Research and Capacity Building for MPA monitoring
Final Report

A. NOAA Grant No: NA07NMF4630092

B. Amount of Grant: $39,255.75

Grant Title: Research and Capacity building for MPA monitoring

C. Grantee: Palau International Coral Reef Center

D. Award Period: 10/01/2007 - 03/31/2009

E. Period Covered by this report: – 10/1/2007 – 7/31/2009

F. Summary of progress and expenditures to date:

1. Work Accomplishments

Project accomplishment (10/1/2007-7/31/2009)

MPA monitoring
Fish and invertebrate monitoring were conducted for a period of 18 months.
Preliminary analysis for fish data (see figures) shows that MPA does have an effect
on fish abundance, however not significantly difference. Further analysis on fish size
need to be conducted to determine whether reef closure has an effect on fish size.

When each MPA and its control site are analyzed separately, there are MPA that has
more fish than their control and vice versa. Careful analysis and review of
information available for each site will help to determine why such a trend exist.
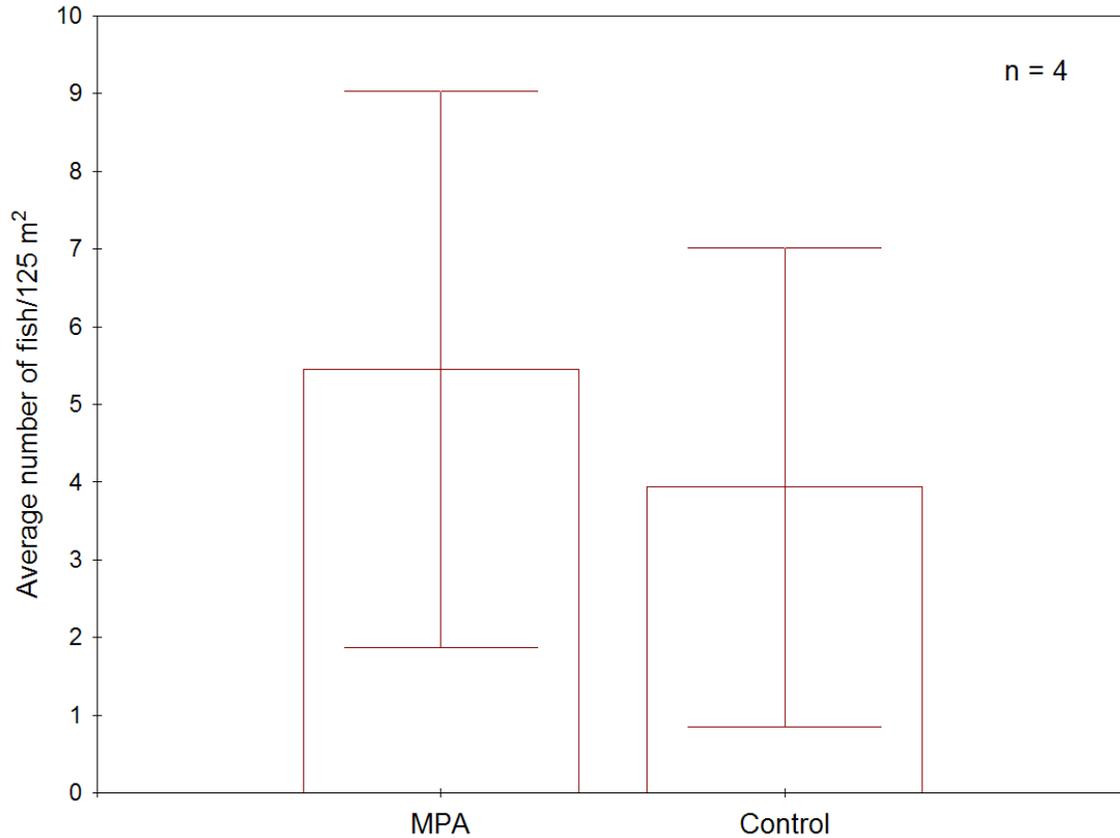
Figure 1. Mean number of fish inside MPA and outside MPA (control). There were four 4 MPA and 4 control sites. MPAs and their respective controls were on similar habitat (seagrass beds), which are exposed at low tides. There is no significant difference in the total number of fish inside and outside of the MPA, based on 1 year data collection. However, MPA generally shows trend in increasing number of fish. There is very high variation in the number of fish during quarterly monitoring; this variation can be attributed to tide, moon phase, and spawning aggregation for rabbitffish, *Siganus fuscescens*. Majority of the fish found in the monitoring sites were rabittfish. While there is no significant difference in fish abundance, we still need to analyze the data to determine whether there is a significant effect on fish size.
