



**MOVING TOWARD MEASURING OUR  
EFFECTIVENESS:  
THE 2<sup>ND</sup> MEETING OF THE MC  
MEASURES WORKING GROUP AND  
PICRC-JICA CORAL REEF  
MONITORING PROJECT MEETING**

15-19 February, 2010

Palasia Hotel, Koror

Republic of Palau



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# EXECUTIVE SUMMARY

The Micronesia Challenge was launched in 2006 with a general but ambitious goal to “effectively conserve at least 30% of the near-shore marine resources and 20% of the terrestrial resources by 2020” for the five MC jurisdictions. To meet this goal, government and non-government agencies across the MC region, along with MC regional and international partners, have been working together to formulate a monitoring framework that will provide the guiding structure, direction, guidelines and tools (or methods) on how we can realistically implement our respective conservation strategies at the jurisdictional level and measure conservation progress at a regional level.

In 2008, the 1st MC Measures Meeting took place to define a proposed process and timeline for the periodic measurement and analysis of progress toward achieving the goals of the MC. From February 15-19, 2010, we held the 2<sup>nd</sup> MC Measures Meeting to take what we had collectively agreed on from the 1<sup>st</sup> Measures Meeting and use that information to develop a regional monitoring framework (e.g., what should be measured; how should they be measured; who will be involved; and what level of capacity is needed to carry out this measures work). This 2<sup>nd</sup> MC Measures Meeting coincided with the PICRC/JICA project, “Capacity Enhancement Project for Coral Reef Monitoring”, which shared some overlapping objectives with the 2<sup>nd</sup> MC Measures Meeting - to produce a monitoring protocol that is realistic, relevant and achievable to be used by all five MC jurisdictions to measure conservation progress of the MC goals. Due to limited time and resources, this meeting excluded the terrestrial component of the MC, while it focused on the marine sector and its socioeconomic indicators.



Despite the complexity and large scale of our goal, you will note from this report that we accomplished almost all of our objectives in this workshop. As we did not have time to fully discuss and develop consensus on some of the suggested monitoring indicators, several participants from the workshop volunteered to join one or more of the three small working groups (i.e., Marine Ecology, Socioeconomics and Score Card) which were created and tasked to continue discussions and work out the details via email, or other virtual means, until a consensus on the respective indicators is reached by representatives of the five MC jurisdictions. This workshop allowed jurisdictions to make significant progress in the process of establishing a feasible, realistic regional monitoring protocol and allowed us to create a solid foundation for future collaborative efforts to meet the needs of each jurisdiction and the region as a whole.

# ACRONYMS

<b>CBD</b>	Convention on Biological Diversity	<b>MICS</b>	Marshall Islands Conservation Society
<b>CCS</b>	Chuuk Conservation Society	<b>MIMRA</b>	Marshall Islands Marine Resources Authority
<b>CEPCRM</b>	Capacity Enhancement Project for Coral Reef Monitoring	<b>MINA</b>	Mariana Islands Nature Alliance
<b>CI</b>	Conservation International	<b>NBSAP</b>	National Biodiversity Strategy and Action Plan
<b>CMAC</b>	Coastal Management Advisory Council	<b>NISP</b>	National Implementation Support Partnership
<b>CNMI</b>	Commonwealth of the Northern Mariana Islands	<b>NOAA</b>	National Oceanic and Atmospheric Administration
<b>CRM</b>	Coastal Resources Management	<b>OIA</b>	Office of Insular Affairs
<b>CSJ</b>	Creative Cooperation Service Japan	<b>PAN</b>	Protected Areas Network
<b>CSP</b>	Conservation Society of Pohnpei	<b>PCS</b>	Palau Conservation Society
<b>DAWR</b>	Division of Aquatic and Wildlife Resources	<b>PICRC</b>	Palau International Coral Reef Center
<b>DEQ</b>	Department of Environmental Quality	<b>PIF</b>	Pacific Islands Forum
<b>DLNR</b>	Department of Lands and Natural Resources	<b>PII</b>	Pacific Invasives Initiative
<b>DRD</b>	Department of Resources & Development	<b>PILN</b>	Pacific Invasives Learning Network
<b>FSM</b>	Federated States of Micronesia	<b>PIMPAC</b>	Pacific Islands Managed and Protected Area Community
<b>GCMP</b>	Guam Coastal Management Program	<b>RMI</b>	Republic of the Marshall Islands
<b>GEF</b>	Global Environment Facility	<b>ROP</b>	Republic of Palau
<b>JICA</b>	Japan International Cooperation Agency	<b>SOW</b>	Scope of Work
<b>JWRC</b>	Japan Wildlife Research Center	<b>SPC</b>	Secretariat of the Pacific Community
<b>KCSO</b>	Kosrae Conservation and Safety Organization	<b>SPC</b>	Secretariat of the Pacific Community
<b>KIRMA</b>	Kosrae Island Resource Management Agency	<b>SV</b>	Sustainable Visions
<b>LMMA</b>	Locally Managed Marine Area Network	<b>TNC</b>	The Nature Conservancy
<b>MC</b>	Micronesia Challenge	<b>UH</b>	University of Hawai'i
<b>MCT</b>	Micronesia Conservation Trust	<b>YapCAP</b>	Yap Community Action Program
<b>MIC</b>	Micronesians in Island Conservation	<b>YINS</b>	Yap Institute of Natural Science

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## USEFUL WEBSITES

Capacity Enhancement Project for Coral Reef Monitoring [www.cepcrm.org/](http://www.cepcrm.org/)  
 Japan International Cooperation Agency <http://www.jica.go.jp/english/>  
 Locally Managed Marine Areas Network <http://www.lmmanetwork.org/>  
 Micronesia Challenge: [www.micronesiachallenge.org](http://www.micronesiachallenge.org)  
 Micronesian Conservation Trust: [www.mctconservation.org](http://www.mctconservation.org)  
 Pacific Marine Resource Institute: [www.pacmares.com](http://www.pacmares.com)  
 Palau International Coral Reef Center: [www.picrc.org](http://www.picrc.org)  
 Secretariat of the Pacific Community <http://www.spc.int/corp/>  
 Secretariat of the Pacific Regional Environment Programme <http://www.sprep.org/>  
 The Nature Conservancy Micronesia: [www.nature.org/wherewework/asiapacific/micronesia](http://www.nature.org/wherewework/asiapacific/micronesia)



