A3.** • At least 65% of all families with farms. • All farmers in the area are subsistence. • Crop varieties distributed to more than 75% of total number of families.	**A4.** • 65% of all families with farms. • 65% of farmers in area are part time subsistence farmers. • crop varieties distributed to at least 75% of total number of families. **A5.** • Agriculture sector plan in its entirety is operational with M&E framework. **A5 a.** • Close to 50% increase in production yield. • Mix of crops + other agriculture e.g Poultry, piggery etc. • 3 crop varieties. **A5 b.** • Progressing towards getting assistance for subsector operations.
Very high Impact	4	76-100%	**A1.** • All land is used for crop farming. • Full use of organic fertiliser. • Burning to clear land for planting. • Fallowing of at least one season between crops). Is the soil allowed to rest between crops? Use best practice guidelines according to crop variety. **A2.** • More than 50% of participant were women. • 75% of farmers issued with seedlings. • 75% of women farmer provided with seedlings. • More than 3 trainings carried out. **A3.** • More than 75% of all families with farms. • All farmers in the area are subsistence. • Crop varieties distributed to more than 75% of total number of families.	**A4.** • All households with improved diet. • More than 3 crop varieties. • Mix of crops and other agriculture. • Household able to cover family costs for education, improved standard of living etc. **A5**. • State of agriculture planning. • Agriculture sector plan in its entirety is operational with M&E framework. **A5 a.** • 50% increase in yield since introduction. • Mix of crops + other agriculture e.g Poultry, piggery etc. • 3 or more crop varieties. **A5 b.** • Assistance for subsector operational e.g. Subsidies for other agriculture activities.

Figure 11. Standardised rating for Resilient Agriculture.

Produced by GCCA+ SUPA Output 1 led by
the Secretariat of the Pacific Regional Environment Programme

ISBN 978-982-04-1149-4