

Yap Island

Coastal Degradation Assessment Report

Background

Yap State is one of the four states which make up the Federated States of Micronesia and is the most western state of the nation. It is located between Guam and Palau, approximately one hour flight from Guam and 45 minutes from Palau via the United Airlines which services the state two times a week. It is situated in a +10 UTC time zone which is the same with Guam and one hour ahead of Palau. The population of Yap is roughly 7,000 on Yap Island with another 5,000 in the outer islands.

The government consist of the legislative, executive, judiciary, and a unique fourth branch, which are the two local councils of traditional chiefs known as the Council of Pilung (COP) for the Main Island and Council of Tamol (COT) for the neighboring islands. A chief or proxy from each of the ten municipalities in Yap serves as member of the council. On the other hand, the neighboring islands is politically divided into four distinctive precinct however all chiefs are represented in the council through the chiefs themselves or proxy. The two council's primary roles are to monitor operation and development of the state so as not to be in conflict with the traditional ways.

The tide during April to June generally reaches 6 feet and above at its highest peak but then drops down to less than an inch during its lowest peak. In the past five years, typhoons, storms, and, king tides have been more frequent than people could recall. Strength and level of such occurred phenomenon have increase in intensity. Typhoons have reached an all time height and strength of super-typhoon and sea-level rise have frequently reached high marks seldom reached in the past. All of these natural occurrences have contributed to erosions of the coastlines. In some areas around the island of Yap, coastline erosion has occurred as much as 60 feet. Erosion occurred mostly in areas with exposed shorelines. In other areas protected by patches of mangroves, the occurrence is a lot less however, still occurred but not so noticeable.

The land and reef resources around the islands are owned by individuals, clans, and or estates. Permission must be secured and granted prior by the traditional chiefs or head of each estate in order for any activities to take place on any land or reefs. At times this proves to be difficult for any activities to be accomplished in a timely manner, especially when it involves visiting such places for official business.

Communities and government must work hand in hand on any given projects in order to reach a positive and useful outcome and be able to meet goals and objectives. Even when any government entities wish to conduct any activities on any given property, it must follow the local protocols of securing permission from one of the two relevant traditional council offices. The council does not just give out permission but rather seek approval from property owner(s). It is only with their blessings that such activities could go forth. On land is just as the same as in water extending out beyond the water breakers.

Marine Resources Management Division, a division of the Department of Resources and Development of the Yap State Government was given funding under the United Nation Global Environmental Facility, Reef to Ridge (R2R) Project to implement the following projects: 1) *Marine Protected Area (MPA) Enhancement*; 2) *FAD Deployment*; 3) *Aquaculture Feasibility Study*; and 4) *Coastal Assessment* along the coastal shorelines of the main island, Yap Island. This report covers the assessment methods, findings and results, and opinions of the implementing division, MRMD, based on the same said assessment done within the months of June to September 2017. Although the assessment took three months to complete due to other official duties and responsibilities, this paper will cover all mentioned activities but mainly report on the heavily affected areas and sites around Yap.

Initial assessment took place within the month of July. However, the assessment was incomplete due to other official commitments and projects which were happening simultaneously with the R2R projects. The R2R projects were sidelined in order for the staff of the division to refocus on other pressing matters which included office projects and expected outcomes and expectations. Activities resumed in August and continued until September, the time this report was developed.

Assessment Method

Method used to conduct the assessment is actual site visits accessing the sites with two modes of transportation, boat and car. The assessors were equipped with a GPS unit to obtain site coordinates and a camera to capture photo of affected sites. The initial assessment was done utilizing a 25 footer double decked fiberglass boat with twin 40 horsepower four-stroke engines. At times when called for, two other boats were utilized; an 18 footer double decked fiberglass boat with a single 40 horsepower, four-stroke engine and the third boat is a 20 footer double decked fiberglass boat with a 40 horsepower, two-stroke engine.

GPS used to obtain site coordinates was a portable Garmin Etrex 10 with backup coordinates taken from a Garmin GPS72H. The cameras used to capture the photos are a Sealife digital camera. The backup camera used was a Fujifilm XP, model number 65A17380.