Photo by Trina Leberer

# BACKGROUND

## *Overview of the Micronesia Challenge and the Measures Group*

In early 2006, the Chief Executives of the U.S. Commonwealth of the Northern Mariana Islands (CNMI), the Federated States of Micronesia (FSM), the Republic of the Marshall Islands (RMI), the Republic of Palau (ROP), and the U.S. Territory of Guam signed the Micronesia Challenge (MC), a shared commitment to effectively conserve at least 30% of the near-shore marine resources and 20% of the terrestrial resources across Micronesia by 2020.

The MC was conceived as a result of the deep commitment of these five leaders to ensure a healthy future for their people, protect their unique island cultures, and sustain the livelihoods of their island communities, by sustaining the island biodiversity of Micronesia. The MC also contributes to global and national targets set out in the Millennium Development Goals, the Johannesburg Plan of Implementation for the World Summit on Sustainable Development, the Mauritius Strategy for Small Island Developing States, the U.S. Coral Reef Task Force National Plan of Action, and the relevant Programmes of Work of the Convention on Biological Diversity.

To begin the process of implementing the MC, 80 representatives from the five jurisdictions participated in the 1st Regional Action Planning meeting in Palau in December 2006. This meeting resulted in a comprehensive set of recommendations; base definitions for the various components of the commitment; broad categories of indicators to track regional progress on achieving the goals of the MC; and a recommended strategy for regional outreach. All participants in the meeting agreed to continue to work together across their borders in the future as they implement the Challenge.

From 2-6 June, 2008 more than 60 participants from the FSM, CNMI, RMI, ROP, and Guam converged on Pohnpei for the 2nd Regional Meeting of the Micronesia Challenge. The meeting was comprised of three components:

1. A technical workshop “Moving Toward Measuring Our Effectiveness: The 1st Meeting of the MC Measures Working Group” to continue the discussion on regional indicators
2. A communications workshop “Moving Toward Communicating our Messages: the 1st Meeting of the MC Communications Working Group” to develop a regional communications strategy; an
3. The 4th meeting of the MC Steering Committee

This meeting was co-hosted by the Government of the Federated States of Micronesia and The Nature Conservancy’s Micronesia Program. Staff from the non-governmental organizations Foundations of Success and Conservation International, and the U.S. National Oceanic and Atmospheric Administration (NOAA) were invited by the co-hosts to help design and lead the facilitation of the meeting. All five MC jurisdictions, including each of the 4 states of the FSM, were represented by 3-5 participants. Participants brought a wealth of experience and a variety of skills to the meeting, including communications, outreach, government relations, marine management, forestry, wildlife management, socio-economics, GIS, and monitoring. His Excellency President Emanuel Mori opened the meeting with an inspirational speech, encouraging the meeting participants to identify measures of success that would be relevant to donors and legislatures ensuring their continued support of the MC, yet also clear and relevant to communities.





## ***Overview the First MC Measures Workshop***

As mentioned, the first MC Measures workshop was held from June 2 to 6, 2008 in Pohnpei as part of the 2nd Regional Meeting of the Micronesia Challenge.

The goal of the workshop was to define a proposed process and timeline for the periodic measurement and analysis of progress made toward achieving the goals of the Micronesia Challenge (MC).

There were five associated objectives to this workshop goal:



1. To establish a technical working group focused on developing a process for and coordinating the periodic completion of measurement and analysis of progress made toward achieving the goals of the MC;
2. To identify the regional overlaps and gaps associated with biological and social indicators related to natural resource management being collected across terrestrial and marine ecosystems by participating agencies and organizations operating within each of the participating jurisdictions;
3. To identify a shared set of results chains that are related to the MC goals;
4. To build consensus around a proposed set of relevant and useful categories of MC measures and a possible set of corresponding indicators to be collected across jurisdictions, as appropriate; and
5. To provide recommendations to the MC communications working group on how the outputs of the MC measures working group should be used for messaging purposes.

The workshop succeeded in the majority of its objectives including forming a technical working group , identifying overlaps in monitoring approaches, developing a set of shared results chains related to the MC Goals, and developing an initial proposed set of indicators tied to strategies and actions being implemented in each jurisdiction to achieve management objectives to reduce priority threats and improve the health of conservation targets, to be collected across all jurisdictions to help measure our collective progress toward achieving the Goals of the Micronesia Challenge. The results were then shared with the communications group to include in their strategy. The proposed indicators that were developed during this workshop are presented in Appendix Two.



While the first MC Measures workshop succeeded in its objectives, it was determined that monitoring the proposed set of indicators would be extremely ambitious and may not be possible for all jurisdictions. As a result, it was recommended that these indicators be further refined and narrowed down to an essential set of indicators that must be monitored in order to measure our collective progress. Identifying and agreeing on this essential set of indicators was the main objective of the Second MC Measures Workshop.



## ***Summary of the MC Regional Climate Change Meeting: Climate Change and the Micronesia Challenge: Ways forward in Collaboration and Adaptation***

The MC recognized that in its first Regional Meeting it did not adequately discuss the threat of Climate Change and how this will impact the MC. As a result, it was agreed to hold a workshop with a focus on Climate Change. This was the **“Climate Change and the Micronesia Challenge: Ways forward in Collaboration and Adaptation”**, held on April 14-17, 2009 in Majuro. This workshop brought together relevant groups of stakeholders from these countries to meet with experts from climate, natural, and social sciences. The main objectives of the workshop were to: 1) present summaries of current climate data and projected climate risks in the Micronesian region; 2) identify climate risks and vulnerabilities for MC countries; 3) identify and prioritize key national climate adaptation needs and issues; 4) outline national adaptation options and projects; and 5) formulate regional goals and secure regional collaboration in addressing climate impacts.

