

# Aimeliik State Conservation Action Plan

Aimeliik State  
Republic of Palau



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Prepared by The Nature Conservancy  
Palau Field Office

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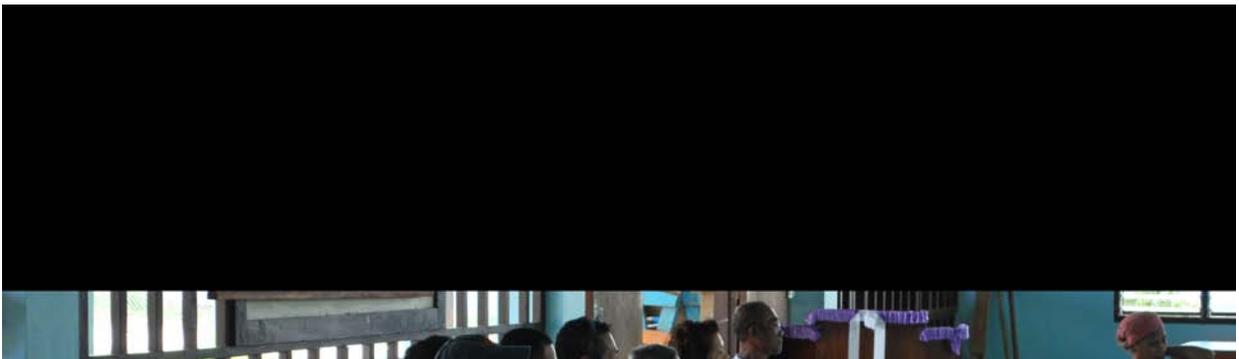
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## *Vision*

*We, the people of Aimesiik, want to pass on to the next generation the benefits of our abundant natural resources, vibrant economy, and respect for our heritage through promotion of sustainable development and preservation of our traditional knowledge and practices to improve our livelihood.*



## Table of Contents

1.	Introduction.....	5
1.1.	A Context for Conservation.....	5
1.2.	Overview of this Report.....	6
2.	Conservation Planning and Adaptive Management.....	7
2.1.	Define the Project Team and Scope .....	7
2.2	Identify Conservation Targets and Assess Viability .....	7
2.3	Identify and Assess Critical Threats .....	11
2.4	Situational Analysis .....	15
2.5	Conservation Strategies.....	15
2.6	Measures and Monitoring .....	17
3	Capacity Assessment .....	18
4	Conclusion .....	18
5	References.....	19

## **1. Introduction**

### **1.1. A Context for Conservation**

Aimeliik state is located on the western side of Babeldaob island. Its neighbors include Airai State to the south and Ngatpang State to the north and east. The state is approximately 4,100 ha (10,200 ac) in size. The topography consists of steeply sloping areas in the Ngerdelungch and Elechui areas surrounding Ngchemiangel Bay and flatter areas in the interior of the state near Nekkeng. Most of the coast of the state is fringed with mangroves. Ngeremeduu Bay and its associated watershed are located partly within Aimeliik. The State has given a portion of its land and mangroves that borders the bay for Conservation as mitigation of the compact road construction.

Aimeliik has one of the largest and intact native forests in all of Babledaob. This is exemplified in the Aimeliik flag, where the green color signifies the green lush forest. Aimellik has potential to support agriculture and therefore there is a greater need for implementation of conservation initiatives to ensure that agriculture developments do not have major impacts on Aimeliik terrestrial and marine ecosystems.

The “Kmai”, blue crab, for which Aimeliik is well known for in Palau is disappearing from its marine habitats as a result of overharvesting and habitat degradation. There is a general consensus of people of Aimeliik to see the crab come to its abundant state in its marine habitats. This is one of a driving concern that leads people of Aimeliik to focus conservation efforts for the marine ecosystem.

Aimeliik State currently has some areas that has been set aside for conservation. The Ngerderar Conservation Area, a watershed area of roughly 941 acres, was established in 2008 to protect the upland forest and to ensure clean freshwater sources. The Imul Mangrove Conservation Area (199.9 acres), a mangrove area adjacent to the watershed was also established to protect mangrove resources. The State also established a 1 mile radius around Ngercheball Island as a conservation area in recognition of the need to protect declining fish and marine resources.

## 1.2. Overview of this Report

This report was created to document the results and products of the conservation planning workshops. It is intended to be used by the State as reference for the development of the management plan for the sanctuary. The report is organized around the steps of the Conservation Action Planning (CAP) Adaptive Management Cycle (Figure 1), which was also used to organize the workshops. Each step will be described briefly and the main products of that step will be discussed. Please refer to the excel workbook for details of the workshops input.

