

# Belau Watershed Alliance Action Plan 2018-2022



*Communities Working Together to Protect  
Belau's Precious Resources*





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## Acronyms

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|         |   |
|---------|---|
| ASPC    | Association of State PAN Coordinators                     |
| BEHST   | Belau Environmental and Health Solutions and Technologies |
| BNM     | Belau National Museum                                     |
| BWA     | Belau Watershed Alliance                                  |
| CAP     | Conservation Action Planning                              |
| CBO     | Community Based Organizations                             |
| CCO     | Climate Change Office                                     |
| COC     | Council of Chiefs   |
| EQPB    | Environmental Quality Protection Board                    |
| GEF     | Global Environment Facility                               |
| IW      | International Waters                                      |
| MCA     | Master Cooperative Agreement                              |
| MNRET   | Ministry of Natural Resources, Environment, and Tourism   |
| NBSAP   | National Biodiversity Strategic Action Plan               |
| NEC     | National Emergency Committee                              |
| NEMO    | National Emergency Management Office                      |
| NGO     | Non-Government Organization                               |
| NRCS    | Natural Resources Conservation Service                    |
| OPM     | Office of Project Management                              |
| PALARIS | Palau Automated Land and Resource Information System      |
| PAN     | Protected Areas Network                                   |
| PCS     | Palau Conservation Society                                |
| PICRC   | Palau International Coral Reef Center                     |
| POP     | Persistent Organic Pollutants                             |
| PPUC    | Palau Public Utilities Corporation                        |
| R2R     | Ridge to Reef   |
| SDG     | Sustainable Development Goals                             |
| SGP     | Small Grants Programme                                    |
| TNC     | The Nature Conservancy                                    |
| UNDP    | United Nations Development Programme                      |
| USAID   | United States Agency for International Development        |
| WFL     | Water for Life  |



## Foreword

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It is with great pleasure that we present to you our 2018-2022 Belau Watershed Alliance (BWA) Strategic Action Plan. This update complements past efforts and expresses strengthened commitments to the protection of Belau’s watersheds. It is intended that this document will continue to guide local, state, and national watershed protection efforts, further linking to regional and global initiatives.

BWA’s goals for the next five years include more focus and advocacy of (1) Education and outreach, (2) Sustainable financing, (3) Climate change resilience and drought, and (4) Capacity enhancement. Some specific actions include but not limited to support for enabling participatory water quality monitoring programs, restoring streams and water flow; and promoting partnerships for continued water and water related research. From the previous action plan, we understand that this document is expected to be frequently referenced as such goals and strategic actions have been formatted to facilitate its use as a working document.

Building upon the success of the Protected Areas Network and other locally and nationally managed initiatives, the Alliance re-affirms its outlook “Communities Working Together to Protect Belau’s Precious Resources”. We also recognize that some challenges might still exist in running these successful initiatives. We are eager and willing to continue as community conduits to advocate our shared responsibility of protecting our waters and natural resources.

We are thankful for the multiple opportunities and partnerships that have been provided to us throughout the years and are optimistic for more areas of collaboration in the future. From the bottom of our hearts, we thank you for your continued commitment and support.

Respectfully,

A handwritten signature in blue ink, appearing to read 'Jonathan Temol', written in a cursive style.

Jonathan Temol  
Chairman, Belau Watershed Alliance

# Special Message from the Minister

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Looking back on the past 12 years, the Belau Watershed Alliance has come a long way. What began as a dialogue about watershed issues between two states has now encompassed all Babeldaob States, a significant milestone for the Alliance.

Notable accomplishments in its earlier years include hosting several Watershed Summits, advocating for the establishment of watershed protected areas, and supporting the completion of conservation action plans and management plans. More recent work for the Alliance includes supporting water restoration projects, conducting educational outreach to schools and events, developing educational materials, supporting various workshops and resource management trainings, and hosting a National Dialogue on Environmental Issues, a first for the Alliance.

This action plan represents continued cooperative efforts of everyone. BWA is fortunate to have the support of various key agencies such as the office of the President, traditional and elected leaders of states, community organizations, and the representatives of each of the BWA member states. It is our combined mission to empower state governments and local communities to strengthen effective and sustainable watershed management.



I would like to congratulate BWA on their achievements and I am hopeful for the successful deliverables of their future endeavors. The Ministry of Natural Resources, Environment, and Tourism and the BWA Technical Committee is in full support of the Belau Watershed Alliance Action Plan 2018-2022 and will continue to support BWA’s efforts in resource and watershed management.

A handwritten signature in blue ink, reading "F. Umiich Sengebau". The signature is fluid and cursive.

F. Umiich Sengebau,  
Minister, Natural Resources, Environment, and Tourism

## BWA Outlook

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### VISION

*The Belau Watershed Alliance will become a national model for ensuring that states have continued access to clean water and healthy habitats, and promote environmentally sustainable economic development through collaborative efforts of a diverse array of stakeholders.*

### MISSION

*The Belau Watershed Alliance will protect, conserve and restore the water resources of Belau through collaborative outreach, education, networking, science, information sharing and technical assistance by and for the communities of the island.*

### CORE VALUES

*“We cannot take natural assets with us (in death), but they are entrusted to us to protect for those who will come.”*

*“Each person is like the stump of a tree that is supported by a network of roots (of affiliations and resources).”*

*The steering committee emphasizes on Palauan values and ethics by respecting cultural protocols and governance. Our conservation values come from two Palauan proverbs, or ollachitnger, literally translated to “laws of Tnger”. These values are the basis of the alliance’s motivation to nurture partnerships that bring in the resources necessary to fulfill our obligation to the future generations of Palau.*



<sup>1</sup> Tnger is a reef in the northern lagoon where this story of a greedy heron takes place. A heron ate too much fish at the Tnger reef and vomited all its food on its way back and came home with an empty stomach. The moral of the story is “There is always tomorrow, thus ethical values and sustainable practices will take one far.” Proverbs come from folktales that emphasize on values and considered “laws of life” in the Palauan culture.



## BWA Strategy

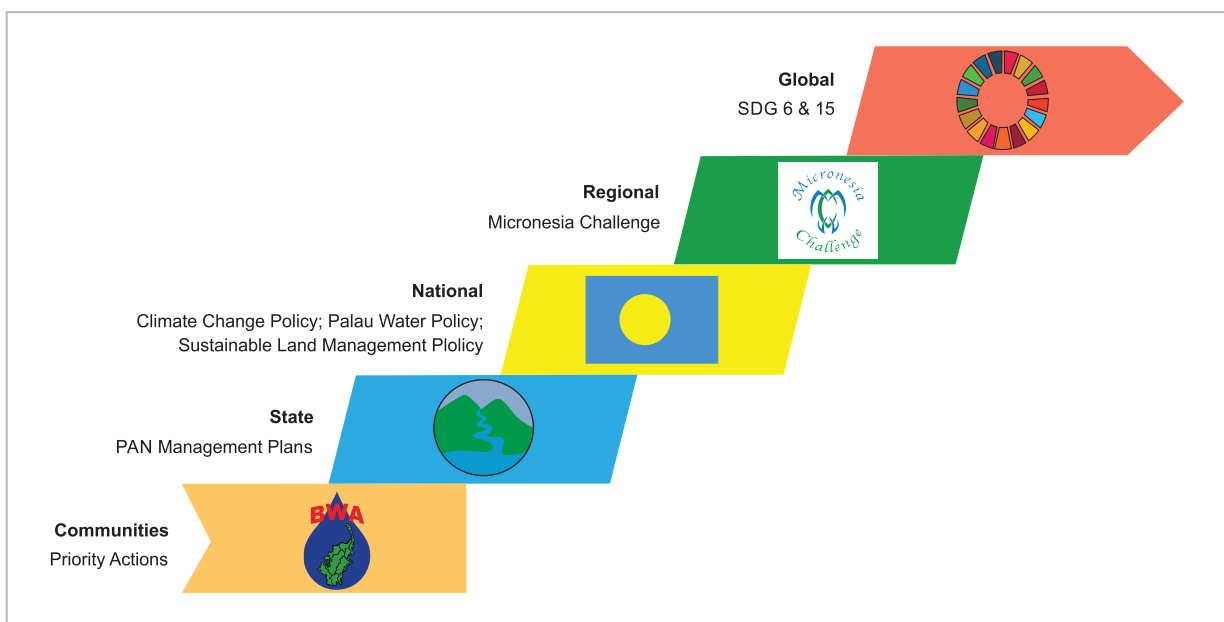
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BWA knows that water is without a doubt, a valuable resource that humans, ecosystems, and economic health depend on. Therefore, it aims to work with groups and communities in line with goals set by state and national government, as well as regional and global initiatives to ensure proper management of the earth's fresh water resources.

The BWA strategy is to ensure protection of Palau's water resources and perpetuate water quality and abundance for Palauan communities. The Alliance works with local and regional partners to address land use issues, safeguard critical ecosystems, habitats and species that are culturally and ecologically important to Palauans. This includes support for ongoing forest monitoring initiatives by MNRET and partners to monitor forest health, as it is an indicator of watershed health. The Alliance promotes indigenous and science based management by building upon previous efforts and wisdom of its ancestors while seeking science advice to validate their management practices. By merging science based and traditional practices, communities are able to understand models and techniques that are scientifically sound as well as applicable in Palauan society.

BWA envisions the whole of Palau as having access to clean safe water, and promote sustainable economic development through collaborative efforts with stakeholders. This vision supports the Palau Water Policy vision and goals which ensure safe, affordable, and sustainable water for all. In addition, the BWA vision supports global goals such as Sustainable Development Goal (SDG) 6, which calls for clean water and sanitation for all and SDG 15, which aims to protect, restore, and promote sustainable use of terrestrial ecosystems and forests, which includes water sources.

The Alliance is a proud supporter of local, state, national, and global goals and initiatives to safeguard Palau's and the earth's most precious natural resource.





## **Governance**

The Belau Watershed Alliance is governed by the Governors and High Chiefs of each member state/community. In most instances, the traditional chiefs of the community are included in the state leadership as advisers, or official members of the legislative or administrative body of the state government by state constitutions. The state governors of each alliance member appoint representatives as members of the steering committee with approval of the state legislature and council of chiefs either by oral consensus (informal,) or by official resolution (formal) appointment.

The steering committee, as representatives of their states and communities, select individuals from resource agencies who are experts in their fields to provide technical support to the committee. This technical support group is called the Technical Resource Team who are non-voting members of the steering committee but valued trustees of the alliance. Partnership activities are coordinated by the Ministry of Natural Resources, Environment, and Tourism.