The common pressing climate-related issues identified by the MC countries are coastal erosion, salt water inundation, threats to corals, and disasters. Periodic extended droughts have been identified as a very serious impact that results in disaster declarations and relief assistance, with severe effects on livelihoods, food security, and survival. These issues are quite pronounced in low-lying and atoll islands, particularly in RMI and FSM. For other volcanic and high islands, although some of these problems are not immediate, the risks of changing climate and the uncertainty of predictions are recognized as hampering development.

A range of needs that should be met to allow for national climate adaptation were identified. On the individual level, these include addressing: low awareness and risk perception regarding climate change; poor understanding of climate



terms and issues; and, immediate livelihood priorities. In terms of resources, there are needs for baseline data that allow for better understanding of climate impacts, increased technical capacities, augmentation of human resources, and both sustainable funding and methods to plan for climate risks and effectively implement adaptation projects and activities. On the national level, there are needs to mainstream climate issues into national development policies, and to initiate and sustain planning and strategy development in relation to specific climate issues. Finally, there is also a need for coordination among agencies and organizations at both national and local levels in adaptation efforts.

The MC countries recognize the importance of incorporating climate change adaptation into existing state and national projects. As the first step in this direction, the workshop participants intend to meet among themselves to plan next steps and form (or reconstitute) a climate change working group in their countries. Some of the jurisdictions suggested pursuing vulnerability analysis while others believe national and regional learning networks are important to moving forward. The development of new and innovative technologies (e.g. desalination, renewable energy and better climate and weather prediction), as well as education and capacity training in these areas, are identified as high priorities.

In addition to the improved collaboration of local climate relevant sectors, the MC participants recommend future workshops on climate adaptation to ensure sharing of lessons learned among MC islands, particularly in response to sector-specific needs. Sustained communication and coordination across the region are crucial to the success of efforts to cope with climate change at local, national and regional scales. The Micronesia Challenge could spearhead these efforts and serve as the coordinator of the region. The full report, prepared by Cheryl L Anderson and Supin Wongbusarakum of the Hazards, Climate, & Environment Program, University of Hawai'i Social Science Research Institute, is available at [http://www.hazards-climate-environment.org/yahoo\\_site\\_admin/assets/docs/MicronesiaChallengeClimateChange\\_021110\\_Web.4292808.pdf](http://www.hazards-climate-environment.org/yahoo_site_admin/assets/docs/MicronesiaChallengeClimateChange_021110_Web.4292808.pdf)

# WORKSHOP OBJECTIVES

The objectives of the Second MC Measures Workshop were to:

1. Introduce PICRC/JICA project to the MC jurisdictions
2. Gain better understanding of:
  - ♦ Status of MPAs in each jurisdiction,
  - ♦ Management issues in the different MC jurisdictions that monitoring efforts can focus on, both ecological and social,
  - ♦ Status of monitoring including, objectives of monitoring, indicators, limitations, strengths/weakness, needs in each jurisdictions (based on information already provided in the 1<sup>st</sup> MC Measures Meeting in June 2008 and any new information as preparatory work for this workshop)
3. Gain knowledge of different methods available for ecological and social monitoring, for assessing both the status of the health of the resources and the effectiveness of management strategies
4. Identify and agree on an essential set of indicators for both status and effectiveness for the MC and methods that we will test and recommend for adoption
5. Identify specific capacity needs and strategies to fill these needs to implement the protocol in each MC jurisdiction
6. Develop a framework for testing and adopting monitoring protocols, including timeframe and responsibility of each body/agency in the MC Measures Working Group.

As this report summarizes, the majority of these objectives were met and for those that were not fully met, the Measures Group developed a set of follow up next steps to ensure that the objectives are met in the near future.



# AGENDA OVERVIEW

## ***Day One: Sharing and Learning***

The first day of the MC Measures workshop was designed to welcome participants, introduce the PICRC/JICA Coral Reef Monitoring Project, review the progress to date on the MC Measure process, and provide an overview of the current status of marine management and monitoring in Micronesia. The participants were welcomed in opening addresses by the President of Palau and the Ambassador of Japan. Presentations were provided to introduce the PICRC/JICA project, to review two monitoring case studies - one in Palau and one in CNMI, to summarize the results of the last MC Measures meeting, and by each jurisdiction to update the participants on the status of their management and monitoring efforts.

## ***Day Two: Learning and Identifying What we will Measure?***

The second day of the workshop was designed to share and learn more about ongoing monitoring approaches and then to narrow down to the set of indicators that are essential to measure progress in the MC. To do this, a series of presentations were provided by experts in monitoring including review of a monitoring project in FSM and Marshall Islands, review of socio-economic monitoring methods including SEM-Pasifika, review of effectiveness measures, and review of the MC database. In the afternoon reviewed the objectives for monitoring under the MC and held a series of small groups and a plenary discussion to prioritize an essential indicators out of the initial set created by the first MC Measure group.



## ***Day Three: How will we Measure?***

Day three was designed to develop effective protocols for measuring the essential set of indicators that we developed in Day Two. To do this we divided into small groups based on expertise (ecological, socioeconomic, and management) and developed recommended protocols for monitoring each indicator. We were also hosted by PICRC to tour their aquarium facilities.

## ***Day Four: Capacity for Measuring and Next Steps?***

Day four was designed to assess the capacity and potential of each jurisdiction to monitor the proposed indicators and to lay out next steps for the monitoring framework. During the day, the participants broke into jurisdictional groups to review capacity for monitoring the proposed indicators using the proposed protocol, adapted the indicators and protocols based on feedback from the jurisdictions, created small thematic working groups to follow up (Ecological, socio-economic, score-card), developed a set of next steps, closed the meeting, and officially signed the minutes of the meeting.