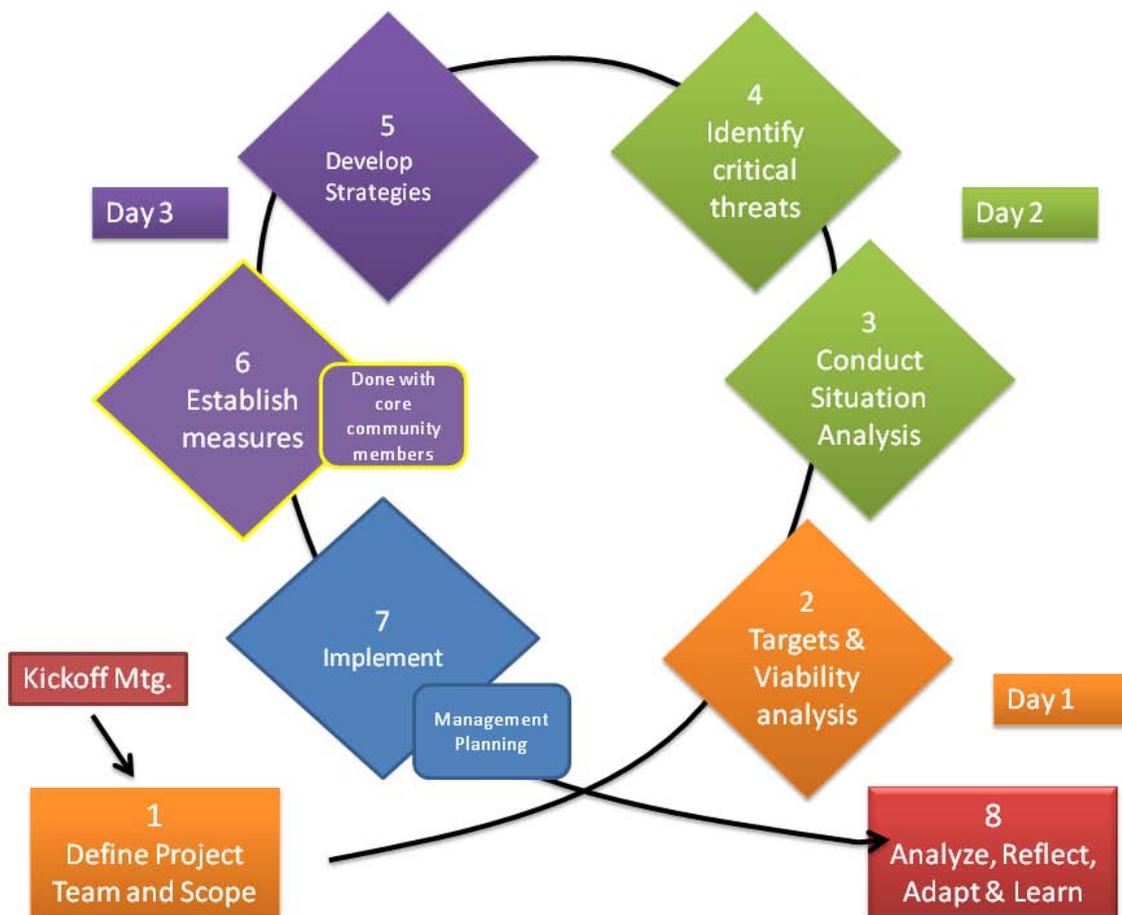


Figure 1. Conservation Action Planning (CAP) Adaptive Management Cycle, the project planning method used to organize the planning workshops and this report.

## **2. Conservation Planning and Adaptive Management**

The CAP Adaptive Management Cycle is an iterative process which helps conservation projects develop and implement strategies, and then evaluate and learn from their experiences. The general steps of the process are to 1) define the project team and scope, 2) identify the conservation targets and assess their viability, 3) identify and assess the critical threats, 4) conduct a situation analysis, 5) develop conservation strategies, 6) establish measures, 7) implement the strategies and measures, and 8) analyze, reflect and learn from the results. The use of adaptive management means that the planning is never fully completed, but is continually refined, improved, and adapted over time. Future work will include a re-evaluation and refinement of the products to better reflect our growing knowledge and experience.

### **2.1. Define the Project Team and Scope**

The first iteration of the Conservation Action Planning was conducted with the Aimeliik State and the community. The State has not formally assign a team to participate in the process, so the general public was invited to provide input into the Conservation Action Plan. This process ensures that conservation strategies are the ones that community and the State sees as priority and will assist in whoever will be task to implement them.