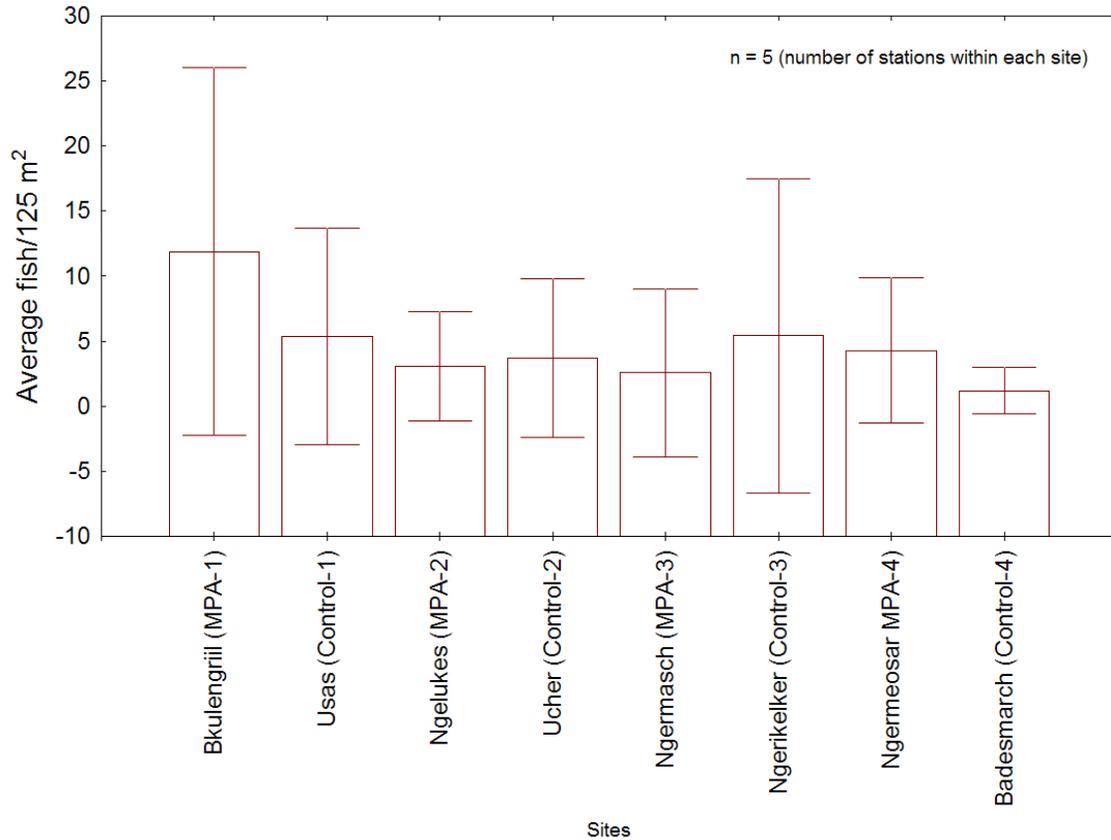
Figure 2. Comparison of fish abundance inside and outside (Control) for each MPA.
There were 5 stations of 5, 25 m x 5 m belt transect within each study site. There was no
significant difference in the number of fish inside the MPA and outside of the MPA
(Control) between sites. However, MPAs generally has slightly higher abundance of fish
than the Control site. There was an instance, where MPAs had slightly lower abundance
of fish than the Control sites, e.g Ngermasch MPA & Ngerikelker (Control) and
Ngelukes MPA & Ucher (Control). There are two possible explanations for this: (1)
fish survey happened to be aggregated in areas where there is low fish abundance, e.g in
Ngermasch; according the Conservation Officer from Ngardmau State, areas of high fish
abundance were south of where surveys took place. Sampling station were haphazardly
place on the north end of Conservation area as we were not aware of the extent of the size
of the Conservation Area until later on during the study. Future monitoring stations will
be place haphazardly throughout the whole Conservation Area. (2) These two MPA's
where there is generally low abundance in fish compared to the Control Sites are located
just outside of major river mouths in Babeldaob (**Figure 3**). There is a potential that
these sites are being degraded by sediments thus affecting its value as a fish habitat.
Analysis of sediment data collected during this study will help to provide more
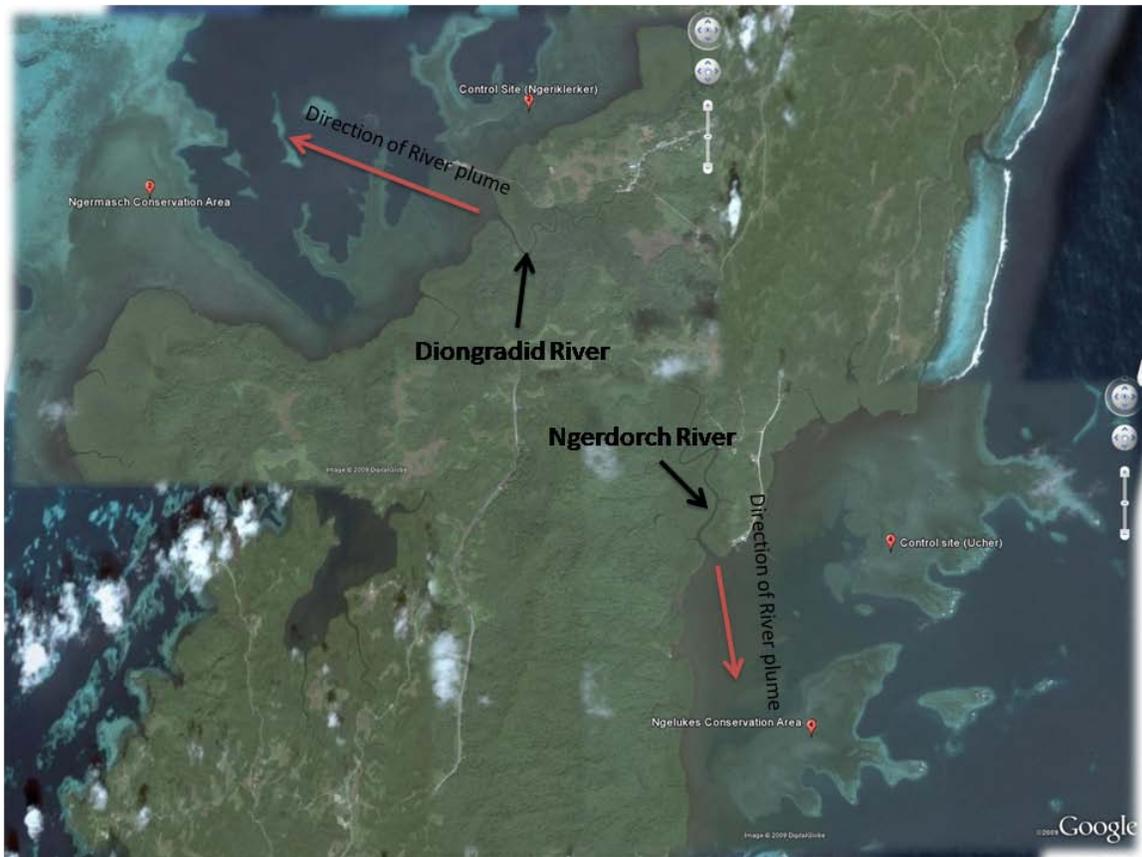understanding to these differences in fish abundance.