The method involves the boat motoring around the island at a very slow speed scanning the shorelines and where it is deemed necessary and able, the boat stops and photos and GPS coordinates were taken and noted on notepads. One person would obtain the beginning and end coordinates and the second person would take still shots on the cameras while moving along the coast at those affected areas.

Afterwards while back on land, careful review of the photos and coordinates the sites are determined by order of how badly affected they are and whether a site revisit is necessary, as well as determining if selected sites are accessible by car. Selected and accessible sites are revisited using a car and at times a boat is used if it is not accessible by car.

Number of people present on the boat to conduct the assessment ranged from four to eight people. It usually takes a minimum of five people on a single boat to conduct the assessment; One person as

the driver, the second and third person to gather information (GPS and photo); fourth person as the crew; and fifth (when necessary) as the community/owner representative. However, at most times, all personnel contracted under the R2R Project funding participated in the assessment.

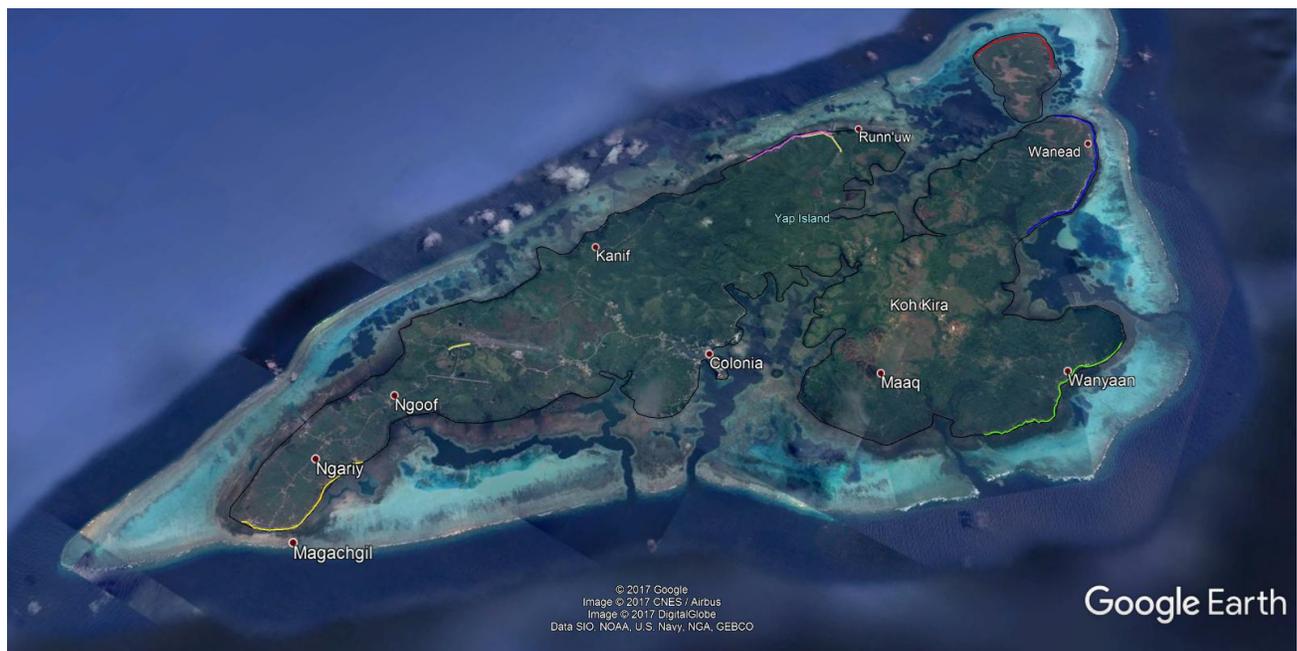
Assessment Coverage

The entire coastline of Yap Island was surveyed and assessed, including Rumung Island. The survey started out in the northern part (Gagil and Tomil) on the first day and Rumung and Maap on the second day. On the third day, the survey had to come to an abrupt halt as the staffs were suddenly tasked to perform other official core duties.

Survey resumed in late August where it continued until the second week of September picking up from where the last site was left off. The survey continued down on the western side of the island toward the southern end. By the first week of September, the survey crews have reached the southern end of the island and immediately started working on the eastern side of the island. By the end of the second week of September, the survey crew had reached the starting point in Gagil to which they have circumference the whole island.