The participants of the CAP all agreed that the scope of the discussion of conservation in Aimeliik will include all of Aimeliik land and territorial waters. The participants believed that in order to ensure effective conservation of marine resources, land issues particularly the threat from sedimentation needs to be addressed. The participants decided to focus their discussion on ensuring that critical ecosystems and habitats that support the species for which the communities depend on are maintained ecologically to support long term viability of these resources.

### **2.2 Identify Conservation Targets and Assess Viability**

Conservation targets are species, communities, or ecological systems that represent the biological diversity of the project area and or what communities care about to conserve and protect. A good set of conservation targets should be designed to include those elements of the system that, if properly conserved, will result in the conservation of the full diversity of the landscape. Coarse-filter targets are intended to capture a large amount of smaller-scale biodiversity, both common and rare, within them, while fine-filter targets should include those small-scale elements that “fall through” the coarse filter and require individual attention.

For project management purposes, the CAP process has tended to restrict the number of targets for a project to eight or less in order to facilitate tracking of each target. This restriction has been successful for the vast majority of CAP projects worldwide. For Aimeliik , the team selected eight targets through a group process of nomination and consolidation. The six targets for Aimeliik State are described below.

1. **Native Forest** (native trees & wildlife). The native forest of Aimeliik account for roughly 25,900,00 m<sup>2</sup> of the State. The forest are still relatively intact and support a healthy wildlife populations.
2. **Savannah**. Aimeliik has about 6,600,000 m<sup>2</sup> of savannah area. The people of Aimeliik sees the savannah area as a potential area to support urban development because it is relatively flat area. They want to protect at least 30% of the savannah, which includes historical sites and sites in close proximity to water sources for buffering impact of soil erosion.
3. **Rivers & Streams**. This target includes the Ngerderar River and other small tributaries that runs through Aimeliik State and drains in adjacent States.
4. **Mangrove ecosystem**. This target includes the commercially valuable species that inhabit the mangrove area, such as mud clam and mangrove crab. Mangroves are important ecosystems as they protect shorelines from erosion as well as provide habitat and nursery for variety of marine species.
5. **Seagrass ecosystem**. Seagrass ecosystem in Aimeliik traditionally supports abundant invertebrate and fish resources. These abundant resources are declining in this habitats because of both harvesting and degradation of seagrasses.
6. **Coral reef ecosystem**. Within Babledaob, Aimeliik has the second largest barrier reef (27 km<sup>2</sup>) and lagoon area (55 km<sup>2</sup>) within its territorial waters. Of all the coral reef habitat combined, Aimeliik has the largest marine area within Babeldaob, which support the reef resources that people of Aimeliik and Palau depend upon for livelihood.
7. **Historical & Cultural Sites**. Aimeliik has many historical sites of great significance to the State and the oral history of Palau. Aimeliik sees these sites as part of their identity and as potential tourist attractions.
8. **Kmai** (Blue Crab). This species of crab is well known to have been abundant in Aimeliik and what gives identity to Aimeliik's shallow marine habitats. This species has declined drastically and the people of Aimeliik hope that through conservation efforts, it can come back.