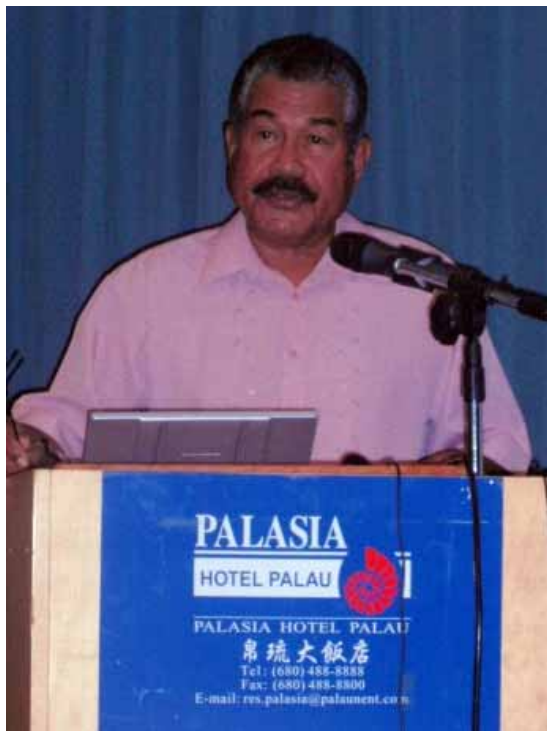
# SUMMARY OF MONDAY FEBRUARY 15

## *Welcoming Addresses*

### **President of Palau, Johnson Toribiong:**

I am pleased and honored this morning to represent the people and the government of the Republic of Palau to welcome you. Palau is very proud and honored to host this conference, the 2nd Micronesia Challenge Monitoring meeting and PICRC-JICA sponsored monitoring project.

It is my hope that this conference will move the Micronesia Challenge and our challenge to preserve and protect our environment to the full realization of our goals and objectives.



*“It is my hope that this conference will move the Micronesia Challenge and our challenge to preserve and protect our environment to the full realization of our goals and objectives.”*

His Excellency President  
Johnson Toribiong

My policy is to promote collaboration and cooperation between all organizations and people of the region to pool their resources and energy to protect our environment, especially our marine resources. We in Palau have moved forward on the commitment to preserve and protect our environment – to promote the health of our oceans, our land and our air. Because we believe, as I know you do, that we are stewards of our natural resources. We do not own our resources, we only hold them for the benefit of future generations.

In Palau, under our constitution, we are obligated to preserve and protect and conserve our beautiful and healthful environment. Throughout Micronesia, we share the same traditional practice to preserve our environment. We have always looked to our marine environment for our livelihood.

I am happy and proud to join you this morning – and to share that it is the commitment of my administration to work with you toward the achievement of our ambitious goals, and to help promote the goals of the Micronesia Challenge and Palau International Coral Reef Center.

Palau has extended our economic zone as the first international shark sanctuary.

We have adopted the Protected Area Network – PAN – and implemented it by funding it through the green fee. For every visitor who comes to Palau, we assess a departure fee of \$15 to fund our protected area network.

We also have a traditional practice and custom – the Bul – to protect areas. We are one of the first islands to declare an area as sanctuary; the 70 islands were declared a sanctuary in the mid 1950s by our local Legislature.

I have also invited the presidents of the Parties to the Nauru agreement to hold a conference next week to try to conserve our tuna stocks, and to make the harvesting of tuna sustainable, and to maximize the benefits to the island states who own the fishing grounds. Virtually all the presidents will be here.

In my proposed supplemental budget I have also included a requirement that each of our states must establish a marine sanctuary or they will not be eligible to receive funding; this will allow our fish, turtles and dugong to be preserved.

It is my hope that the goals and objectives of the Micronesia Challenge, Palau International Coral Reef Center and all the organizations will work together to bring these great ideas to reality – from the conference to actual hands on protection of our environment.

Thank you to the sponsors – PICRC, TNC, JICA and others.

I hope your stay in Palau will be enjoyable while doing your very best to move the Micronesia Challenge toward the final goal of protecting and promoting the conservation of our marine and terrestrial resources. I have confidence in all of you – to make our region the leading, shining example.

I'd like to leave by giving you food for thought – from the Indian revolutionary Mahatma Ghandi: The earth can provide for the need of every man, but not his greed.



Photos by Trina Leberer

**His Excellency Yoshiyuki Sadaoka, Japanese Ambassador to Palau:**

President Toribiong, Dr. Tellei, all distinguished guests from Micronesian countries, ladies and gentlemen, good morning. It is my great pleasure and honor to make my first public speech at this very important meeting as the first resident full Ambassador after I presented my credentials to President Toribiong last Wednesday.

Firstly, I would like to place Micronesia Challenge into the context of recent Japanese efforts to mitigate global environmental issues. As declared at PALM 5 in Hokkaido, Japan, we are islanders. To bequeath the coming generations with the bountiful marine ecosystem is of crucial significance for us as islanders. Proper management of our marine ecosystem, based on meticulous scientific research and monitoring, is the duty for all of us. In this regard, the Government of Japan strongly supports the Micronesian Challenge and the Palau International Coral Reef Center. Furthermore, I would like to emphasize Japan's earnest efforts to tackle global climate change. Prime Minister Hatoyama has manifested that Japan will reduce emission of greenhouse gases by 25 percent by year 2020.

The Government of Japan now stands ready to mitigate imminent crisis due to the global warming. Significance of Coral Reef Protection arises here also, since coral reefs contribute to produce livelihoods for islanders. Also, Japan will have the honor to host the COP 10 meeting of the Convention of Biological Diversity in the coming October. Needless to say, it is our common duty to protect the tremendous biodiversity in coral reefs of the Micronesian region.