## **How to Become a BWA Member State**

The steering committee developed a 10-Step process to insure that each member may visually track progress and is adequately supported. The following steps are usually the route each member state would take to ease into the Alliance as efficiently as possible. An initial meeting with state and community leadership resulting in agreement to join BWA is the first step. The second step is for the state to create a resolution to join the Alliance.

Following the resolution is the appointment of the steering committee representatives followed by the signing of the Master Cooperative Agreement (MCA). Then technical recommendations should be made along with a legislation to designate the state's watershed protected area. The state then appoints a planning team to develop a management plan and finally endorses it. Lastly, the state will need to establish a sustainable funding mechanism to continue proper management and ensure a healthy watershed.



# BWA Strategic Action Plan 2018-2022

|                        | GOAL 1  | OBJECTIVES   | STRATEGIC ACTIONS   |
|------------------------|---|--|---|
| EDUCATION AND OUTREACH | <p><b>BWA will communicate up-to-date best watershed management practices and water resource information through education outreach materials and events.</b></p> | <p>(1) By the end of year 1, at least 5 watershed-based and water resource educational materials are developed while supporting existing water-based campaigns and activities in Palau</p> | <p>(1.1) Develop new and support existing watershed-based educational materials and campaigns to schools, communities, and relevant agencies as well as be more proactive in state and national events.</p> <p>(1.2) Partner with the Ministry of Education to incorporate watershed-based educational material into school curriculum.</p> <p>(1.3) Work with states to update watershed protected areas signage with map and facts.</p> <p>(1.4) Involve business community in watershed education campaign.</p> <p>(1.5) Produce a promotional/ educational video.</p> <p>(1.6) Collaborate with partner agencies to post caution signs around major water sources in Babeldaob as part of water quality campaign.</p> |
|                        |   | <p>(2) On an annual basis, the Alliance will update national and local leadership on watershed management and water resource status of Palau.</p>  | <p>(2.1) Build partnership with National Council of Chiefs and Governors Association</p> <p>(2.2) Garner National and Regional recognition and support for BWA.</p> <p>(2.3) Foster dialogue on environmental issues to update leadership, share lessons learned, strengthen network and partnerships</p> <p>(2.4) Create opportunities and forum for a diverse array of stakeholders to discuss and resolve Belau's land-based resource issues.</p>  |
|                        |   | <p>(3) By the end of Year 5, BWA will have reached out to non-member states while supporting national and regional initiatives.</p>  | <p>(3.1) Advocate for BWA membership for Koror and outlying states.</p> <p>(3.2) Support National Campaigns and Initiatives such as the "Responsible Tourism Campaign" and the "Palau Active Land Management" initiative.</p> <p>(3.3) Continue to expand and maintain partnership with key agencies and partner organizations as technical resource support of BWA.</p>  |
| SUSTAINABLE FINANCING  | <p><b>BWA will achieve Sustainable Financial Support to carry out its vision and mission.</b></p>   | <p>(1) By the end of the first year, funding priorities will be identified and established for the Alliance</p>  | <p>(1.1) Set realistic fund goals to support Alliance activities and events.</p> <p>(1.2) Create an annual budget for BWA.</p> <p>(1.3) Develop guidelines and protocols regarding the responsible use of BWA funds.</p>  |
|                        |   | <p>(2) By the second year of the plan, BWA will have identified, evaluated, and selected funding sources</p>   | <p>(2.1) Identify appropriate funding sources including public and private grants, donations, and fundraising events.</p> <p>(2.2) Solicit donations from local business community.</p> <p>(2.3) Identify funding for watershed management program.</p> <p>(2.4) Explore climate change funding for watershed management.</p>   |
|                        |   | <p>(3) Before the fourth year of the plan, BWA will develop sustainable finance mechanisms to support watershed management throughout Palau</p>  | <p>(3.1) Develop a BWA Resource Mobilization Plan.</p> <p>(3.2) Continue to strengthen financial sustainability for BWA by collecting membership dues.</p>  |



| CLIMATE RESILIENCY AND DROUGHT   | GOAL 3  | OBJECTIVES   | STRATEGIC ACTIONS   |
|--|---|--|---|
|  | <p><b><i>BWA will help build resiliency to changes in climate and weather patterns by protecting biodiversity, maintaining ecosystem functions, sustaining water and food resources to ensure health, safety, and security for the community.</i></b></p> | (1) By the end of the plan, community awareness of climate change, building resiliency, and adaptation will be increased.  | (1.1) Develop climate change and adaptation education and outreach materials and events.<br>(1.2) Work with partners to conduct vulnerability assessment workshops for communities.   |
|  |   | (2) Before the end of the plan, BWA will have partnered up with appropriate agencies and built awareness on food security, renewable energy, health issues, and disaster preparedness throughout Palau.  | (2.1) Assist States incorporate climate change adaptation strategy into watershed management plans.<br>(2.2) Assist in reviewing and revising existing state and community plans to include climate change adaptation strategies.<br>(2.3) Work with partners to develop a BWA Drought Protocol<br>(2.4) Coordinate efforts and collaborate with agencies conducting research and project on climate change adaptation, food security, and renewable energy.<br>(2.5) Foster partnerships with infrastructure and emergency/preparedness agencies (not limited to PPUC and NEMO) for source water restoration and protection. |
|  |   | (3) By the end of year 2, BWA will pilot a water quality monitoring project in at least three states as well as support other watershed related initiatives  | (3.1) Work with states to set up water quality monitoring program.<br>(3.2) Assist states in water quality monitoring on a consistent basis.<br>(3.3) Work with states to collect water quality data for pilot states.<br>(3.4) Support Forest Monitoring Program established by MNRET and partners.  |
| CAPACITY ENHANCEMENT   | GOAL 4  | OBJECTIVES   | STRATEGIC ACTIONS   |
| <p><b><i>BWA will improve capacity needed to reach BWA's vision and mission.</i></b></p> | (1) By the end of the plan, BWA will strengthen and improve individual capacity and internal operations and management.   | (1.1) In the beginning of the Plan, BWA will develop Standard Operating Procedures (SOPs) and Scope of Work (SOWs) to ensure efficiency and quality work is carried out.<br>(1.2) Assessments and Evaluations to be made on an annual basis to improve effectiveness of BWA work carried out.<br>(1.3) Advocate and be mindful of social inclusion for all activities. |   |
|  | (2) By the end of the plan, BWA will improve institutional capacity to strengthen multi-sectoral and multi-stakeholder coordination at the local and national level for effective implementation of the Action Plan.                                      | (2.1) Develop strategic relationships with key partner agencies and state governments.<br>(2.2) Collaborate with key partner agencies to update BWA Action Plan.<br>(2.3) Strengthen coordination, governance, and leadership roles through trainings and workshops.<br>(2.4) Develop, indicators for effective watershed management.                                  |   |
|  | (3) By the end of the plan, BWA will promote water quality and water quality related research through capacity building training programs or mentorship.  | (3.1) Advocate and facilitate for participatory water quality monitoring programs<br>(3.2) Facilitate partnerships with State and Partners for opportunities for water quality and water quality related research.<br>(3.3) Share all opportunities for research and partnership with members.   |   |

## Current Highlights

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### ***Managing Storm Water Pollution with Palau Conservation Society (PCS) – 2017***

This project is a collaboration headed by the Palau Conservation Society (PCS) along with the United States Agency for International Development (USAID), The Environmental Quality Protection Board (EQPB), and the Belau Watershed Alliance (BWA). The Project's aim is to explore, raise capacities, and implement the three State's (Melekeok, Ngeremlengui, and Ngarchelong) institutional and regulatory framework around watershed management, specifically, storm water management, so that they can sustainably develop.

The three States in the project are all members of the Belau Watershed Alliance, have protected areas with active management, and are willing to develop their states without stressing the ecosystems that provide goods and services to residents in their respective states. These factors make them ideal for this storm water management program.

After a few assessments, it was clear that little capacity exists in the states but there is awareness and support for storm water management that already existed. It is hoped that this project will be applied to the remaining seven states in Babeldaob.

### ***National Dialogue on Environmental Issues – 2018***

The Belau Watershed Alliance (BWA), hosted a National Dialogue on Environment Issues. The purpose of the National Dialogue was to raise awareness among all national, local, private agencies, and community based organizations (CBOs) on Palau's environment issues.

This space allowed various stakeholders to participate in an issue learning atmosphere to increase their knowledge of environment policies, programs, and frameworks in place to address current environment issues. Most importantly, this national dialogue clarified each participating agency or organization's value added role in improving institutional decision making and conservation of biodiversity. Communities play an important role in achieving Palau's Environmental objectives both nationally and globally. As such, this national dialogue was a way to ensure that our community efforts to manage resources and conserve biodiversity meet our national commitments and benefit our people.

Various environmental agencies presented on national environment policies, strategies, and initiatives such as the presentation of the State of Palau's Environment, the Climate Change Policy, Land Degradation Strategies, National Biodiversity Strategic Action Plan (NBSAP), Palau Water Policy, and the Convention on Persistent Organic Pollutants (POPs). In addition, community organizations presented on community based environmental strategies and efforts, namely the Small Grants Programme (SGP), Ngeremlengui State, Dilisor Agriculture Association of Ngarchelong, Mindszenty High School, and Ngarchelong State Protected Area Network (PAN).

The success of the National Dialogue was made possible with the support of the following co-hosts and planning team, namely the, the GEF Small Grants Programme (GEF SGP), the United Nations Development Programme (UNDP), the Palau Government, the Protected Areas Network (PAN), the Association of State PAN Coordinators (ASPC), the GEF Pacific Ridge to Reef (R2R) International Waters (IW) program, and Palau Conservation Society. BWA is committed to working with all agencies, organizations, and private sectors to further strengthen its relationships to help increase knowledge on Palau’s environment issues.

***PICRC two-year education and outreach program on water conservation management***

The Palau International Coral Reef Center (PICRC) was tasked by the National Emergency Committee (NEC) to launch a two-year education and outreach program on water conservation management called for by the “Immediate and Near-term Drought Response Plan” from the NEC. As requested, BWA will collaborate with PICRC and grant them access to the technical information on watersheds and conservation management that BWA has.