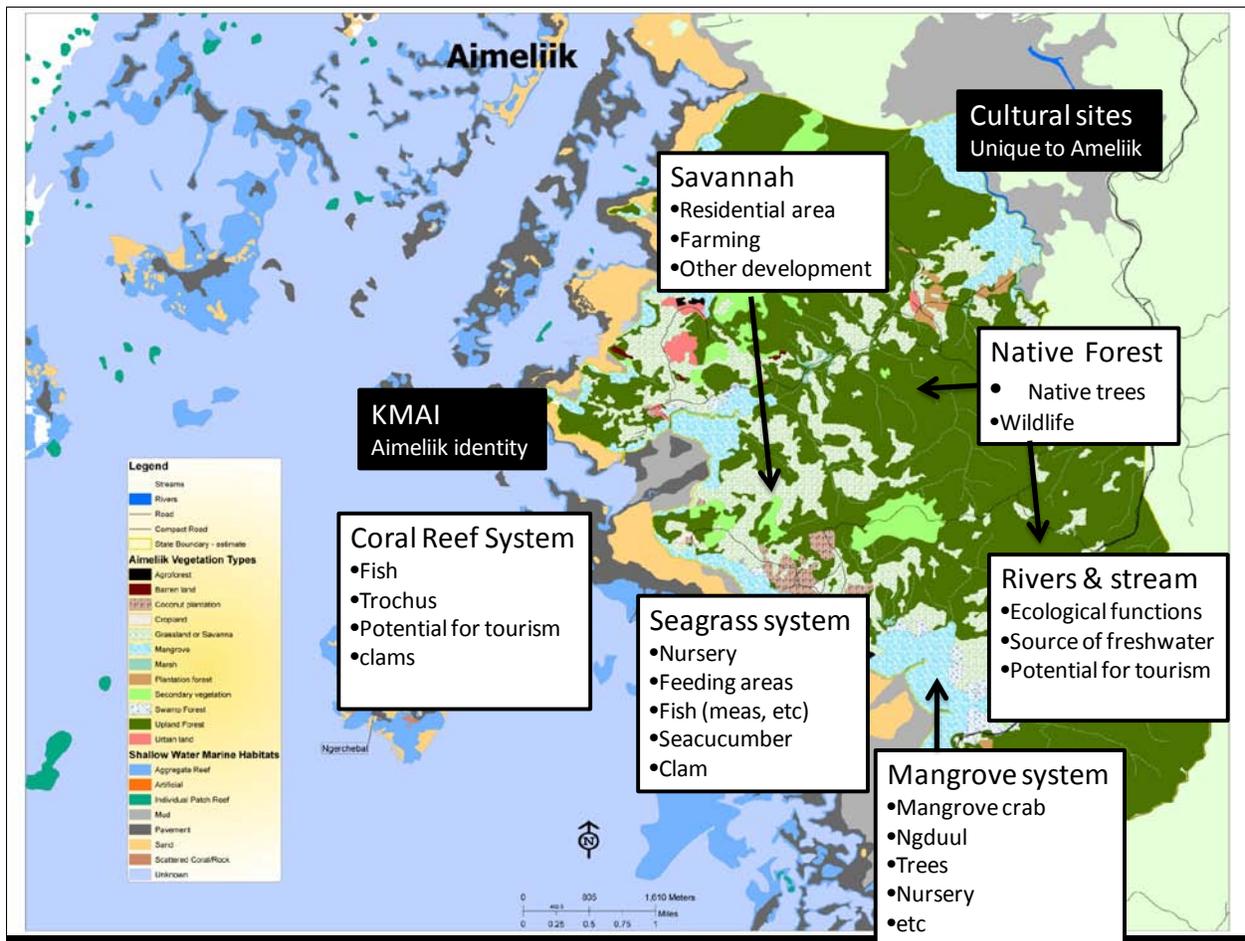


Figure 2. Vegetation and shallow water habitat map of Aimeliik State with general area where conservation targets may be found. Shallow water habitat map derived from NOAA Shallow water habitat map for Palau & Vegetation map from US Forestry.

In order to assess the targets' viability, or ability to persist over the long term, the CAP process has developed a system to help teams define what they consider a "healthy" state for each target. The benefit of this exercise is in understanding the current status of the targets, as well as having a clearly defined desired status as a measurable objective toward which to work. The process for doing this involves identifying key ecological attributes (KEAs), indicators, ranges of variation, and rating schemes for each target. KEAs are characteristics of the target that are critical to its biology and that if altered would lead to the loss of the target. KEAs tend to fall into the broad categories of size, condition, and landscape context. Since KEAs are often not directly measurable, associated indicators (key characteristic of a target that can be measured) are selected in order to develop a rating scheme by which to evaluate the target status (Table 1).

<b>Conservation Targets</b>	Landscape Context	Condition	Size	Viability Rank
<i>Current Rating</i>				
Native Forest (swamp forest, native trees, & wildlife)	Fair	Very Good	Very Good	Good
Savannah (regulated residential & farming)	-	-	Fair	Fair
Rivers & Stream - freshwater source, tourism potential)	Poor	-	-	Poor
Mangrove Ecosystem (Trees, filter, nursery, emang, mangrove clam)	Poor	Poor	-	Poor
Seagrass Ecosystem (seacucumber, ibuchel, fish, kmai, feeding ground)	-	Poor	Poor	Poor
Coral Reef Ecosystem (valuable reef fish species, inverts)	-	Poor	-	Poor
Historical & Cultural sites (tourist attraction, identity)	-	Very Good	-	Very Good
Kmai (Blue Crab)	-	Poor	-	Poor
<b>Project Biodiversity Health Rank</b>				<b>Fair</b>

Table 1. Summary of viability ranks for Aimeliik's Conservation targets.

Based on information provided by the Aimeliik CAP participants, the overall ranking of the conservations targets is at Poor. Targets such as Rivers & Streams, Coral Reef System, and Invertebrates where there were direct resource use by communities were ranked as poor.