As the Ambassador of Japan, kindly allow me to remark on Japanese contribution to preserve Marine Ecosystem in the Micronesian region. The Government of Japan donated 8.3 million U.S. dollars to build the Palau International Coral Reef Center in Koror. Fortunately, the institute enjoys its fame through many articles in international publications. The Center's aquarium also enhances tourism development of the Republic of Palau. These achievements are the fruits of our first technical cooperation named "Palau International Coral Reef Center Strengthening Project." In view of the importance of capacity building of this beautiful island nation, Japan has dispatched many experts in various domains including coral reef ecology, sea weed taxonomy, and aquarium exhibition. Having successfully completed the said first project, Japan launched the second technical cooperation project named "Capacity enhancement project for coral reef monitoring." In this project, Japan envisions to codify standard monitoring protocol to enable the people of Micronesia to evaluate and manage their own reefs. Let me recognize the tremendous contribution of our devoted experts, Dr. Nakaya and Mr. Takeda standing over there, to empower people of Micronesia. [Japan has also dispatched a young volunteer, Ms. Nakanishi, as an environmental education officer.] These attempts mirror Japan's sincere challenge to strengthen the capability of the people of Micronesia.

In conclusion, as the first resident Ambassador of Japan in Palau, and as an islander, I would like to reiterate that Japan will further contribute to your common endeavor to bestow invaluable coral reef ecosystem for the next generations. Thank you, indeed, for your attention.

**Workshop Hosts:**

Fabian Iyar, Executive Director of PICRC of behalf of PICRC/JICA Project, welcomed the group. Charlene Mersai, Coordinator of the Micronesia Challenge, and Trina Leberer, Micronesia Director of The Nature Conservancy Micronesia program, welcomed participants and expressed their hope that the meeting would tackle issues critical to the region.

## Presentation Summaries

### Fabian Iyar – PICRC Executive Director: History of the Palau International Coral Reef Center

The Center opened in 2001 with the mission to be a self sustaining center of excellence for marine research, education, and training. The goal is far reaching and PICRC finds it to be a continuing challenge. The origin of the center dates back to the early 1990s when it partners were deliberating on where to locate the center in the region. The Center was envisioned as a way to address global issues. In addition to paying for the construction of the Center, JICA has provided two phases of support to strengthen the Center. The first phase began in October of 2002 and finished in October 2006. JICA provided technical assistance, dispatched Japanese experts, and provided machinery and equipment. Phase 2 of the PICRC-JICA partnership began in July 2009 with capacity building in various technical areas and the monitoring project which will be highlighted next in the presentation of Dr. Seiji Nakaya

PICRC Website: [www.picrc.org](http://www.picrc.org)



### Dr. Seiji Nakaya – JICA: The PICRC/JICA Partnership

The Capacity Enhancement Project for Coral Reef Monitoring (CEPCRM) is a new project for coral reef monitoring to help build on the fact that MPAs are an effective tool for conservation. Palau has an existing network of MPAs and monitoring is essential for MPA management. PICRC's technical contribution is expected to help Palau and the region determine the best monitoring options to understand MPA effectiveness and progress toward conservation goals. This is a new collaboration with the Micronesia Challenge. It's important for JICA, PICRC to collaborate with these larger initiatives. The monitoring goals include that they must follow accepted protocols, must help to answer management questions, will proceed to support community work with PICRC assistance, must be statistically robust, and must address both ecological and socio-economic indicators. The Project will be carried out from 2009 to 2012 and will work to enhance the technical capacity of PICRC to support monitoring. The output of the project will be a system to support monitoring of MPAs, partnerships will be enhanced between PICRC, international initiatives, and the MC jurisdictions. CEPCRM Website: [www.cepcrm.org/](http://www.cepcrm.org/)

Photos by Doreen deBrum

**Trina Leberer, Micronesia Director, The Nature Conservancy: Overview of the First MC Measures Meeting in 2008<sup>1</sup>**

To ensure that this meeting built on past successes and does not duplicate efforts, Trina Leberer presented an overview of the first measures meeting to frame the efforts at this workshop. The first MC Measures workshop was held in Pohnpei in 2008 as part of the second MC Regional Meeting. President Mori of FSM gave us our charge that we must show progress and tell our stories so that Governments and donors can use this information but we must also make the information so clear that even our grandmothers can understand it. The workshop was held to address five objectives: Establish measures working group to develop the way forward, Identify overlaps and gaps in indicators being collected regionally, Identify shared results chains, Propose a set of regional MC measures, and help to guide MC messages. Because we can't measure all indicators, we needed to establish criteria for key indicators. These include: Importance – how critical is it to the MC that this indicator be measured regionally and communicated with target audiences?; Practicality – how realistic is it for all or most to measure at this time?; Cost – is it cost effective to measure this indicator; and Sensitivity – will it tell us what we need to know?

The Key outputs from the workshop included: 15 target indicators, 4 suggested threat indicators, 12 suggested intermediate result indicators (including many SEM indicators, and 5 suggested process variables. These indicators are summarized in Appendix Two.

Things to keep in mind for this second MC Measures workshop include: Are we missing any targets? Are we missing any indicators? We will work to identify a minimum set of indicators for the region that we can and should measure. The full report from the first MC Measure Workshop can be found on the MC website below:

MC Website: [www.micronesiachallenge.org/](http://www.micronesiachallenge.org/)



<sup>1</sup>Please note, a more complete summary of the first MC Measures is found in the Background of this report.



Each country's implementation of the Micronesia Challenge goals is unique, based on the individual jurisdiction's needs, culture and communities. To understand some of the challenges in creating a region-wide monitoring program Palau and the CNMI presented case studies of different types of projects designed to work toward MC goals.

