

Marine Resources of Helen Reef in the Year 2000

A Summary Report of the Helen Reef Baseline Monitoring Expeditions
sponsored by the
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by the
The Community Conservation Network
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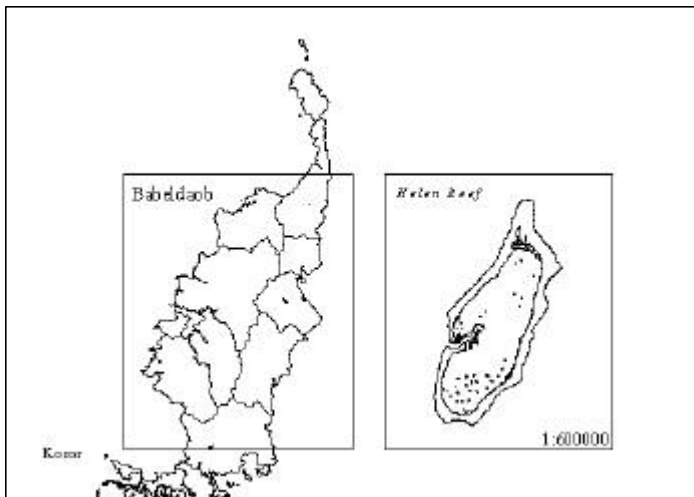
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1 Introduction

1.1 *Importance of Helen Reef*

Helen Reef in the Southwest Islands of Palau is the one of the greatest marine assets of the Hatohobei (Tobi) People and of the Republic of Palau. As reflected in its Hatohobeian name *Hocharihie*, meaning “Reef of the Giant Clam” Helen Reef is perhaps most famous for its once incredibly abundant giant clams. Helen Reef is known as one of the most biologically diverse atolls in the Pacific and historically one of the most abundant reefs in



Palau, with acclaimed marine resources including trochus, turtles, sea cucumbers, seabirds, and many large reef fish. Helen Reef is 24 km long and 10 km wide, and the large scale of its resources can be seen when it is compared to Babeldaob (Figure 1). The richness and abundance of this atoll's resources are factors of its location, being remote from human populations and bordering the Indo-Pacific center of coral reef biodiversity.

Figure 1. Comparison of the Size of Helen Reef and Babeldaob
Produced by the Palau Bureau of Lands and Survey

1.2 *History of Use and Conservation Issues*

The atoll has attracted many users over time including subsistence fishermen from Hatohobei and neighboring islands, local businesses interests, and foreign commercial fishermen. The remoteness that formerly protected Helen Reef from high levels of exploitation is now a factor in recent resource declines, as it usually uninhabited and has been notably vulnerable to poaching for the last half century by foreign fishermen from Asian countries, some using destructive fishing methods (such as blast and cyanide fishing). Over time, it is suspected that these combined uses have affected many of the reefs resources. Of particular concern are the following:

- ?? Commercial gleaning of giant clams, trochus shells and sea cucumber
- ?? Live reef fish trade
- ?? Capture of turtles, collection of eggs
- ?? Capture of nesting birds, chicks and eggs
- ?? Depletion of coastal sharks.

In addition to these impacts, there is a great deal of concern regarding coral bleaching. Bleaching can lead to mass mortality of reef-building corals, soft corals and other animals, and is thought to be a natural process that has been increased by global warming. Reefs in Palau and throughout the world suffered heavy losses during the 1997 and 1998 warm

water events accompanying the El Nino. A survey of Helen Reef in 1999 confirmed that the atoll had been very hard hit by the bleaching (Weng and Guilbeaux, 2000).

1.3 ***Actions to Enhance Management***

These impacts, along with coral bleaching episodes in 1997 and 1998, have raised concerns among community members, resource managers, and scientists about the status and condition of marine resources at Helen Reef. Therefore, Hatohebei State and the Community Conservation Network (CCN) organized a number of expeditions in 2000 to assess the condition of the atoll and to begin the processes of developing a management program. The goals of this project were as follows:

- ?? To provide the State with a report on the status of key living resources and general ecosystem conditions at Helen Reef.
- ?? To build the capacity of the State and community to undertake monitoring of living resources at Helen Reef, through appropriate education and training activities.
- ?? To produce recommendations on the design of a comprehensive, long-term monitoring program for Hatohebei State that includes both scientific and community oriented monitoring protocols.
- ?? To furnish the State with general and specific management recommendations, procedures, or actions that may serve to improve the management, use, and conservation of marine resources at Helen Reef, especially as related to Marine Protected Area development.

To accomplish these goals, Hatohebei State and CCN assembled a team comprising experts in corals, fish, turtles and marine invertebrates to undertake a survey of the atoll and work with members of the community to develop a community-monitoring program. Prior to the expeditions, meetings were held in Koror at which the community directed the team to focus on the following issues:

- ?? The status of key resources, being trochus, sea turtles, giant clams, sea cucumbers, large fishes, especially Napoleon Wrasse, Grouper, and Parrot Fish, and seabirds
- ?? Options for recovery for those resources that are depleted
- ?? Impacts of, and options for establishing a permanent station on Helen Island
- ?? Impacts of, and options for stabilizing Helen Island
- ?? Options for establishing a marine protected area at Helen Reef.