### 2.3 Identify and Assess Critical Threats

Fifteen threats were identified as reducing the viability of at least one target (Table 2). The threats were ranked according to two factors, contribution and irreversibility in order to gauge the degree of the threat. Contribution is the level at which the threat acting contribute to the source of stress on a given target. Irreversibility is the likelihood for the target to recover given certain threat to that target (Refer to Table 2 for more clarification).

The overall ranking of the threat is affected by the severity and scope of a given stress on the target. Stress is the impairment of key ecological attribute for a given target. Scope is the extent of an area within the conservation target that could potentially be impacted within 10 given current situations. Severity is the level of damage to the conservation target that can be reasonably expected within 10 years under current circumstances.

Description	Ranking			
	Low	Medium	High	Very High
Contribution -- expected contribution of the source, acting alone, to the full expression of a stress (as determined in the stress assessment) under current circumstances (i.e., given the continuation of the existing management/ conservation situation).	The source is a low contributor of the particular stress.	The source is a moderate contributor of the particular stress.	The source is a large contributor of the particular stress.	The source is a very large contributor of the particular stress.
Irreversibility -- reversibility of the stress caused by the Source of Stress (or reversibility of the threat itself if using the alternative threat ranking methodology).	Easily reversible at relatively low cost (e.g., off-road vehicles trespassing in wetland).	Reversible with a reasonable commitment of resources (e.g., ditching and draining of wetland).	Reversible, but not practically affordable (e.g., wetland converted to agriculture).	Not reversible (e.g., wetlands converted to a shopping center).

Table 2. Description of criteria used to rank contribution of threat to stress on the target.

Criterion (Description)	Ranking			
	Low	Medium	High	Very High
<b>Scope</b> - Most commonly defined spatially as the proportion of the overall area of a project site or target occurrence likely to be affected by a threat under current circumstances.	Very localized in scope, affect the conservation target at a limited portion of the target's locations.	Localized in scope, affect the conservation target at some of the target's locations.	Widespread in scope, affect the conservation target at many of its locations.	Very widespread or pervasive in scope, affect the conservation target throughout the target's occurrences.
<b>Severity</b> - The level of damage to the conservation target that can reasonably be expected under current circumstances.	Slightly impair the conservation target over some portion of the target's occurrences.	Moderately degrade the conservation target over some portion of the target's occurrences.	Seriously degrade the conservation target over some portion of the target's occurrences.	Destroy or eliminate the conservation target over some portion of the target's occurrences.

Table 3. Descriptions of the criteria used to rank stress of key ecological attribute on the target.

After the threats were ranked for each target, the CAP excel workbook consolidated threats that occurred for multiple targets and use an algorithm to roll the individual rankings up to an overall rank for that threat. Table 4 summarizes the target ranks and overall rank for each of the 16 threats identified. The “critical” threats, those with overall ranks of medium or higher, and which ranked high for at least one target, are described in more detail in the following pages. In addition, the targets that had at least a threat ranking of medium are also discussed.

<b>Threats Across Targets</b>	Native Forest (including swamp forest)	Savannah	Rivers & Stream	Mangrove Systems	Seagrass Ecosystem	Coral Reef Ecosystem	Historical & Cultural Sites	Kmai	Overall Threat Rank
<b>Project-specific threats</b>	1	2	3	4	5	6	7	8	
Sedimentation	-	-	-	High	High	Very High	-	Very High	Very High
Overharvesting	-	-	-	Medium	Medium	Very High	-	Very High	Very High
Poaching	Low	-	-	Medium	-	Very High	-	-	High
Climate change	Low	-	-	-	High	High	-	High	High
Dredging	-	-	-	-	High	-	-	High	High
Natural cause	Low	-	-	-	Medium	High	Low	-	Medium
Pollution	-	-	-	-	Medium	-	-	High	Medium
Road construction	-	Low	High	-	-	-	Low	-	Medium
Fire	-	Medium	Medium	-	-	-	Low	-	Medium
Farming	-	Low	Medium	-	-	-	-	-	Low
Invasive species	Low	-	-	Medium	-	-	-	-	Low
Boating activities	-	-	-	-	Medium	-	-	-	Low
Migration	-	-	-	Medium	-	-	-	-	Low
Natural erosion	-	-	Medium	-	-	-	-	-	Low
Deforestation	Low	-	Low	-	-	-	-	-	Low
Cutting trees	-	-	-	Low	-	-	-	-	Low
<b>Threat Status for Targets and Project</b>	Low	Low	Medium	Medium	High	Very High	Low	Very High	Very High

Table 4. Summary of rankings for threats that affects Aimeliik’s conservation targets.