### **Steven Victor - TNC-Palau: Palau's Protected Area Network (PAN) and a Case Study on Ebiil Channel**

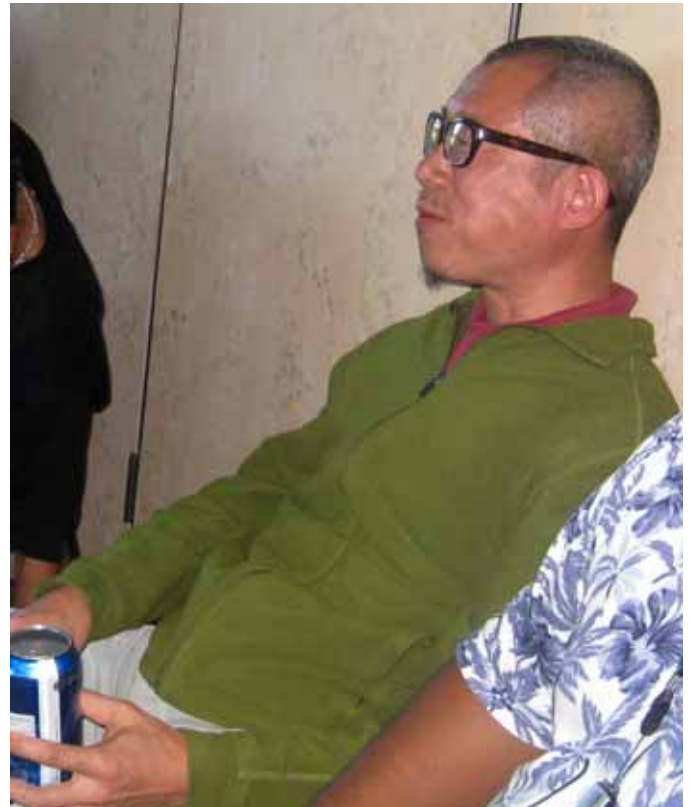
The Protected Area Network (PAN): The PAN includes many marine and terrestrial areas. The concept came about as result of 1998 coral bleaching. But Palau is not new to marine conservation. Palau first established a protected area in the mid 1950s; a group of islands in the Rock Islands with 1 mile radius of marine areas around it. In 1994, TNC began working with community to create a nature reserve at tip of Palau. Legislation followed in 2003. It took a couple years to decide what the network should look like. Not just marine – sediment is a big issue besides overfishing. In 2006, TNC spear-headed the creation of a sustainable financing plan. A Conservation Action Plan assessment in 2006 identified additional areas that need protection. In January of 2008, Lake Ngardok, the only fresh-water lake in Micronesia was adopted as the first PAN site. In May of 2008, The Ambassador of Taiwan presented 500,000 USD as part of Palau's MC endowment. Also in May of 2008, the President signed legislation establishing the green fee. This is a \$15 departure fee that will go to supporting PAN sites. It took about a year to actually implement and Palau started collecting this departure fee in November of 2009. The green fee has brought in more than \$200k since November 2009.



Ebiil Channel Protected Area: Ebiil is a grouper aggregation site in northern reef lagoon. There are two aggregation sites that are known today and still in existence. There used to be many but all are fished out except for these two protected areas. Ebiil has been well studied since the 1980s. It was known that the grouper was in decline even with efforts to close the area. The area was closed in 2000, originally from April until the end of July. In October 2003 the closure was extended to be permanent. Management planning began in 2009. But plans get written and shelved. We need to actually use them. The Management Plan was completed in September 2009. The objectives of the plan are: to maintain economically important fish and invertebrate populations with documented increases by 2012; to minimize violations within the conservation area; to reduce interactions to near negligible levels by the end of 2011; to promote awareness and understanding among the community, managers and other stakeholders of conservation area rules and provisions, ; to maintain the coral reef habitats and marine biodiversity at Ebiil at current levels to ensure healthy ecosystem and to appeal to tourism; to develop and implement components of a sustainable financing program for the conservation area.

[www.palau-pcs.org/ebiil.html](http://www.palau-pcs.org/ebiil.html)





**Marianne Teregyo - CNMI Department of Lands and Natural Resources: Monitoring for the Micronesia Challenge in CNMI**

CNMI defines “near shore” as the 0 to 100m depth contour. CNMI divides management into fisheries and benthic resources, but only focuses on fisheries. CNMI uses a Framework approach considering the area of coral reef, management effectiveness, and biomass. Management effectiveness considers 3 measures: Legal outreach - Laws, regulations, and awareness of laws and regulations of resources; Enforcement - officer knowledge of laws and regulations; violations; level of enforcement; Research management – aspect data collection, analysis, etc. The Framework process describes resource and estimate biomass with low/high estimates and identifies pertinent management measure. Enforcement is heavily weighted.

**Dr. Tadashi Kimura - Japan Wildlife Research Center: Southern Japan and COTS issue in 1983 Organization of a national monitoring program in Japan**

In 1983 there was a severe COTS problem in several of Japans marine parks. The government paid a lot of money to try to remove the starfish. They needed to monitor the recovery of the reefs and determine signs of a new outbreak. The Area around Ishigaki Island is a shallow lagoon with barrier reef and patch reef areas. This was the target for monitoring, particularly within the 4 MPA site. Needed monitoring sites in with reef; needed to decide the monitoring method (for areas of 20km by 10km). Considered manta tows as a way to cover broad areas, but patchy areas made tows difficult. Considered line transects or quadrats but to do this would need thousands of lines, difficult with small budget. In the end they chose timed swims for coral cover and COTS. This is simple, within budget, and can cover entire area in 20 days with 2 researchers, a boat and a driver. We can save money with this method and use the money to exchange information and development better management. Since we started in the 1980s, the Government recognized monitoring is important for other areas. Started in southern Japan; extended all over Japan up to near Tokyo (coral community, but not a reef). The lesson we learned is that simple monitoring is enough to help managers reach decisions. Our program is focus on a limited purpose. Monitoring depends on purpose. It saves on cost when you focus on specific purpose. Also – it’s easy to collect data and show results. But challenge is to provide feedback from monitoring results to conservation activities. How to use the results of the monitoring is important. We need to consider this when we set up the monitoring program. We need to translate monitoring into simple language for managers and decision makers.