# BWA at a Glance 2006-2018



In Hawaii in search of watershed alliance model 2006



First Watershed Summit Sept. 22, 2006



Melekeok and Ngeremlengui sign the first MCA Dec. 2006



Ngiwal signs MCA as third member, Nov. 2007



USFWS funds hired BWA Coordinator, April 14, 2008



Aimeilik signs MCA as fourth member Aug. 28, 2008



Ngaradmau signs MCA as fifth member Sept. 12, 2008



Second Watershed Summit held at Ngarachamayong Cultural Center, Oct. 22, 2008



Ngeremlengui passes Ngermeskang Reserve Act, Sept. 22, 2008



Ngchesar signs MCA as sixth member, Oct. 30, 2008



Ngiwal passes Orsouklesol Ngerbekuu Act, Dec. 22, 2008



1st Micronesia Watershed Learning Exchange Jan. 21-27, 2008



Ngarachelong signs MCA as seventh member, Jan. 21, 2009



Ngiwal CAP Workshop in 2009



Ngchesar CAP Workshop (2010)



Ngatpang signs MCA as eighth member (2010)



Ngarard signs MCA as ninth member (2010)



BWA Action Plan Review with Technical Committee and Agencies, Oct. 29, 2010



Third Watershed Summit at Ngarachamayong Cultural Center April 21, 2011



Third Watershed Summit on April 21, 2011



Leadership awareness with Palau Council of Chiefs (2011)



Leadership awareness with Palau Council of Chiefs (2011)



BWA Quarterly Meeting held in Aimeilik (2013)



Learning Exchange in Ngaradmau (2014)



Learning Exchange in Melekeok's Ngaradok Nature Reserve (2014)



Learning Exchange in Ngchesar (2014)



Learning Exchange in Ngarachelong (2014)



BWA Quarterly Meeting held in Ngiwal (2015)



BWA Leadership Meeting in Ngarachelong on Jan 26, 2016



Lead Representatives and Technical Committee meet Mar. 17, 2017



Watershed Learning Exchange Workshop Sept. 19, 2017



BWA Quarterly Meeting held July 25, 2017



Airai Community Meeting Jan 16, 2018



World Water Day Fair Outreach at PICRC Mar 22, 2018



National Environment Dialogue May 10, 2018



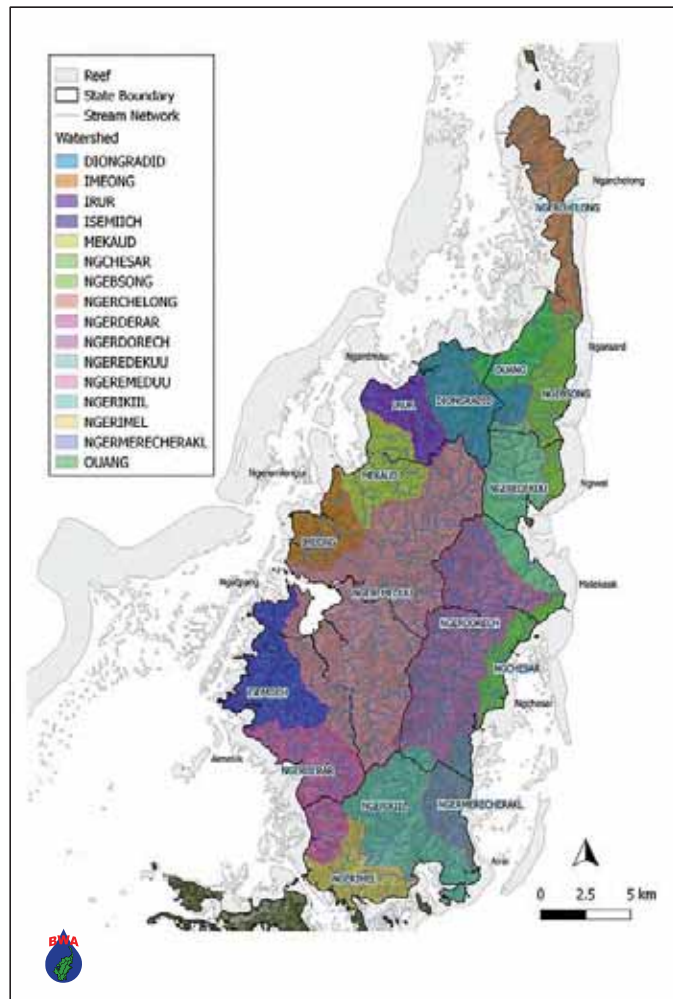
BWA Quarterly Meeting Jun 21, 2018

# Watershed Profiles

## Introduction to Watershed Profiles

A watershed is an area of land from which rainfall and groundwater drain to a lake, river, or ocean. Watersheds not only include the channels which the water flows, but also the topography and the environment from which the water drains. A watershed can be described in different scales, from a small stream to a network of rivers.

Palau's watersheds are found in Babeldaob. Babeldaob has five major watersheds, namely Ngermeduu, Ngerdorch, Ngerikiil, Diongradid, and Ngerbekuu, including numerous smaller watersheds. The 2010-2015 version of the BWA Action plan provided a concise snapshot of the natural history of Palau, Babeldaob, watersheds, and issues of concerns. This update wishes to introduce basic watershed profiles for each of the BWA states. Information for these watershed profiles were collated from various sources and are presented below.

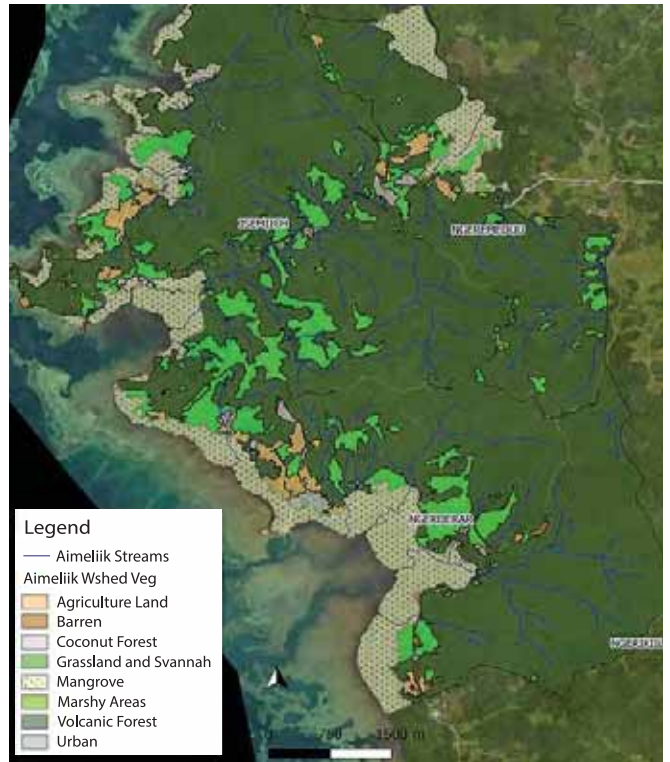


- *Watershed Connectivity:* Watersheds are not limited to State or political boundaries. Many states share watershed coverage with one another. Watershed connectivity were derived from layers obtained from PALARIS office.
- *Protected Areas:* Notable accomplishments in the protection of watersheds is the establishment of protected areas. These protected areas were either enacted through State PAN laws or State Legislations.
- *Demographics:* Information on State population, household, source of water, type of sewer systems. Obtained from the 2015 Census for Palau.
- *Major water sources:* Sources of water either surface water, rainfall, or groundwater. Information derived from communication with stakeholders.
- *Land Cover:* Shape files obtained from PALARIS, reclassified based on 2017 forest strategy communication,
- *Soil Types:* Obtained from the US NRCS Soil Database for Palau.

As noted above, various data were collated to produce the watershed profiles. Updates will be made to the profiles when new information is made available.



# Aimeliik



| Land Cover (PALARIS)   |        |
|------------------------|--------|
| Agriculture Land       | 0.40%  |
| Barren                 | 0.14%  |
| Coconut Forest         | 0.03%  |
| Grassland and Savannah | 2.44%  |
| Mangrove               | 4.22%  |
| Marshy Areas           | 0.09%  |
| Volcanic Forest        | 92.54% |
| Urban                  | 0.15%  |

## General Soil Types (NRCS)

Typically, soil types in Aimeliik on hills and terraces of volcanic islands are very deep, well drained soils. These soils support mixed-upland forest and grasslands-pandanus forest plant communities and are used for native vegetation, watershed, or agroforestry cultivation of subsistence crops. A few areas are used for urban development.

Commonly, Aimeliik soil types in the intertidal zone of mangrove swamps adjacent to volcanic islands are very deep, but poorly drained. They are formed in organic deposits and alluvium (a deposit of clay, silt, sand, and gravel) derived from volcanic material or limestone.

Soil information were obtained from the US NRCS Soil Database for Palau.

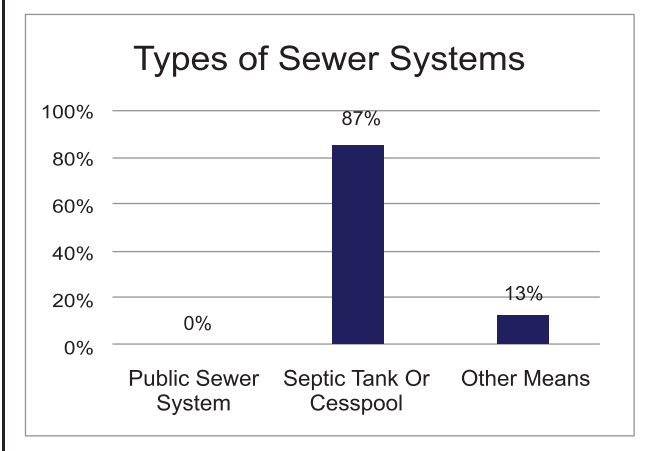
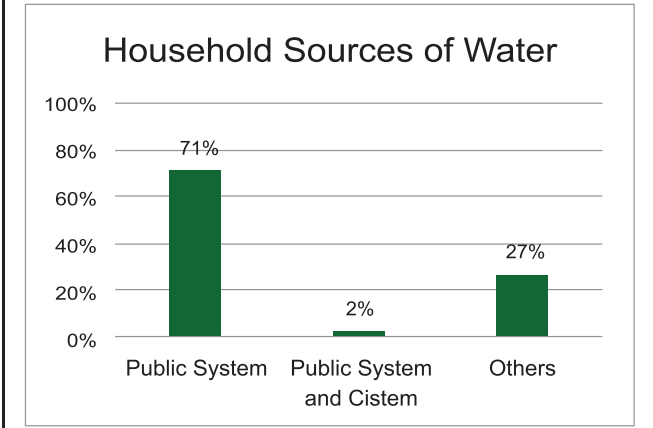


**Watershed Connectivity**  
Ngermeduu; Ngerderar; Isemiich; Ngerikiil

**Protected Areas**  
Imul Mangrove Conservation Area; Ngerchebal Island Wildlife Conservation; Ngerderar Watershed Conservation Area; Ngermeduu Conservation Area; Oisebukel Marine Reef Sanctuary