## Critical Threats:

- 1. Sedimentation.** Sedimentation resulting from road construction, farming activities, and land clearing is a concern to the people of Aimeliik. This threat affects the health of the Rivers & Streams, Mangrove Ecosystem, Seagrass Ecosystem, and Coral reef Ecosystem, which affects the fish and invertebrate resources the communities relies upon for daily sustenance and also as a source of income.
- 2. Overharvesting.** This threat is identified as mainly affecting the fish, sea cucumber, sea urchins, mangrove crabs, and mud clams, most especially the Kmai (blue crab). The threat of overharvesting is a result of both subsistence harvesting and commercial harvesting.
- 3. Poaching.** The people of Aimeliik regard people who fish in Aimeliik without fishing permit as poachers. People are allowed to fish as long as they obtain a permit. The threat from poachers from neighboring States is a high concern for the people of Aimleliik as the fish and other marine resources continues to decline.
- 4. Climate Change.** The rising temperatures and other possible effects of climate change (the unknowns) are concern to the people of Aimeliik, particularly their effects on fish and corals, which are already in decline from local use and habitat degradation.
- 5. Dredging.** Dredging along the coast is view as a high threat because it removes important reef areas but also affect current circulation that contributes to coastline erosion. This threat is blamed particularly for the decline in Kmai in front of the Mongami Dock that the people of Aimeliik knew as a good habitat for Kmai.
- 6. Road construction.** These threats that results because of need for infrastructure contribute to the threat of sedimentation. The Compact Road construction is perceived to have caused major impact and open access to areas where people continue to clear land causing further soil erosion.
- 7. Natural Causes.** This threat is identified as the natural ecological and divine process that controls natural resources – The Unkown.
- 8. Fire.** Unregulated fires, particularly in the Savannah is a concern to the people of Aimeliik as it destroy plants, habitats for animals, and eventually will result in soil erosion because of the removal of the ground cover.

## 2.4 Situational Analysis

In order to document our understanding of the social and ecological context surrounding threats and targets, the team developed a conceptual model for the targets showing the connections between the threats and the factors assumed to be driving them (Figure 3). The model is by necessity incomplete, and represents the working assumptions of the project team, as opposed to actual ecological relationships. It is intended to be a flexible tool that can be altered over time as our conception of the system develops.