A second overview of methodology options was presented by Dr. Alison Green, who discussed monitoring for climate change.

**Dr. Alison Green - TNC:**

Dr. Green provided an overview of a methodology to monitor for the impacts of Climate Change on coral reefs. Climate change is here. It's going to have profound impacts on our coral reefs. Need to consider this in designing MPAs and monitoring. The methodology is based on monitoring functional groups of herbivorous reef fishes as indicators of coral reef resilience. Need to monitor process of coral reefs, not just patterns. Traditional coral reef monitoring focuses on patterns: e.g. coral cover, groupers, the status of reef right now versus how likely reef is to recover after major disturbance. We want to get people thinking about processes that are important in coral reef recovery. As there are more and more frequent disturbances like bleaching, how well they recover is key. Resilience is the ability of a system to cope with change, maintain its functions and recover following a disturbance (e.g. a system recovers coral cover after a major disturbance not change to algae dominated area). Key factors that facilitate resilience include: Supply of larvae, Good water quality, Substratum consolidation, Biological conditioning. For Asia-Pacific reef fish tend to be the important herbivores, though urchins and others are significant in other regions. Parrot fish, surgeons, rabbits, angels, damsels, batfish, rudderfish. What we tend to count are food fish, carnivores. Need to count herbivores. But not all herbivores are the same. You can't just count them all. The protocol provides guidance on the roles that different herbivores play and how monitoring them can help us monitor the impacts of Climate Change.

<http://www.iucn.org/cccr/publications/>



Following Dr. Green's presentation, each jurisdiction provided a status report of monitoring activities already occurring in each location, as well as a summary of existing protected sites, their objectives, and the needs and capacity issues present in the jurisdictions.

**Workshop Preparation: Jurisdictional Surveys:**

To help prepare for the workshop, each jurisdiction was asked to fill in a table reporting on key aspects of management for their MPAs (Table 1). In particular it was important to find out what the primary Management Objectives are for the MPAs in each jurisdiction as we need to be sure that the indicators will help us to measure whether or not we are making progress in the main Management Objectives that define the MPA systems of Micronesia. The results indicate that the majority of MPAs in Micronesia have similar objectives. The vast majority include objectives for fisheries protection and replenishment, while many also include objectives specific to habitat recovery. Some MPAs also included objectives for tourism and resilience to climate change impacts. The full results of the survey are found in Appendix Three.

Table 1. Column headings for pre-workshop MPA survey.

<ul style="list-style-type: none"> <li>• Country/Jurisdiction</li> <li>• State</li> <li>• Name of MPA</li> <li>• Size (if known)</li> <li>• Type (mangrove: MG; seagrass: SG; reef: CR)</li> <li>• Management Objectives (Fish stock replenishment: FSR; Habitat recovery: HR; Fisheries protection: FP)</li> <li>• Management body (state, national, NGO, etc.)</li> <li>• Monitoring (methods)</li> </ul>	<ul style="list-style-type: none"> <li>• Number of people living in the MPA</li> <li>• main use (if not no-take)</li> <li>• Year Established</li> <li>• Coordinates (if known) or map showing location</li> <li>• Designated by (national, state, traditional, international, mixed)</li> <li>• Species protected</li> <li>• Restrictions</li> <li>• Management Activities (eg., enforcement)</li> </ul>
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## Summaries of Jurisdictional Presentations:

### Republic of the Marshall Islands - Albon Ishoda: Marshall Islands Conservation Society

**Current Protected Areas:** Conservation in RMI is based on Reimaanlok approach, which is an integrated atoll wide approach to conservation including planning, management and monitoring. The atoll wide approach to create management plans – considers food security, healthy ecosystems, habitats. One atoll might have up to 20 protected sites or regulated conservation errors. Much trial and error over 10 year process. We've realized as a national coordination team – work with each other before communities ("ridge to reef" in the FSM, and "bridge to reef" in RMI). There are many protected areas throughout the country and many are being added

**Current Monitoring Efforts:** Biological assessments. Coral disease, COTS monitoring and extraction, major coastal development activities; source of water contaminants, oil and hazardous waste spills; illegal pesticides; solid waste; catch data; socioeconomic baselines. Monitoring is independent, but we need to coordinate the efforts and data to find out how effective our conservation work is.

**Challenges and Capacity Needs:** Geographic isolation – huge area, Human resource development and management, National level and site specific capacity needs, Enforcement, Awareness Opportunities – to integrate a climate change lens into the process; community certificate course; improved national coordination



Left photo by Doreen deBrum; right photo by Dean Jacobson



**Federated States of Micronesia - Alissa Takesy: FSM PAN Coordinator**

**Current protected areas:** Four states, 607 islands, 3 million square miles of ocean. National and state governments, non government partners and community based work. States have jurisdiction to 12 miles from shore. National is 13 miles and out. The guiding framework nationally is the strategic development plan – environment sector strategic goal 5. Objective – to manage and protect the nation’s natural environment; protect, conserve and sustainable manage a full and functional representation of the FSM’s marine, freshwater and terrestrial ecosystems.

**Current Monitoring Efforts:** Monitor fisheries, coral. Varies by state, Successes include rapid ecological assessments in 4 states concluded in 2008.

**Challenges and Capacity Needs:** Reconciling views of scientific and local, traditional communities; Isolation; Human resources hard to recruit. Need to allow young people to continue their heritage

**Opportunities:** GIS clearing house mechanism; add climate change component to assessment. Work with climate change focal points to do multi-sectoral assessment of 10 outer islands – look at vulnerability and adaptability.

- ♦ Invasives, household consumption, water catchment, food security.
- ♦ Know that climate change is significant – food stock primarily breadfruit, banana, and taro varieties.
- ♦ Strong ties – unwillingness to relocate. Elders have already said they would rather die on island than relocate.