Figure 3. Map of Babeldaob showing location of Ngermasch Conservation Area (top left) and Ngelukes Conservation Area (bottom left) that are potentially impacted by sedimentation potentially degrading the habitats.

Sediment monitoring
1. Sediment monitoring was completed in June 2009. This marks the end of a 1 year long sediment monitoring.
2. All data has been entered into an xls database and are now being analyzed (no result provided, yet)

Community outreach
During the course of this project, we conducted several outreach programs, which included:
1. Student exposure to PICRC and the research undertaken
2. Presentation of project and results to key partners
3. Capacity building for MPA monitoring.

We began our project by inviting Governors and Conservation Officers from Airai State, Ngchesar State, Ngardmau State and Ngaremlengui State for brief overview of the project and their support. The Governors were very responsive to our request for collaboration and our intention to assist them in building the capacity of their

Conservation Officers for monitoring their MPAs. The Governors designated their Conservation Officers as the State representative to be trained. We agreed to formally begin this project with their respective States and agreed that our work will be executed through an MOU (see Photo 1 & Attachment 1). During our signing of MOU, the Governor of Ngardmau State requested that we assist them in seeking opportunity for their Conservation Officers to be SCUBA certified. PICRC through this project provided that training for 2 Conservation Officers from Ngardamu. The Governor of Ngardmau agreed that we can utilize their Conservation Officers for PICRC field surveys. The Conservation Officers has assisted PICRC in the annual coral reef monitoring as well as the monitoring of grouper aggregations.