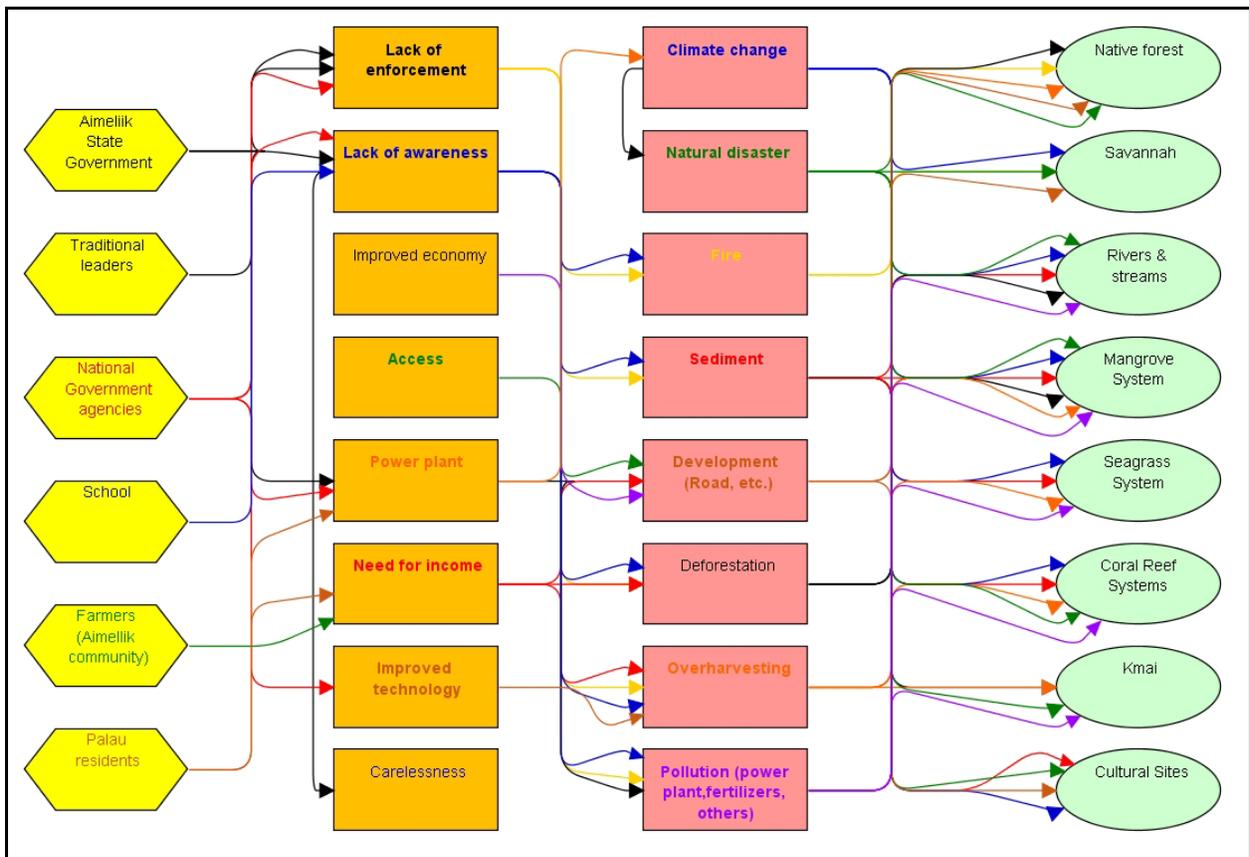


Figure 3. Situation diagram targets (green), direct threats (pink), contributing factor (dark yellow), and stakeholders (yellow).

## 2.5 Conservation Strategies

Strategies consist of one or more measurable objectives, the associated strategic actions, and their action steps. Measurable objectives are detailed statements that describe the desired outcome of the strategy. Strategic actions are the general activities undertaken by the project team to achieve these objectives. Action steps are the specific tasks required to carry out each strategic action. See Table 5 for list of strategies developed by the project team during the

workshops. The team decided on two objectives to address key threats to reduce overfishing and sedimentation.

#	Objectives, Strategic Actions with Steps, and Indicators	Cost (5 years total)	Person Responsible
<b>Objective 1</b>	<b>Increase food fish and invertebrates by 10% within 5 years</b>	<b>\$360,000</b>	
Strategic action 1	Study feasibility for culturing commonly exploited marine species	\$100,000	Governor's Office
Strategic action 2	Regulate fishing activities and harvesting within Aimeliik State	\$5,000	Aimeliik State Legislature
Strategic action 3	Strengthen the traditional practice of Bul	\$10,000	Aimeliik Council of Chiefs
Strategic action 4	Delineation of existing protected areas	\$25,000	Governor's Office
Strategic action 5	Create and strengthen law enforcement capacity in Aimeliik State	\$195,000	Governor's Office
Strategic action 6	Awareness of conservation laws, regulations, and best practices	\$25,000	Governor's Office
<b>Objective 2</b>	<b>Reduce sediment in rivers and stream at specified location by 10% by 2015</b>	<b>\$134,000</b>	
Strategic action 1	Regulate commercial farming practices	\$5,000	Aimeliik State Legislature
Strategic action 2	Encourage use of best farming practices	\$15,000	Bureau of Agriculture
Strategic action 3	Clearing of waterways (rivers, streams, and taoch)	\$10,000	Aimeliik State Leaders
Strategic action 3	Create appropriate state entity to enforce regulations.		Governor's Office
Strategic action 5	Create a zoning commission to create a zoning plan for Aimeliik State	\$104,000	Governor's Office

Table 5. List of objectives and strategic actions with estimated cost for implementation.

## 2.6 Measures and Monitoring

The fundamental question facing conservation project team is: “Are the conservation strategies we are using having their intended impact?” To answer this question, the team will be collecting data on a number of indicators that gauge how well it is keeping the critical threats in check and, in turn, whether the viability of our conservation targets is improving. See Table 6.

Conservation Target	Key Attribute	Indicator	Suggested methods
Native Forest	Species abundance	number of belochel (micronesian pigeon)	Bird count (Alan Olson's method)
	species diversity	# of tree species	Forest Plots
	Aerial extent	% forest cover	
Savannah	Aerial extent	% vegetation cover	GIS based vegetation analysis
Rivers & Stream	Water level fluctuations	depth of river	River gauge
Mangrove Ecosystem	Community architecture	soil structure	Soil moisture test
	Abundance of food resources	Number of emang (mangrove crab)	Visual census on transect
Seagrass Ecosystem	species abundance	number of cheremrum	Belt transect
	aerial extent	% seagrass cover	Quadrat
Coral Reef Ecosystem	Presence / abundance of key functional guilds	number of fish	Belt transect
	Presence / abundance of key functional guilds	number of giant clam	Belt Transect
	Presence / abundance of keystone species	number of trochus	Belt transect
Historical & Cultural sites	Historical/cultural value	Site integrity	Visual observations
Kmai (Blue Crab)	Presence / abundance of key functional guilds	number of kmai	Belt transect

Table 6. List of indicators for measuring each target with suggested methods for monitoring.