## Demographics (2015 Census)

Population: 334  
#Household: 97



**Major Water Sources**  
Surface Water; Rain





# Airai



## Watershed Connectivity

Ngerdorech; Ngermeduu; Ngerikiil; Ngermerecherakl; Ngerimel; Ngerderar

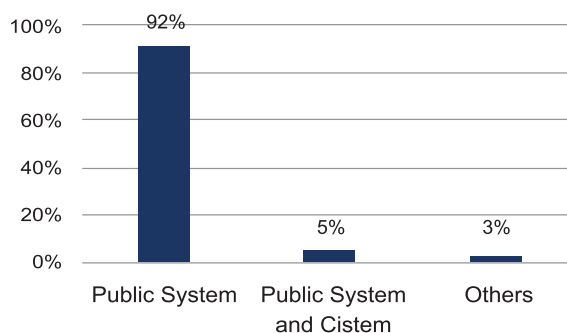
## Protected Areas

Medal Ngediull Conservation Area; Ngchesechang Mangrove Conservation Area; Oikull Mangrove Conservation Area, Ngerream Conservation Area

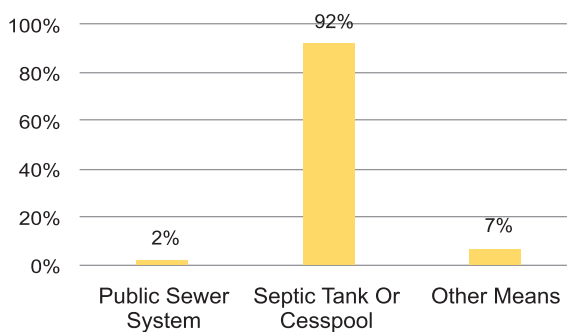
## Demographics (2015 Census)

Population: 2,455  
#Household: 624

### Household Sources of Water

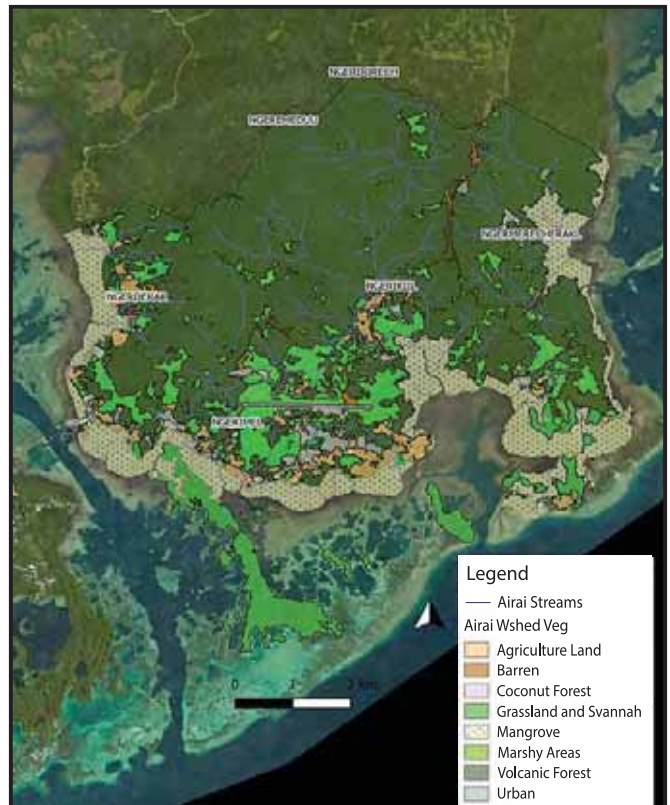


### Types of Sewer Systems



## Major Water Sources

Surface Water; Rain



## Land Cover (PALARIS)

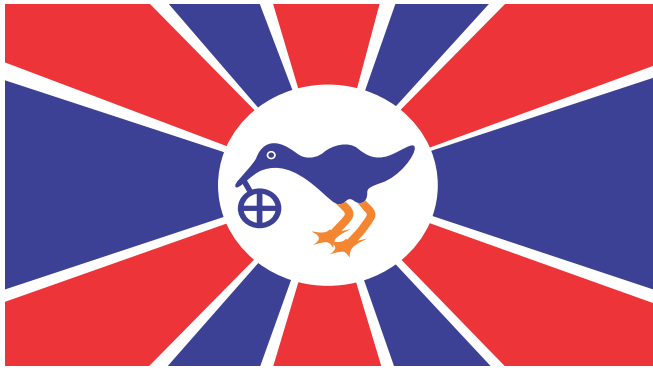
|                        |        |
|------------------------|--------|
| Agriculture Land       | 0.89%  |
| Barren                 | 0.27%  |
| Grassland and Savannah | 2.97%  |
| Mangrove               | 4.54%  |
| Marshy Areas           | 0.13%  |
| Rock Island Forest     | 1.35%  |
| Volcanic Forest        | 89.07% |
| Urban                  | 0.78%  |

## General Soil Types (NRCS)

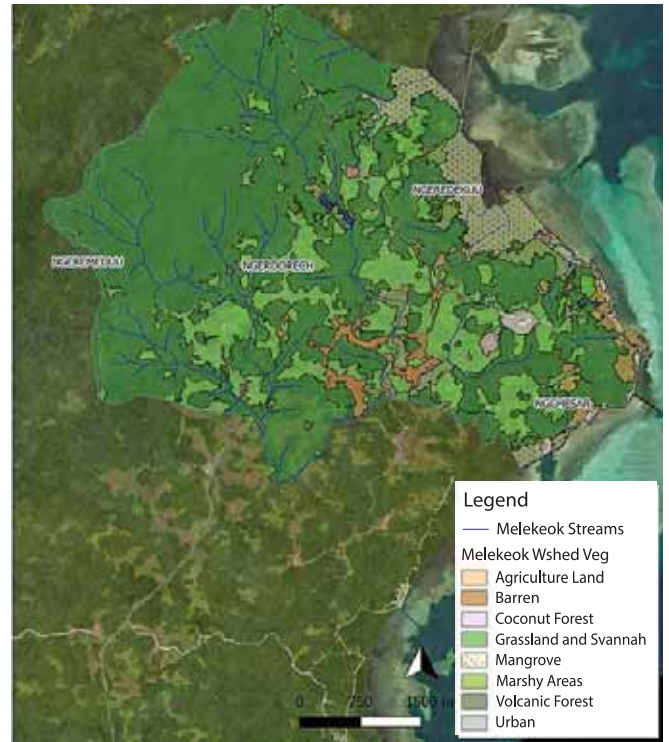
In general, Airai soil types on hills and terraces of volcanic islands are very deep, well drained soils. These soils support mixed-upland forest and grasslands-pandanus forest plant communities and are used for native vegetation, watershed, or agroforestry cultivation of subsistence crops. A few areas are used for urban development.

Normally, Airai soil types in the intertidal zone of mangrove swamps adjacent to volcanic islands are very deep, but poorly drained. They are formed in organic deposits and alluvium (a deposit of clay, silt, sand, and gravel) derived from volcanic material or limestone.

Soil information were obtained from the US NRCS Soil Database for Palau.



# Melekeok



| Land Cover (PALARIS)   |        |
|------------------------|--------|
| Agriculture Land       | 0.24%  |
| Barren                 | 0.27%  |
| Coconut Forest         | 0.01%  |
| Grassland and Savannah | 2.50%  |
| Mangrove               | 1.03%  |
| Marshy Areas           | 0.31%  |
| Volcanic Forest        | 95.48% |
| Urban                  | 0.16%  |

## General Soil Types (NRCS)

Generally, Melekeok soil types on hills and terraces of volcanic islands are very deep, well drained soils. These soils support mixed-upland forest and grasslands-pandanus forest plant communities and are used for native vegetation, watershed, or agroforestry cultivation of subsistence crops. A few areas are used for urban development.

Broadly, Melekeok soil types on erosional hills on volcanic islands are very deep, well drained soils. This soil type is derived from volcanic rocks formed as chemically weathered rocks. Moreover, these soils support fern-land plant communities and generally are used only for watersheds. A few areas are mined for bauxite.

Soil information were obtained from the US NRCS Soil Database for Palau.

## Watershed Connectivity

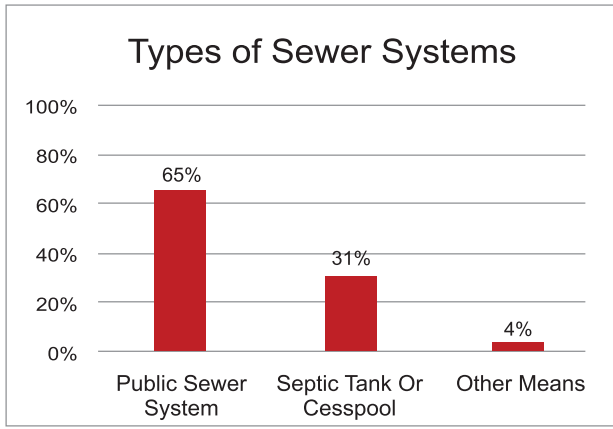
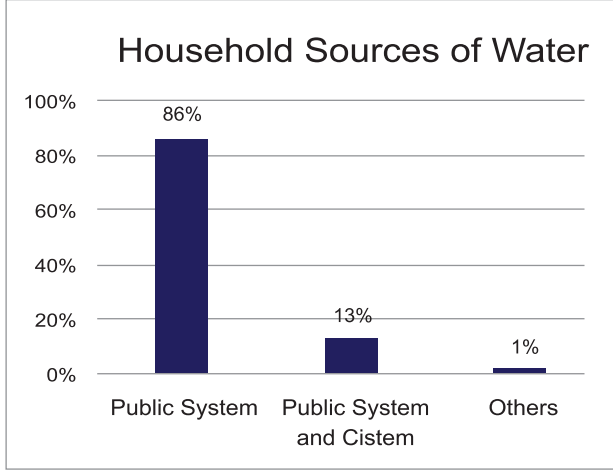
Ngeredekuu; Ngermeduu; Ngerdorch, Ngchesar

## Protected Areas

Ngardok Nature Reserve; Ngermedelim Marine Sanctuary

## Demographics (2015 Census)

Population: 277  
#Household: 78



## Major Water Sources

Surface Water; Rain; Ngardok Lake





# Ngaraard



## Watershed Connectivity

Ngarchelong; Ouang; Ngebsong; Diongradid; Ngeredekuu

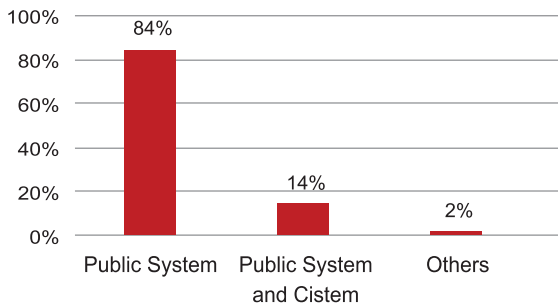
## Protected Areas

Diong Era Ngerchokl Conservation Area; East Coast Conservation Area (Remachel Site); West Coast Mangrove Conservation Area; Ungellel Conservation Area; Ngerkall Lake and Metmellasech Watershed Conservation Area; Ongiil Conservation Area.