In addition to these directives, the team concluded that they could best serve the interests of Hatohebei by conducting surveys that would:

- ?? Provide a scientifically rigorous baseline for long term monitoring
- ?? Measure indicators of ecosystem condition identified by scientific experts
- ?? Where possible, provide historical perspective by repeating surveys previously conducted at Helen Reef.

2 Methods

2.1 Survey Components

The survey was divided into a number of components:

- ?? Reef-building corals
- ?? Key invertebrates (eg trochus, clams, sea cucumbers)
- ?? Fishes
- ?? Turtles
- ?? Birds.

2.2 Repeats of Previous Surveys

Where possible, data was collected to be comparable to previous surveys of Helen Reef, the most comprehensive of which was the Palau Southwest Islands Rapid Ecological Assessment (REA) of Maragos et al. conducted in 1992 (Maragos et al., 1994), hereafter referred to as the 1992 SWI REA.

2.3 Quantitative Baseline

To establish a rigorous quantitative baseline for long term monitoring, further surveys were designed and conducted. These surveys were designed to allow the best characterization of the atoll using widely accepted methods. Techniques used in the surveys included:

- ?? Measured transects
- ?? Timed swims and walks (for benthic invertebrates)
- ?? Drift dives (to survey large fish)
- ?? Beach patrols (for nesting turtles)
- ?? Digital video and still photography
- ?? Other published techniques developed for specific organisms (e.g. birds)

Data collected in all activities was used to update population estimates and species lists for the atoll.

2.4 Community Monitoring Program

A number of Hatohobeians participated in this survey, particularly in studies of trochus and giant clams. By developing the monitoring capabilities of members of the Hatohobei community, we anticipated that it will be possible to establish a community monitoring program that operates with minimal assistance from outside scientists. Such a program, operating over the long term, will allow the State to keep track of the status of resources of most importance to its citizens.

3 Results

3.1 Corals

Based on comparisons with the 1992 REA, it appears that Helen Reef suffered very high mortality of corals during the 1997 and 1998 bleaching events, particularly on the outer slopes. The survey in August 1999 (Weng and Guilbeaux, 2000) noted evidence of recent bleaching as well as presently bleached corals. Studies throughout the world have noted that one group of corals, the genus *Acropora*, is particularly vulnerable to bleaching mortality. The great majority of *Acropora* at Helen Reef was dead in 2000, in stark contrast to its condition in 1992 when this group was common. Nine species of *Acropora* appear to have become locally extinct since 1992. New accounts corals were made at Helen Reef during these expeditions, including a few thought to be previously undescribed by science, raising the number of recorded stony corals present at Helen Reef to 282.

Soft corals are also noted to be very susceptible to bleaching mortality, and large numbers of "footprints" were observed, indicating the recent death of soft corals that formerly occupied a significant portion of the reef.

Corals within the lagoon were much less affected by bleaching mortality, and this is thought to be due to their acclimation to higher temperatures that are common in lagoons. Regrowth of corals appears to be proceeding rapidly in many parts of the atoll, and indicates that the ecosystem remains healthy enough to recover from the bleaching event.

3.2 Key invertebrates

3.2.1 Trochus

Estimates of trochus abundance during the 2000 survey indicate that this resource has been under extreme pressure, possibly due to collecting by foreign fishermen. Trochus were very rare during our survey, with one adult found in an area of two basketball courts (roughly 1000m²). Rough calculations based upon information from knowledgeable Hatohobeian fishermen suggest that a few decades ago the same areas would have yielded about 250 trochus.

3.2.2 Giant Clams

Giant clams were much rarer than trochus. Our surveys indicated approximately one *Tridacna gigas* per hectare (10,000m²) or one for every 25 basketball courts. Unfortunately, the first surveys of this species occurred in the 1970s after a long period of intense harvesting by Asian fishermen. Therefore, we do not have reliable information on the pristine abundance. However, based upon the memories of Hatohobeian and the reputation of the atoll, it is believed that present populations are extremely depleted.

3.3 Fishes

3.3.1 Reef Fishes

Fishes at Helen Reef are numerous and diverse (530 species at present count), and for the most part, appear to be healthy and in far better condition than in many other parts of Palau or the world. Large, highly prized species such as Napoleon Wrasse and Bumphead Parrotfish appeared to have healthy populations in comparison with reefs elsewhere in the world. Some concern was raised concerning spawning aggregations of groupers, which are thought to have been exploited by a live reef fish fishermen. The timing of surveys did allow observations through different moon phases of aggregations.

The survey of Weng and Guilbeaux in August 1999 noted aggregations of a number of grouper species, indicating that particular spawning sites are still viable. The locations of known aggregations surveyed in August 2000 indicate severe depletion of some particular spawning aggregations.