Findings

During the survey 100 percent of the 58 miles of the main island's coastline was covered and visited. Eroded areas are at an estimated 22% or 13 miles. Most of these affected areas are found on the northern and western parts of the island, namely, Gagil, Maap, Rumung, and Fanif. Gilman is on the southern eastern part of the island. Rull however is on the south-eastern part of the island. Refer to below map for better orientation as well as locating the eroded and affected areas.



Green colored coastal outlines represent the affected areas in Gagil. The *blue* colored coastal outlines represent the affected areas in Maap. The *red* colored coastal outlines represent the affected areas in Rumung. The *pink* colored coastal outlines represent the affected areas in Fanif. The *yellow* colored coastal outlines represent the affected areas in Gilman and Rull.

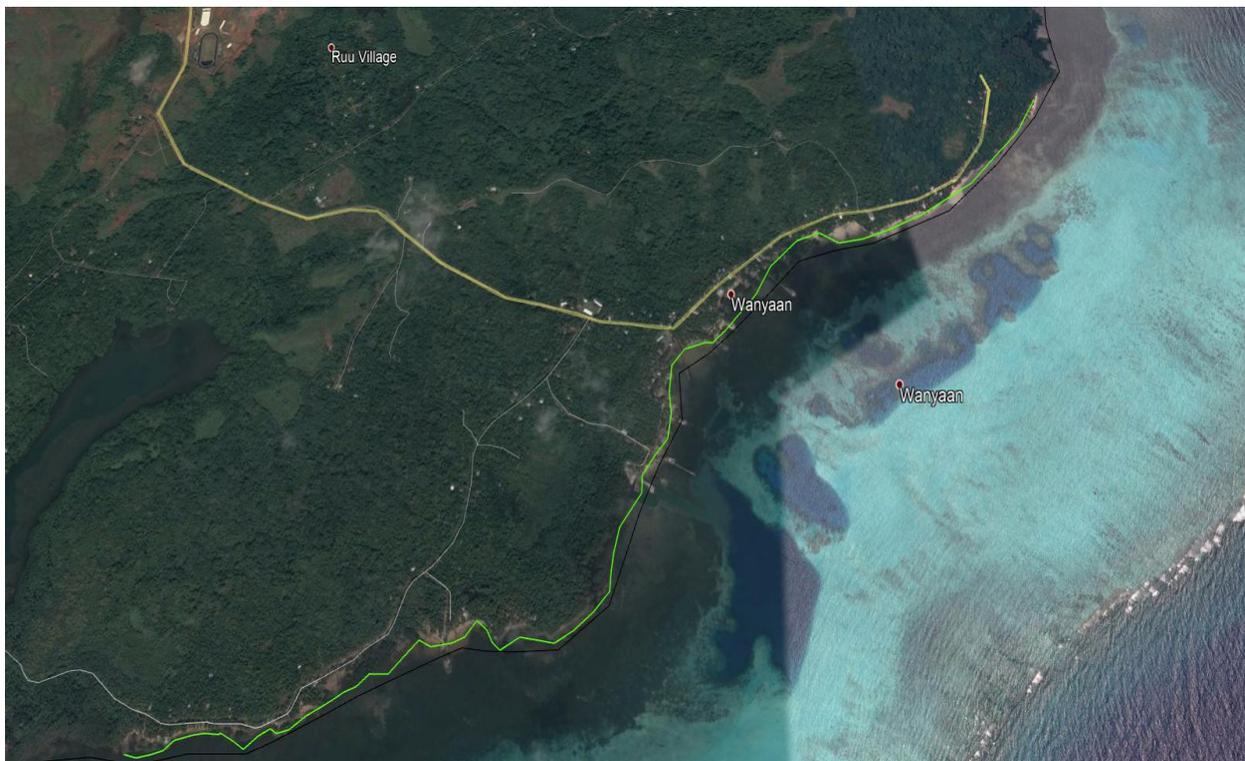
Gagil

Gagil is located in the Northeastern part of the island. The reef extends out from the shoreline and meets the breaking waves at approximately 0.5 miles and as close as 0.15 from the coastlines.