### 3 Capacity Assessment

An analysis of the local capacity of agency staff was conducted during the workshop and facilitated by the facilitators. The following definitions and tables describe the results of this analysis. The overall project resource rank was determined as “medium”. The following list defines the components that comprise this resource rank:

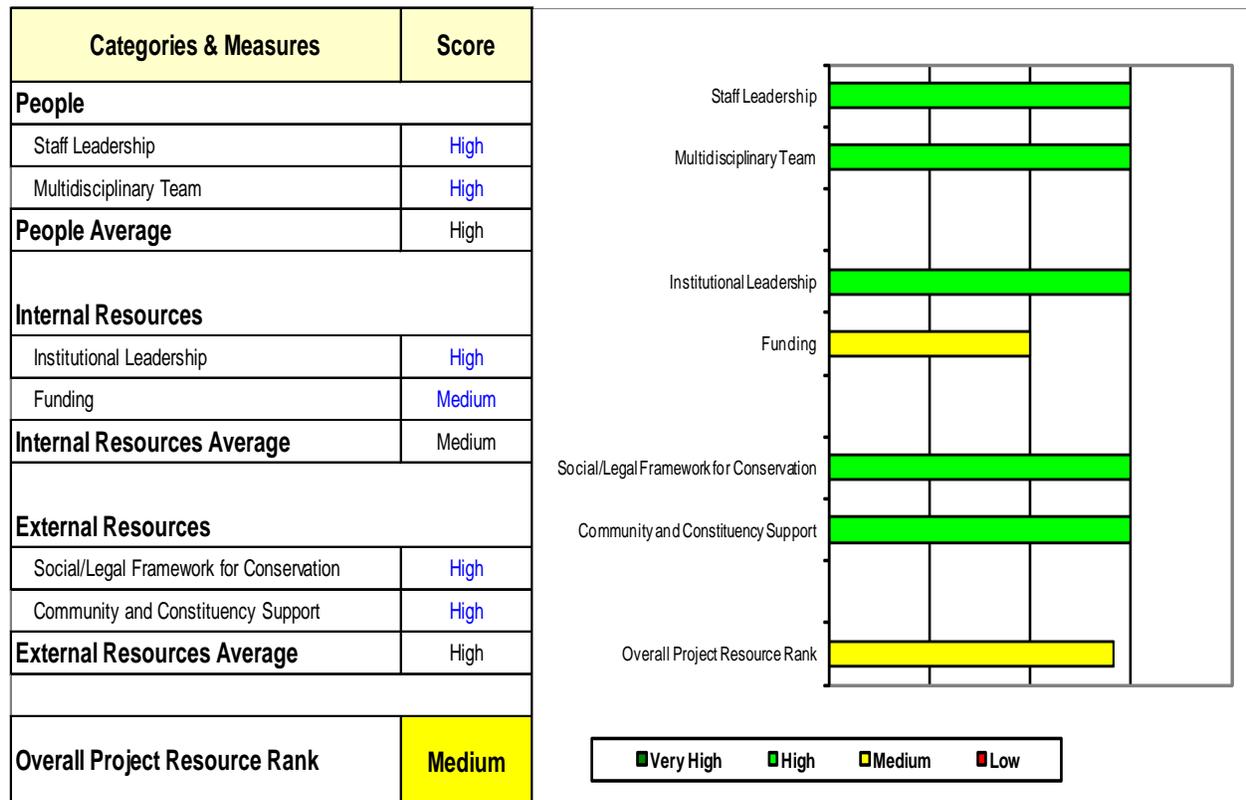


Table 7: Local Capacity Assessment

### 4 Conclusion

This report documents the results and products of the conservation planning workshops. It is intended to be used by Aimeliik State as reference for the development of the management plan for the Aimeliik natural & cultural resources. It is important to keep in mind as Aimeliik State moves forward that the development of the management plan is an important initial step in an on-going cycle of design, implementation and review of management planning, and should view the plan itself as a “working plan,” rather than a final, static document.

## 5 References

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