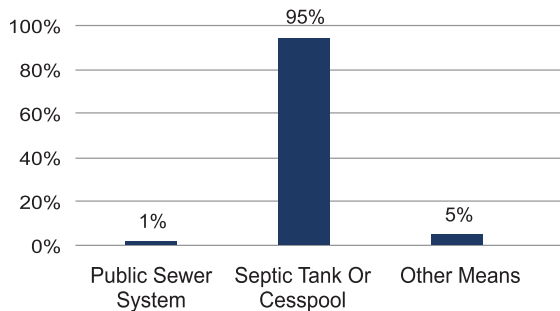
## Demographics (2015 Census)

Population: 413  
#Household: 133

### Household Sources of Water

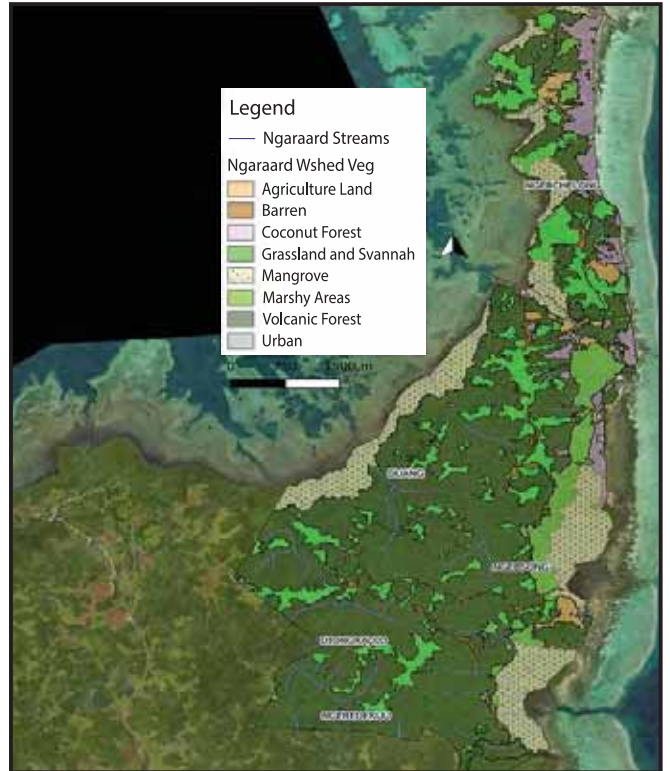


### Types of Sewer Systems



## Major Water Sources

Surface Water; Rain; Ngerkall



## Land Cover (PALARIS)

|                        |        |
|------------------------|--------|
| Agriculture Land       | 0.27%  |
| Barren                 | 0.26%  |
| Coconut Forest         | 0.61%  |
| Grassland and Savannah | 2.34%  |
| Mangrove               | 2.43%  |
| Marshy Areas           | 0.72%  |
| Volcanic Forest        | 93.26% |
| Urban                  | 0.11%  |

## General Soil Types (NRCS)

Usually, Ngaraard soil types in the intertidal zone of mangrove swamps adjacent to volcanic islands are very deep, but poorly drained. They are formed in organic deposits and alluvium (a deposit of clay, silt, sand, and gravel) derived from volcanic material or limestone.

On the whole, Ngaraard soil types on hills and terraces of volcanic islands are very deep, well drained soils. These soils support mixed-upland forest and grasslands-pandanus forest plant communities and are used for native vegetation, watershed, or agroforestry cultivation of subsistence crops. A few areas are used for urban development.

Soil information were obtained from the US NRCS Soil Database for Palau.

# Ngarchelong



## Land Cover (PALARIS)

|                        |        |
|------------------------|--------|
| Agriculture Land       | 4.10%  |
| Barren                 | 0.80%  |
| Coconut Forest         | 12.89% |
| Grassland and Savannah | 21.62% |
| Mangrove               | 31.58% |
| Marshy Areas           | 1.33%  |
| Volcanic Forest        | 25.86% |
| Urban                  | 1.81%  |

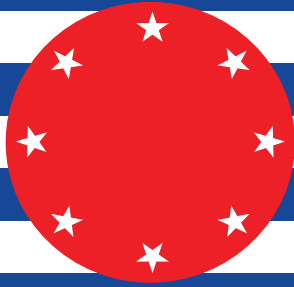
## General Soil Types (NRCS)

Overall, Ngarchelong soil types in the intertidal zone of mangrove swamps adjacent to volcanic islands are very deep, but poorly drained. They are formed in organic deposits and alluvium (a deposit of clay, silt, sand, and gravel) derived from volcanic material or limestone.

Typically, Ngarchelong type soils in areas of swamps and flood plains on valley floors on volcanic islands are very deep and are somewhat poorly drained soils. These soil types are formed in organic material over alluvial (a deposit of clay, silt, sand, and gravel) sediments derived from volcanic rock.

Broadly, Ngarchelong soil types found on hills and terraces of volcanic islands are very deep, well drained soils on. These soils support mixed-upland forest and grasslands-pandanus forest plant communities and are used for native vegetation, watersheds, or agroforestry cultivation of subsistence crops. A few areas are used for urban development.

Soil information were obtained from the US NRCS Soil Database for Palau.



## Watershed Connectivity

Ngarchelong

## Protected Areas

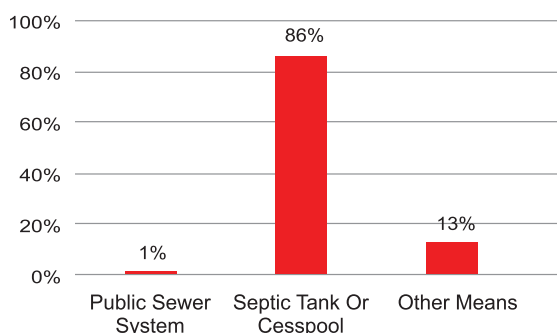
Ngarchelong Marine Managed Areas

## Demographics (2015 Census)

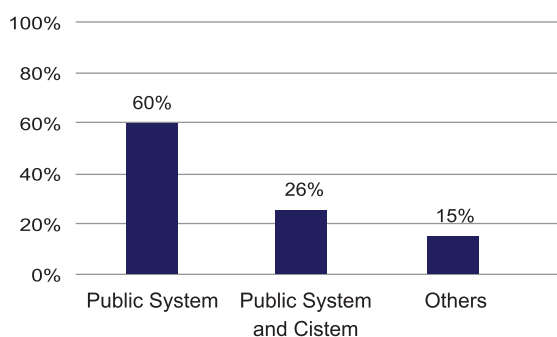
Population: 316

#Household: 94

### Types of Sewer Systems



### Household Sources of Water

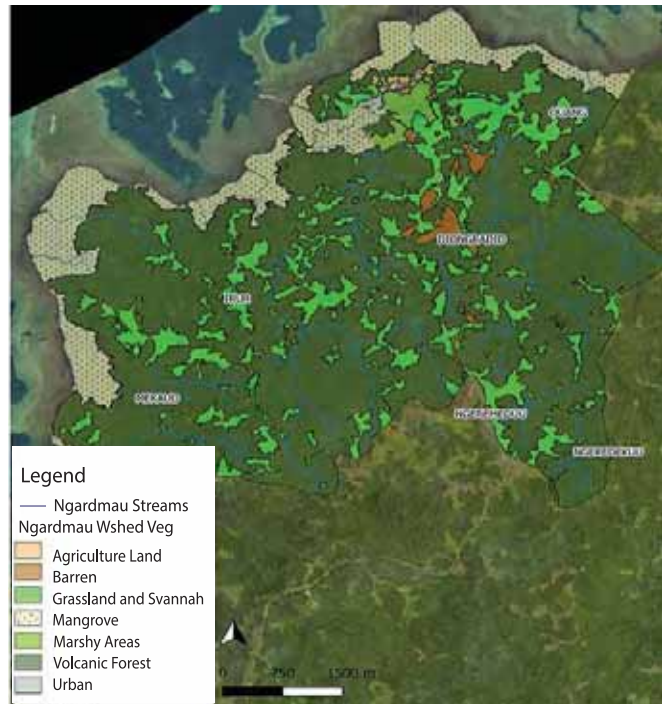


## Major Water Sources

Surface Water; Rain



# Ngardmau



## Watershed Connectivity

Ouang; Diongradid; Irur; Mekaud; Ngeredekuu; Ngermeduu

## Protected Areas

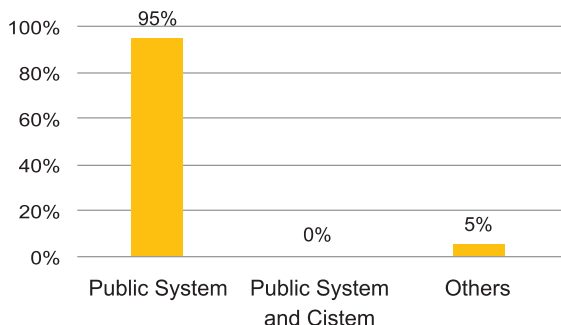
Ileyakel Beluu Conservation Area; Ngerchelchuus Conservation Area; Ngermasech to Bkulachelid Conservation Area; Taki Conservation Area

## Demographics (2015 Census)

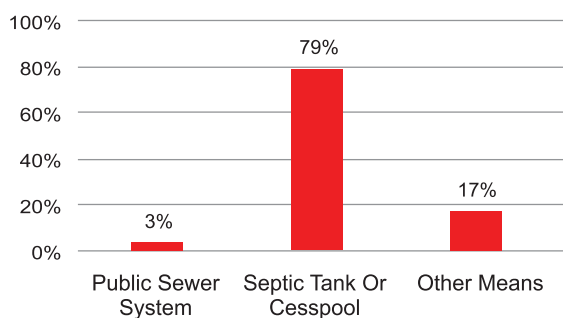
Population: 185

#Household: 58

### Household Sources of Water



### Types of Sewer Systems



## Major Water Sources

Surface Water; Rain

## Land Cover (PALARIS)

|                        |        |
|------------------------|--------|
| Agriculture Land       | 0.05%  |
| Barren                 | 0.21%  |
| Grassland and Savannah | 3.18%  |
| Mangrove               | 2.26%  |
| Marshy Areas           | 0.17%  |
| Volcanic Forest        | 94.09% |
| Urban                  | 0.05%  |

## General Soil Types (NRCS)

In general terms, Ngardmau soil types found on hills and terraces of volcanic islands are very deep, well drained soils. These soils support mixed-upland forest and grasslands-pandanus forest plant communities and are used for native vegetation, watershed, or agroforestry cultivation of subsistence crops. A few areas are used for urban development.