3.3.2 Sharks

In comparison with the 1992 REA, and the knowledge of Hatohobeians familiar with Helen Reef, the numbers of sharks were very low during the 2000 survey. We do not have information pertaining to the exploitation of sharks at Helen Reef, but it is possible that the high price of shark fins has led to shark fishing around the atoll.

3.4 *Turtles*

Helen Island is a known nesting beach for green turtles (*Chelonia mydas*). A total of 6 individual green turtles were observed nesting on Helen Island over 7 days, and were each tagged. Tagging turtles enables estimation of their numbers and their movements to be determined in the event they are observed or captured in the future.

The presence of turtles in the reef indicates that Helen Atoll continues to be an important foraging habitat for juvenile and adult green and hawksbill turtles. However according to Hatohobeians familiar with the atoll, numbers of turtles present have declined considerably.

3.5 *Birds*

Helen is an important site for nesting seabirds year round. The vast reef provides an almost limitless food resource, and the island is remote and isolated. At least three species of sea birds were nesting during our visits, and eight others were recorded. Characterizations of these populations are included in the expeditions' final report. In addition to seabirds, a number of land birds were observed, but it is unclear whether they have viable populations. It is probably that the presence of rats on the island, introduced possibly from abandoned boats, reduces the nesting success and survival of some seabird populations.

3.6 *Water Temperature*

Due to increasing interest in coral bleaching and death related to water temperature changes, a series of water thermographs were installed at various locations. Data loggers are planned to be relocated, recovered, and download on an annual or semi-annual basis

3.7 *Resource Mapping and GIS*

To assist with long-term monitoring of resources, the initiation of a Geographic Information System (GIS) with collaboration with the Palau Bureau of Lands and Survey commenced during these expeditions. Base mapping was performed of monitoring stations, resources, thermographs, and other points of interest (Appendix 1). A geo-reference base station was established on Helen Island for future mapping.

4 **Conclusions and Recommendations**

Base on the characteristics, status, and history of Helen Reef, it is recommended by this group of scientists that Hatohobei State develop and implement an effective management plan that will prevent poaching and ensure the sustainable use of Helen Reef by the Hatohobeian people. Management specialists can assist the Sate in development and implementation of such plans, which can only succeed with effective enforcement. In particular, the plan should address the following:

- ?? Protection of trochus, sea cucumber, and giant clam from harvesting for a number of years to allow recovery. Because the habitat remains fairly intact, both species should enjoy healthy recoveries in the event of protection, which may be facilitated by restocking.
- ?? Protection of grouper spawning aggregations. All species of groupers are easy to catch when aggregating to spawn, and intensive fishing effort has resulted in the extinction of aggregations, leading to the total loss of the grouper resource in an area. The Live Reef Fish Trade is of particular concern due to the large numbers of fish taken and the destructive methods often used.
- ?? Protection or strict control of the harvest of Humphead Wrasse (*Cheilinus undulatus*) and Bumphead Parrotfish (*Bolbometopon muricatum*). Because these fish are large and slow growing, they cannot replenish their populations in the face of high exploitation rates.
- ?? A ban on shark capture and finning, if this practice is being undertaken in the vicinity of Helen Reef. Most shark species are very slow growing and cannot support intensive fishing. The lack of sharks around Helen Reef during recent surveys is an ominous sign that foreign fishermen may have devastated local shark populations.
- ?? Controls on the taking of turtles to allow populations to recover. This could include a ban on taking female turtles and eggs to allow more successful reproduction. Disturbance of turtle nesting activities on the island should be avoided as possible.
- ?? Avoidance of disturbance to seabird nesting activities and the eradication of rats and chickens from the island.

To evaluate the effectiveness of any management plan that is implemented, it is recommended that the State should initiate a monitoring program to assess the status of key resources at regular intervals. Monitoring training and assistance is also available by specialists , such as once per year. Such a monitoring program should use quantitative methods such as those used for this survey. Continuing training of community members for this purpose is recommended. In addition to the community-monitoring program, we recommend that an in-depth scientific survey (such as this one) be conducted by visiting or national specialists at longer intervals, such as every five years.

5 Acknowledgements

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6 References

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Appendix 1. Map of Helen Reef Monitoring Stations

Helen Reef Year 2000 Monitoring Stations

Helen Reef Atoll, Hatohebei State

Republic of Palau

This map was prepared by the Palau Automated Land and Information Systems (PALARIS) Project within the Bureau of Lands and Surveys in cooperation with the Hatohebei State Government and the Community Conservation Network for the marine resource monitoring project.

The data displayed was collected on two expeditions, April 24 - May 5, 2000 and August 22 - 30, 2000. The majority of the geographic positions were obtained using resource grade global positioning systems (GPS) units, specifically Trimble Pro XR GPS units. The positional data was differentially corrected using post-processing software. Positions noted with a label followed by an asterisk were collected using a Magellan Pioneer GPS unit and were not post-processed. Positions noted with a label followed by a double asterisk are estimated positions.

The base map was digitized from the Helen Reef map produced by the U.S. Minerals Management Service, Mapping and Boundary Branch, dated March 24, 2000.