Photo 1: Signing of MOU between PICRC and partner States. Front row (left to right) Governor Sugiyama of Ngardmau State, Governor Ongos of Nagremlengui State, and Governor Kanai of Airai State (back row, left to right) Steve Victor, PICRC Research Department Head and PI and Waisang F. Mariur, PICRC Administrative Manager.

Following the signing of MOU, we started the training component of this project (see Attachment 2). The training involved in class presentation of monitoring protocols and taxanomy as well as field training (Photos 1-5). Participants learned the principles of monitoring, why do we monitor the status of resources, and how to use the information. The workshop also focused on how to use the different equipments necessary to carry out a monitoring program.

Photo 2. Workshop participants learning how to estimate fish size using fish models.

Photo 3. Participants learning how to estimate with of belt transect for fish census.

Photo 4: Participant learning how to use GPS to locate beginning of transect and to lay out transect for invertebrate surveys.

Photo 5: Participant learning how to identify and measure the height of seagrass

What was more important was the involvement of the participants following the workshop in the monitoring activities in their respective MPA's. We used this approach to continue to provide awareness to the community representative as well as continue to build their capacity. On a quarterly basis, we contacted the participants and asked them to secure their State boat and to be involved in the monitoring. The participants assisted in the monitoring of invertebrates.

The Conservation Officers from Ngardmau and Ngchesar became the key partners in the sediment monitoring component of this project. Because the sites are at least an hour drive from either boat or a car from a laboratory, we provided the sediment traps to the conservation officers for deployment and retrieval (Photo 6). This helped save us time as well as provided another training opportunity to the Conservation Officers to understand how sediment is monitored.

Photo 6: Conservation Officer from Ngchesar State deploying sediment traps in Ngelukes Conservation Area.

During the course of the project, we also made several presentation of results of MPA moniotring to community members and policy makers. Results were presented to Babledaob Watershed Alliance meetings to show impact of sediment on coastal marine communities and how MPA is helping to increase fish and invertebrate abundance. Three of the State for which the project was conducted are members of the alliance. We presented results of the study along with other results from PICRC research project to members of the Palau National Congress to increase their awareness as well as continued support for PICRC programs. Results were also presented to the Governors and selected members of State legislatures for the State where project was being conducted.

List of project outputs:

1. Seagrass Monitoring Manual (funded in collaboration with other funding sources)
2. MPA posters (funded in collaboration with other projects)
3. Fish and invertebrate manual for the State
4. Increased awareness of community members and policy makers (presentations)
5. 7 trained conservation officers
6. Leverage funding to continue capacity building and MPA monitoring (GEF Small Grant and Japan International Cooperation Agency Technical Assistance to PICRC will provide funding and technical assistance to continue capacity building and monitoring)

2. **Expenditures to date** (October 1, 2008 – July 31,2009**):**

Item	Federal $	Match $	Total	
Expenditures from April 1, 2009 – July 31, 2009				
Fuel	$1,500		$1,500	
Community outreach	$732.30	0	$732.30	
Supplies	$350	0	$350	
Boat	0	$4,400	$4,400	
Total	**$2,582.3**	**$4,400**	**$2,582.30**	

Item	Federal $	Match $	Total	
Expenditures from October 1, 2008 – March 31, 2009				
Salary & fringe	$7,936	$10,064	$18,000	
Fuel	$1,350	0	$1,350	
Community outreach	$ 270	0	$270	
Boat		$4,400	$4,400	
Total	$9,556	$14,464	24,020	
Expenditures from April 1, 2008 – September 30, 2008				
Salary & fringe	$9,212.23	$10,298.33	$19,510.56	
Fuel	$1,134		$1,134	
Community outreach & training	$2,694.35		$2,694.35	
Supplies	$3,166.35	$1,000 –	$7,166.35	

		camera $3,000 (4)light & temp sensors		
Boat		$4,400	$4,400	
Indirect cost	$2,755.75		$2,755.75	
Total	**$18,962.68**	**$18,698.33**	**$37,661.01**	
Expenditures from October 1,2007-March 31, 2008:				
Salaries and fringe	$7,851.77	7,851.67	$15,703.44	
Meeting	$104		$104	
Fuel	$199		$199	
Others		$1,750	$1,750	Boat
Total	**$8,154.77**	**$9,601.67**	**$17,756.44**	
Total YTD	**$ 39,255.75**	**$47,164**	**$86,419.75**	
Total Fund received		***Total Expenditures***		***Fund Remaining***
$39,255.75		*$39,255.75*		*0*