Commonly, Ngardmau soil types located in the intertidal zone of mangrove swamps adjacent to volcanic islands are very deep, but poorly drained. They are formed in organic deposits and alluvium (a deposit of clay, silt, sand, and gravel) derived from volcanic material or limestone.

Normally, Ngardmau soil types found on erosional hills on volcanic islands are very deep, well drained soils. This soil type is formed as chemically weathered rock derived from volcanic rocks. Moreover, these soils support fern-land plant communities and generally are used only for watersheds. A few areas are mined for bauxite.

Soil information were obtained from the US NRCS Soil Database for Palau.



# Ngatpang



## Watershed Connectivity

Ngermeduu; Isemiich; Ngerdorech; Ngerderar; Ngerikiil

## Protected Areas

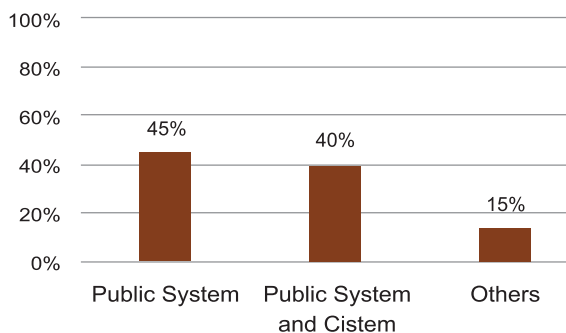
Iuul Conservation Area; Ngermeduu Conservation Area; Olterukl Conservation Area; Oreuaol Ibuchel Conservation Area

## Demographics (2015 Census)

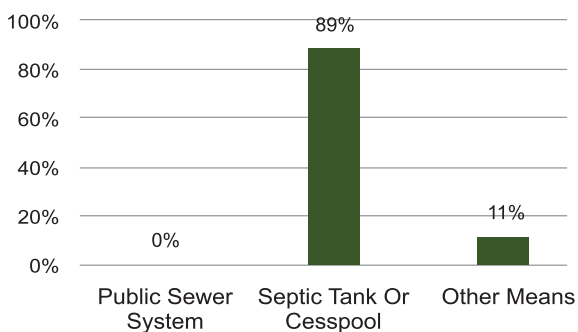
Population: 282

#Household: 62

### Household Sources of Water

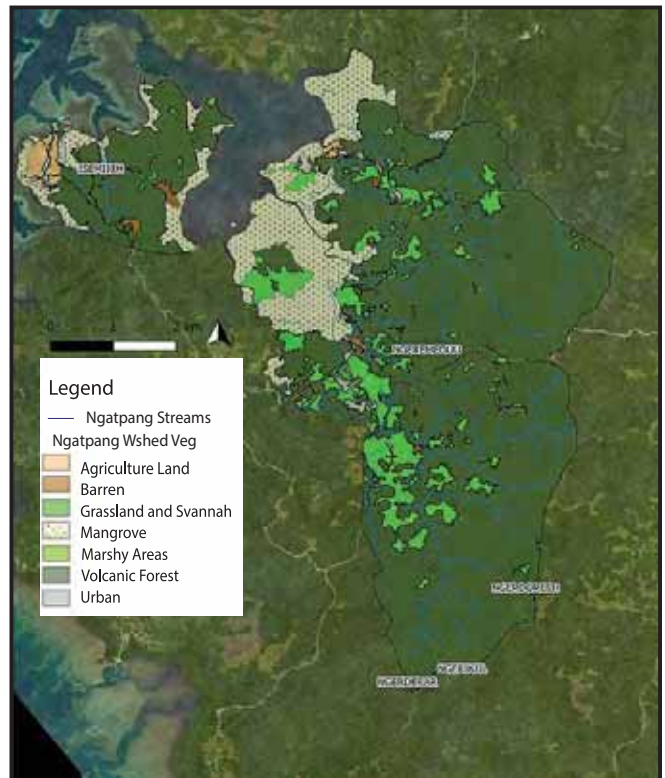


### Types of Sewer Systems



## Major Water Sources

Surface Water; Rain



## Land Cover (PALARIS)

|                        |        |
|------------------------|--------|
| Agriculture Land       | 0.18%  |
| Barren                 | 0.15%  |
| Grassland and Savannah | 1.97%  |
| Mangrove               | 3.46%  |
| Marshy Areas           | 0.10%  |
| Volcanic Forest        | 93.96% |
| Urban                  | 0.18%  |

## General Soil Types (NRCS)

Generally, Ngatpang soil types on hills and terraces of volcanic islands are very deep, well drained soils. These soils support mixed-upland forest and grasslands-pandanus forest plant communities and are used for native vegetation, watershed, or agroforestry cultivation of subsistence crops. A few areas are used for urban development.

Typically, Ngatpang soil types found in the intertidal zone of mangrove swamps adjacent to volcanic islands are very deep, but poorly drained. They are formed in organic deposits and alluvium (a deposit of clay, silt, sand, and gravel) derived from volcanic material or limestone.

Soil information were obtained from the US NRCS Soil Database for Palau.





# Ngeremlengui



## Watershed Connectivity

Diongradid; Irur; Mekaud; Ngeredekuu; Ngermeduu; Imeong; Ngerdoroch

## Protected Areas

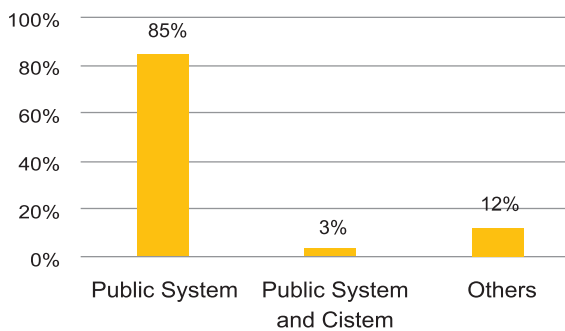
Bkulengriil Protected Area; Ngermeduu Conservation Area; Ngermeskang Bird Sanctuary; Ngermeskang Nature Reserve

## Demographics (2015 Census)

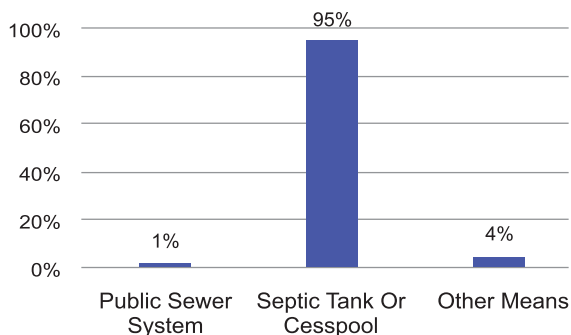
Population: 350

#Household: 91

### Household Sources of Water

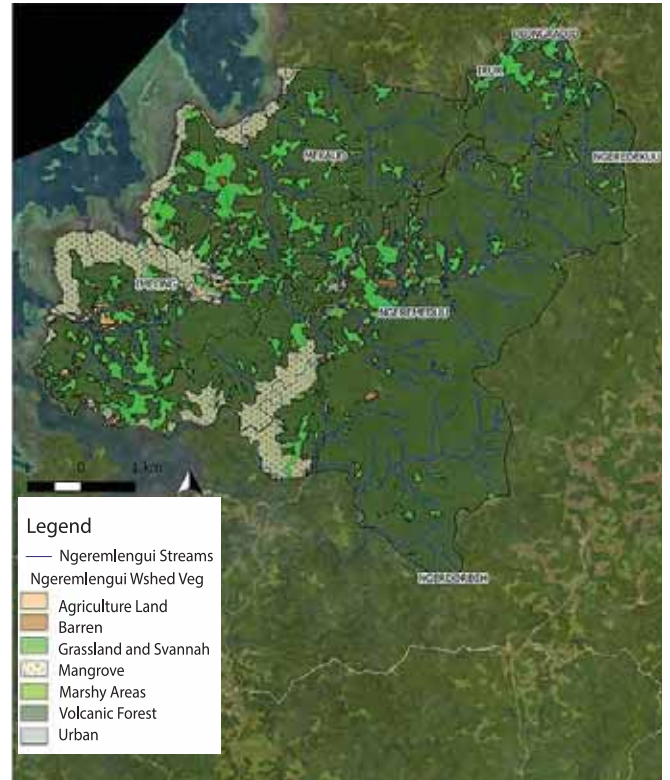


### Types of Sewer Systems



## Major Water Sources

Surface Water; Rain



## Land Cover (PALARIS)

|                        |        |
|------------------------|--------|
| Agriculture Land       | 0.14%  |
| Barren                 | 0.32%  |
| Grassland and Savannah | 4.48%  |
| Mangrove               | 2.56%  |
| Marshy Areas           | 0.27%  |
| Volcanic Forest        | 92.05% |
| Urban                  | 0.18%  |

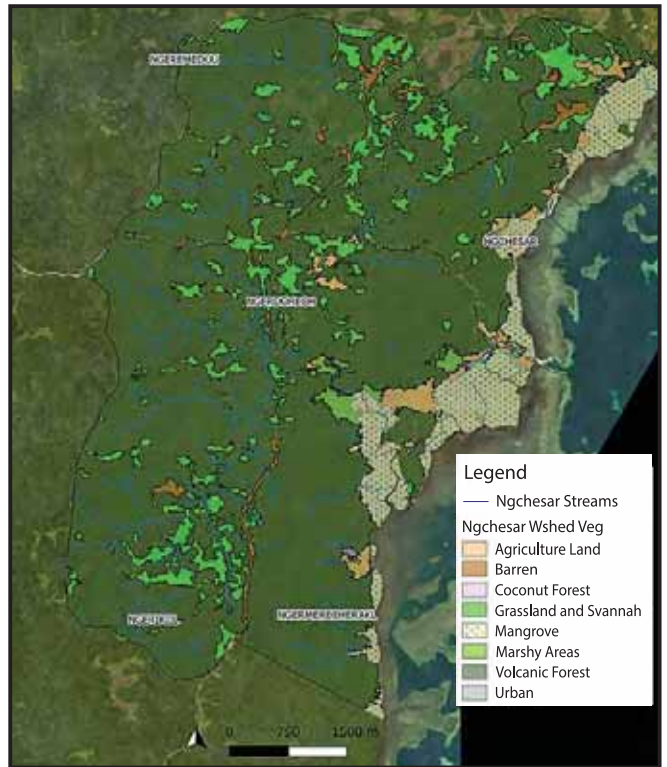
## General Soil Types (NRCS)

Overall, Ngeremlengui soil types found on hills and terraces of volcanic islands are very deep, well drained soils. These soils support mixed-upland forest and grasslands-pandanus forest plant communities and are used for native vegetation, watershed, or agroforestry cultivation of subsistence crops. A few areas are used for urban development.