The affected areas in Gagil cover an area equals to 3 miles. In some areas it is evident that as much as 20 feet and as little as 4 feet have been eroded away. Based on information gathered from interviewing some of the local residents (those who were present on the boat and or in the car) during the survey, those areas slowly eroded away over the past 20-30 years. Information sources revealed that the frequency of typhoons and sea level rise within the last 10-15 years have greatly contributed and magnified the erosion issue. It is worth noting that most of these impacted areas are in places where the coastline is exposed and has no protection from mangroves or mangrove patches.

The former shoreline areas are evident from the lining of the dead and fallen coconut trees and other big trees which are 20 feet from the current shoreline. Constructing a timeline to determine the erosion rate is difficult as there is no available data to help.

Below are photos from couple of the heavily affected sites in Gagil Municipality. These photos were taken from the shoreline during the follow up visit to the heavily impacted sites located in Gagil Municipality.





Maap

Maap is located on the most northern part of the island. 4 miles of eroded areas are found in this area. As shown in below photos, Maap is most vulnerable with very little protection from mangroves and the reef. Mangrove patches does not exist in most areas as most of the coastline is covered with sand which can be most susceptible to erosion and may not be the best for trees to grow and help hold the soil and coastline.

Whether mangroves survived at some point in the eroded areas is unsure but it is definitely not there when it was surveyed. Although some people are recently forced to rebuild and move further inland after the previous typhoons, some people still live close to the water for better access to the water.

A solid landmark to measure how much has been eroded away is the Village View Hotel in Chool, Maap. The hotel was built in the mid 1990s. It was built on a location approximately 50 feet from the shoreline. In 2017, during the time of this assessment, the shoreline has moved 10 feet past the foundation post of the cottages which were closest to the shoreline. Based on these given facts, the soil is eroding at a rate of 0.08 inches on a daily basis; 32.4 inches per year.



Rumung

Rumung is the fourth and smallest island in Yap Main Island. Rumung has no electricity or paved road and can only be accessed by boat, canoes, or rafts. Rumung is high in the middle. Most people establish their homes close to the water or along the coastlines. All along the coastlines, residence are established.

One half of the island's shoreline is protected by mangrove patches while the other half, the side exposed to the reef, is bare and has no coastline protection. As being exposed to the breaking waves on the reef, most of the coastline erosion is happening on this same side. The reef to shore is closest at approximately 0.3 miles. The farthest reef is approximately 0.8 miles to shore. The erosion affected areas amount to a little over 2 miles, 2.15 miles to be exact.





Fanif

Fanif is located on the north western side of the island. It is one of the areas on the island that has the closest breaking waves to the shoreline. The closest reef end is approximately 500 feet away from the shoreline. 1.6 miles of the coastline is affected by shoreline erosion. As being closest to wave action breaking on the reef, this is one of the highly vulnerable areas around the island.





Gilmaan and Ruul

Gilman and Rull are two different municipalities; however, the shorelines are connected. The boundary line was not clearly established during the survey as there were no communities representatives present during the survey. For the purpose of this report, the two adjoined municipalities are hereby labeled as Gilmaan and Ruul.

The erosion affected areas in Gilmaan and Ruul amounts to 2 miles. The affected areas are, like the rest of the other affected areas in the different municipalities, exposed to the wave action caused from the breaking waves on the reef. In the areas where the coastline is protected with mangrove patches, erosion or coastline degradation is considerably less than the exposed areas.



Challenges

It must be noted that during this survey, the crew had to work with the open window of the highest peak of the tide. Given the tide means, it only allowed a working window of four hours on a given day when the high tide is plus or minus two of high noon. The second factor to the prolonged survey was weather condition. Given the rainy season there were approximately four days which the crew were unable to work due to heavy rain which caused operator to be disoriented when navigating the waterways. One other factor which, from time to time, affects progress are community/resource owner's representatives who are scheduled to join the team but at most times are not very punctual. From time to time a good part of an hour is gone before actual work is being conducted.

As the reefs are privately owned, most resource owners prefer to have their selected individuals to join the team and serve as ambassadors or liaison officers between the government and the visiting communities. Almost on a daily basis, one or two community representatives are present on the boat serving as liaison officers depending on how much ground is being planned to cover within that particular day.

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**Developed for UNDP GEF 5
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