Broadly, Ngeremlengui soil types in the intertidal zone of mangrove swamps adjacent to volcanic islands are very deep, but poorly drained. They are formed in organic deposits and alluvium (a deposit of clay, silt, sand, and gravel) derived from volcanic material or limestone.

Soil information were obtained from the US NRCS Soil Database for Palau.

# Ngchesar



## Land Cover (PALARIS)

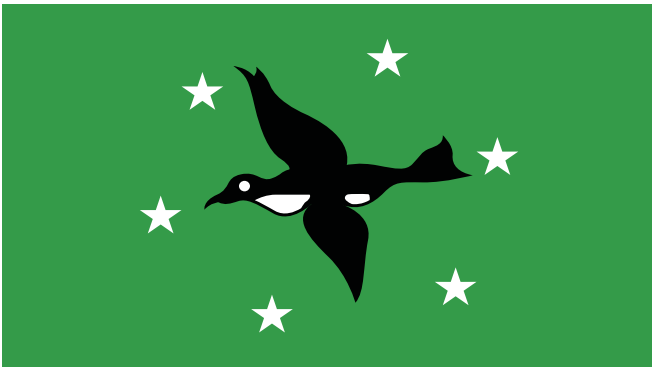
|                        |        |
|------------------------|--------|
| Agriculture Land       | 0.36%  |
| Barren                 | 0.49%  |
| Grassland and Savannah | 2.53%  |
| Mangrove               | 1.39%  |
| Marshy Areas           | 0.22%  |
| Volcanic Forest        | 94.91% |
| Urban                  | 0.09%  |

## General Soil Types (NRCS)

Usually, Ngchesar soil types located on hills and terraces of volcanic islands are very deep, well drained soils. These soils support mixed-upland forest and grasslands-pandanus forest plant communities and are used for native vegetation, watershed, or agroforestry cultivation of subsistence crops. A few areas are used for urban development.

On the whole, Ngchesar soil types found on erosional hills on volcanic islands are very deep, well drained soils. These soils are formed as chemically weathered rock derived from volcanic rocks. In addition, these soils support fern-land plant communities and generally are used only for watersheds. A few areas are mined for bauxite.

Soil information were obtained from the US NRCS Soil Database for Palau.



## Watershed Connectivity

Mesekelat; Ngermeduu; Ngerdorech; Ngchesar; Ngermercherakl; Ngerikiil

## Protected Areas

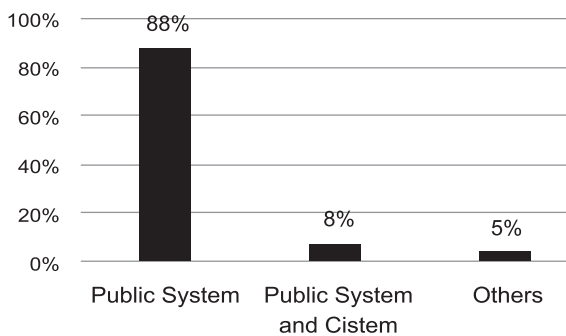
Mesekelat Conservation Area; Ngelukes Conservation Area

## Demographics (2015 Census)

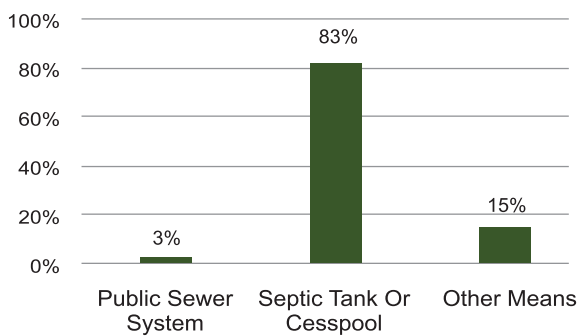
Population: 291

#Household: 80

### Household Sources of Water



### Types of Sewer Systems



## Major Water Sources

Surface Water; Rain

# Ngiwal



## Watershed Connectivity

Ngebsong; Diongradid; Ngeredekuu; Ngermeduu

## Protected Areas

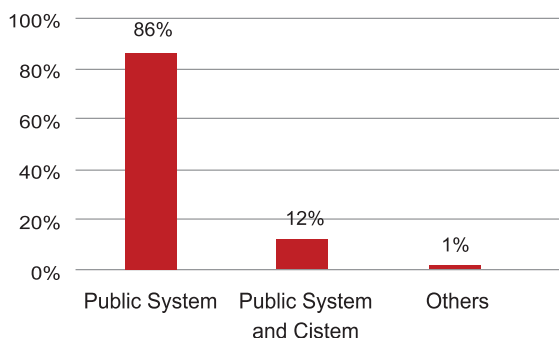
Ngemai Conservation Area; Orsouksesol Waterfall and Ngerbekuu Nature Reserve

## Demographics (2015 Census)

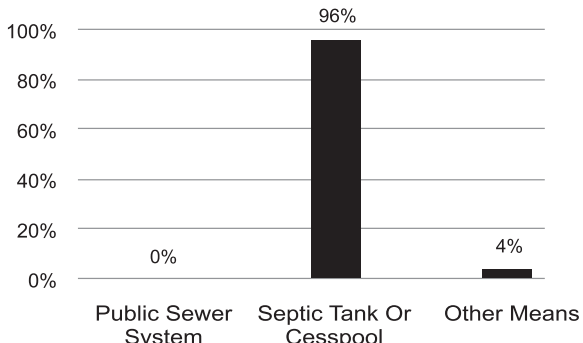
Population: 282

#Household: 74

### Household Sources of Water

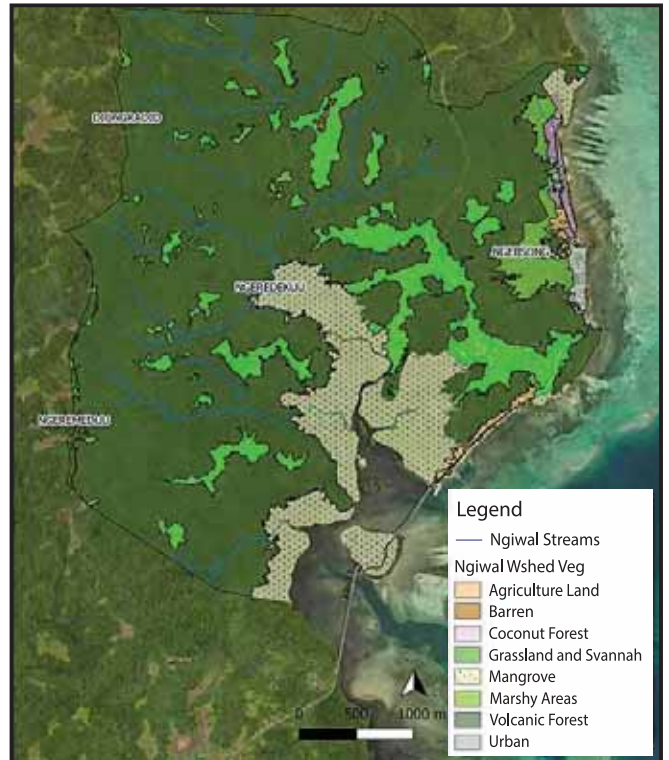


### Types of Sewer Systems



## Major Water Sources

Surface Water; Rain; Groundwater



## Land Cover (PALARIS)

|                        |        |
|------------------------|--------|
| Agriculture Land       | 0.09%  |
| Barren                 | 0.05%  |
| Grassland and Savannah | 0.99%  |
| Mangrove               | 1.12%  |
| Marshy Areas           | 0.21%  |
| Volcanic Forest        | 97.49% |
| Urban                  | 0.05%  |

## General Soil Types (NRCS)

Commonly, Ngiwal soil types found on hills and terraces of volcanic islands are very deep, well drained soils. These soils support mixed-upland forest and grasslands-pandanus forest plant communities and are used for native vegetation, watershed, or agroforestry cultivation of subsistence crops. A few areas are used for urban development.

Typically, Ngiwal soil types located in areas of swamps and flood plains on valley floors on volcanic islands are very deep and are somewhat poorly drained soils. These soils are formed in organic material over alluvial (a deposit of clay, silt, sand, and gravel) sediments derived from volcanic rock.

Soil information were obtained from the US NRCS Soil Database for Palau.



## Annex 1: BWA's Humble Beginning (from 2010-2015 BWA Action Plan)

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The completion of the 85 km (53 miles) road around Babeldaob brought opportunities for development, population growth and access to critical watersheds. The leaders of two prominent communities (and states) in Babeldaob, Ngeremlengui and Melekeok convened to discuss shared concerns of water quality for their water supplies and sedimentation in their reefs as well as the overall integrity of their natural resources. On Sept. 22, 2006, the two states held their first watershed leadership summit in Ngeremlengui and created a steering committee and a resource team from Palau Conservation Society (PCS) and The Nature Conservancy (TNC). The steering committee and resource team were tasked to develop a model for watershed partnership. The team then drafted a Master Cooperative Agreement (MCA) to establish the partnership.

On December 22, 2006, the Master Cooperative Agreement (MCA) was signed by the traditional and elected leaders of Ngeremlengui and Melekeok, thus formalizing the Alliance. During the signing ceremony, High Chief Reklai, Raphael B. Ngirmang of Melekeok addressed his constituent, High Chief Ngirturong of Ngeremlengui with the following statement, “Ngirturong, our vision must extend beyond existing generations for our challenge is not only to protect our water resources for ourselves and our children, but ensure water quality and abundance for many generations to come.” About a year later in November 2007, Ngiwal State joined the alliance, and in March 2008, a BWA Coordinator was hired with funding from US Fish and Wildlife Services through PCS.

In October 2008, the House of Delegates of the 7th Olbiil Era Kelulau (National Congress) passed a resolution commending BWA for its efforts and encouraging other Babeldaob states to join the alliance. Today, all ten Babeldaob states are members of the alliance, namely Ngeremlengui, Melekeok, Ngiwal, Aimeliik, Ngardmau, Ngchesar, Ngarchelong, Ngatpang, Ngaraard, and Airai. Among major accomplishments for the alliance are:

- (1) Establishment of 7 watershed protected areas that cover 11% of Babeldaob;
- (2) Completion of 12 Conservation Action Plans (includes Kayangel, Angaur & Peleliu);
- (3) Completion of management plans for all watershed protected areas; and
- (4) All but one watershed protected area are now PAN sites and receive PAN Funds for management.

Projects and activities included a sedimentation plan developed for Ngarchelong State; Identification of Ngatpang State's critical watershed for protection (legislation pending); Ngiwal and Ngchesar advocated for expansion of their protected sites to include entire watershed basins; development of watershed restoration demonstration sites in Aimeliik, Ngardmau, and Ngchesar; Melekeok's state master plan to address land use and zoning; Ngeremlengui to nominate a PAN site; Ngaraard planning to organize its management board for a climate change vulnerability assessment; and capacity building for conservation coordinators and officers who manage the sites.

The alliance held its second Watershed Summit in October 2008 and developed the next steps for the alliance. At the time, two states, Aimeliik and Ngardmau have joined the first three

states making it a 5-member alliance. Traditional and elected leaders from the 5 states convened with their steering committee and technical support team to update each other, exchange lessons and build the next steps for the alliance. National officials who participated as panel guests were the Vice President Camsek E. Chin, Senator Alan R. Seid and Delegate Noah Idechong. In 2011, a third Watershed Leadership Summit was held in Koror where about a hundred official leaders representing traditional, state and national government, ministers and heads of agencies convened to develop a strategy for water resource management for Palau. Among the leadership was Ambassador Helen Reed-Rowe of the United States. Inspired and motivated, the alliance continued to engage relevant stakeholders in collaborative efforts to protect Palau’s water resources. On World Water Day (March 22) 2011, President Johnson Toribiong recognized BWA for initiating community efforts to protect Palau’s water resources in his proclamation of the national water awareness month. A remarkable lesson from this alliance is “the more, the better!” By this time, four more states had join the Alliance – Ngchesar, Ngarchelong, Ngatpang, and Ngaraard. Then in 2018, Airai State joined the Alliance. The ten member states have been able to realize their goals through collaborative and collective efforts and invite other states to join the alliance in its mission to protect water resources of Belau.



High Chief Ngirturong of Ngeremlengui



Paramount Chief Reklai of Melekeok



High Chief Beouch of Ngardmau



## Annex 2: Steering Committee Members

|                             |   |              |
|-----------------------------|---|--------------|
| Kashgar Rengulbai           | Chairman, Ngardok Reserve Board             | Melekeok     |
| Edwin Polloi                | Member, Ngardok Reserve Board               | Melekeok     |
| Vallary Diaz                | BWA Vice Chairman                           | Ngeremlengui |
| Jackson Ngirongor           | Ngeremlengui Public Works                   | Ngeremlengui |
| Katsumi Abia                | Ngeremlengui PAN                            | Ngeremlengui |
| Elicio Skebong              | Ngeremlengui State Project Officer          | Ngeremlengui |
| Jonathan Temol              | BWA Chairman                                | Ngiwal       |
| Marcia Inacio               | Ngiwal PAN Board                            | Ngiwal       |
| Renee Chin                  | Member, Ngiwal PAN Board                    | Ngiwal       |
| J. Sherry Koshiba           | Aimeliik State Govt. Administrative Officer | Aimeliik     |
| Jennifer Ngiraiwet          | Ngardmau PAN Coordinator                    | Ngardmau     |
| Neil Fisher                 | Community Member                            | Ngardmau     |
| Sahar Hanser                | Community member                            | Ngardmau     |
| Rechetuker Sudo Moses       | Chief & Ngchesar Legislature                | Ngchesar     |
| Verano Ngirkelau            | Conservation Coordinator                    | Ngchesar     |
| Robat Saburo                | Retired BLS Employee                        | Ngchesar     |
| Kennedy Kotaro              | Water Operations Supervisor                 | Ngchesar     |
| Siskind Adelbai             | Retired Educator                            | Ngchesar     |
| Jason Ngiratrang            | Legislator/Chairman of R&D                  | Ngarchelong  |
| Abraham Osima               | Legislator/NR Planning Team                 | Ngarchelong  |
| Dorothy Tadao-Ueda          | BWA Treasurer                               | Ngarchelong  |
| Leonard Basilius            | President, Desbedang Community Organization | Ngarchelong  |
| Francesca Otong             | Legislator                                  | Ngatpang     |
| Echol Sisor                 | Ngatpang State Staff                        | Ngatpang     |
| Calvin Taurengel Emesiochel | BAC Researcher                              | Ngatpang     |
| Leon Debengek               | PAN officer/Acting Police Director          | Ngaraard     |
| Iolani Treked Dwight        | Ngaraard State Govt. Staff                  | Ngaraard     |
| Dedlil Daniel               | Airai State Watershed Officer               | Airai        |
|                             | <b>TECHNICAL RESOURCE TEAM</b>              |              |
| Maireng Sengebau            | Consultant                                  | BEHST/WFL    |
| Meiang Chin                 | Consultant                                  | BEHST/WFL    |
| Dr. Ann Hillmann Kitalong   | Herbarium Curator                           | BNM          |
| Erbai Matsutaro             | Climate Change Coordinator                  | CCO          |
| Samil Beouch                | Dingelius er a Ngirturong                   | COC          |
| Kimie Ngirchchol            | Lab Supervisor                              | EQPB         |
| Obichang Skebong            | PAN Project Manager                         | MNRET        |
| Gwen Sisor                  | Senior Project Manager                      | MNRET        |
| Lukes Isechal               | Applied Scientist                           | MNRET        |
| Leena Muller                | GEF R2R IW Specialist                       | MNRET        |
| Paul Lake                   | Resource Conservationist                    | NRCS         |
| Darlynne Takawo             | GIS Analyst II                              | PALARIS      |
| Abolade Bola Majekobaje     | Executive Director                          | PCS          |
| Umai Basilius               | Policy & Planning Program Manager           | PCS          |
| Geraldine Renguil           | Director of the Research Department         | PICRC        |
| Lynna Thomas                | Project Specialist                          | OPM          |
| Kiblas Soaladaob            | SGP Palau National Coordinator              | SGP          |
| Steven Victor               | Director, Micronesia Program                | TNC          |

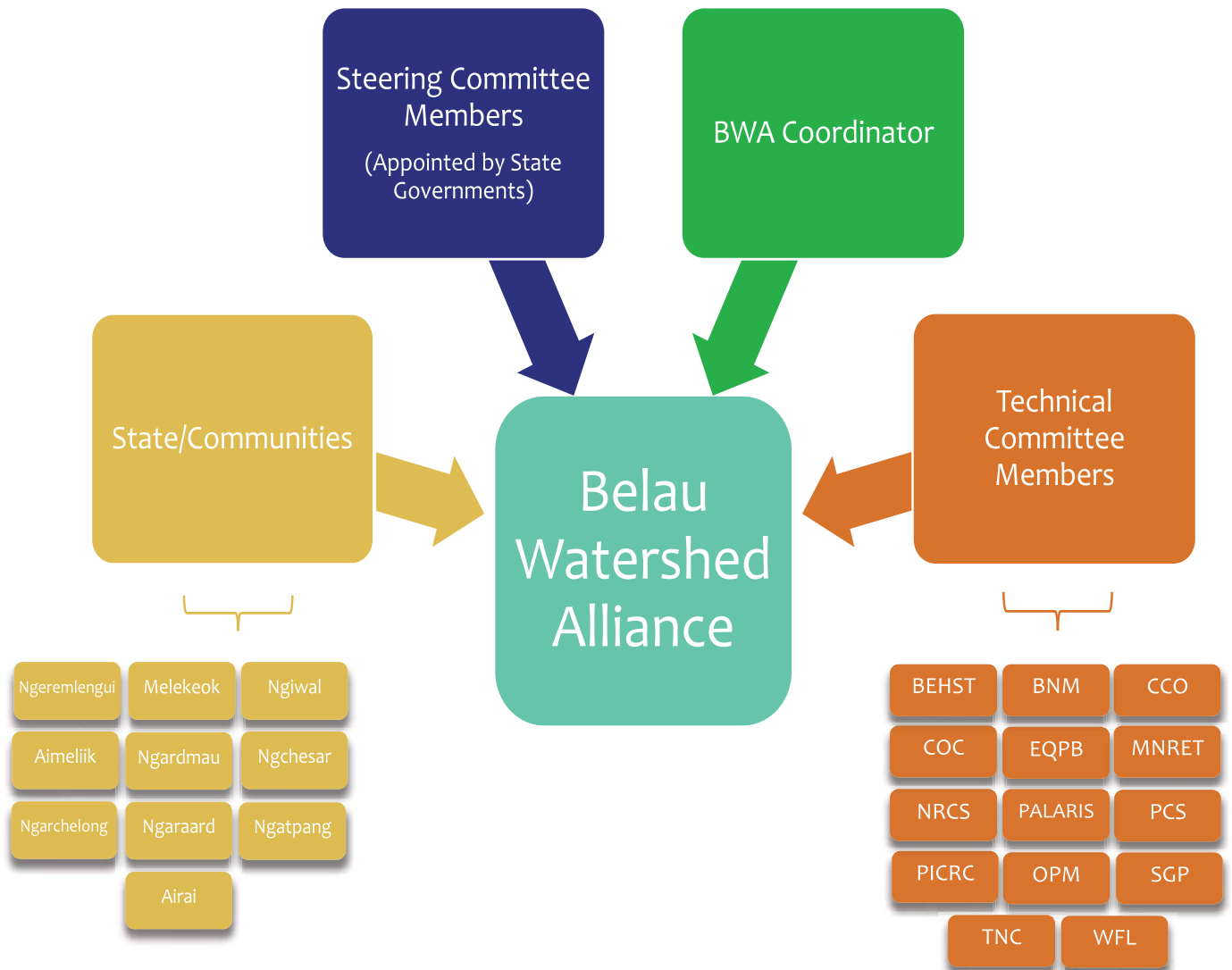


## Annex 3: The 10 Step Process

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## Annex 4: BWA Governance









**BELAU WATERSHED ALLIANCE**

**\*Based at the Ministry of Natural Resources, Environment, and Tourism\***

**P.O. BOX 460 | 2<sup>nd</sup> Floor, Executive Building | Ngerulmud PW, 96939**

**Phone: (680) 767-5435/3125 | Fax: (680) 767-3380**

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