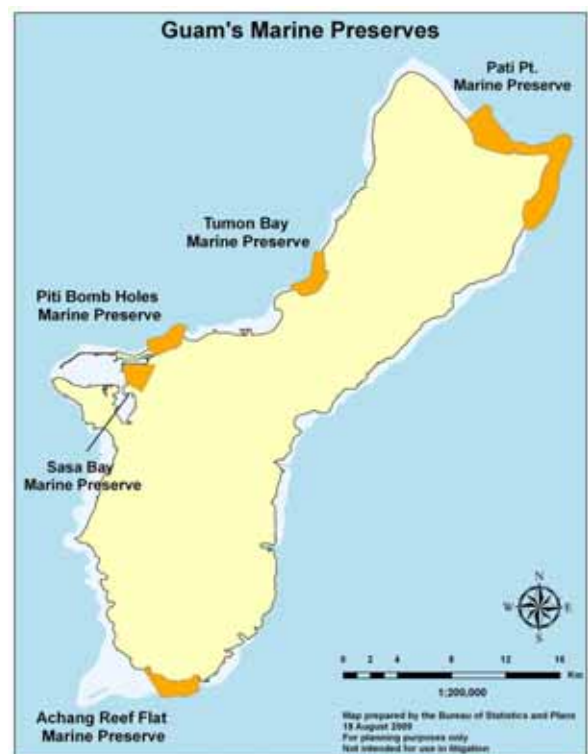
Photo by Peter Houk

## Guam - Brent Tibbatts: DAWR / Dave Burdick: GCMP

**Current Protected Areas:** Five MPAs passed in 1997. Monitoring has been going on since 1999 and full enforcement began in 2001. Part of the agreement for passage of marine preserve legislation was presentation of results to the Legislature on a regular basis. Without tangible results the preserves would be opened. The original preserve law's objectives are to enhance fish stocks and provide environmental/habitat protection. Supplemental legislation has created ability to regulate recreational uses in preserve as well.

**Current Monitoring Efforts:** Continued monitoring in preserves annually or biannually. Visual transects, primarily fish stocks (food fish and coral indicators such as butterfly fish that rely on healthy coral). There are control sites for all habitats to use to compare and contrast (Reef flat, rubble, seagrass, etc). Looking to expand to include benthic habitat and macro invertebrates. Preserve surveys are fish visual transects and video transects. Also examine enforcement data – catches inside and outside preserves. Division of Aquatic and Wildlife Resources creel data for about 25 years. Recent examination of spillover effects from preserves. New comprehensive long term monitoring program focusing on high priority, high profile areas. High degree of statistical robustness. Photo-video transects for benthic cover, quadrat sampling for coral colony density; size frequency; transects and species counts for fish communities. Individual research projects include: effects of preserves island wide; scuba spear effects; *Naso* spp. population dynamics within and outside preserve; spillover of 4 reef fish; larval transportation from Achang Bay Preserve.

**Challenges and capacity needs:** Struggle to get the monitoring program off the ground; Lack of skilled biologists, and hiring issues; Procurement challenges; Military buildup and effect of additional 80,000 people; dredging of 70 acres of coral reef with impacts to additional 400 acres; storm water, sedimentation; loss of experienced managers to contractors; increased risk of invasives; Legislation that threatens integrity of preserves; Social science capacity; Funding



Photos by Trina Leberer



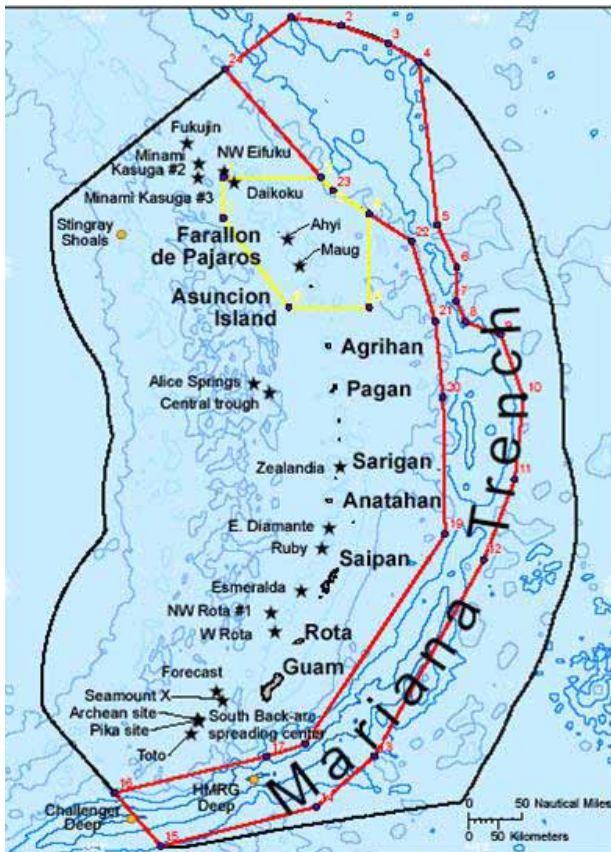
## Commonwealth of the Northern Mariana Islands - John Starmer: CRM

CNMI includes northern (virtually unpopulated with low fishing pressure) and southern populated islands with intense fishing pressure and land use concerns. Each inhabited island has a preserve, but northern areas have low pressure so they are effectively conserved.

**Current Protected Areas [and their objectives]:** Managaha Marine Conservation Area, Saipan [state, habitat recovery]; Forbidden Island Sanctuary, Saipan [state, habitat recovery]; Bird Island Marine Sanctuary [state, habitat recovery]; Laulau Bay Sea Cucumber Reserve [state, sea cucumber enhancement]; Tinian Sanctuary [state, habitat restoration]; Sasanhaya Fish Reserve [state, habitat restoration]; Marianas Trench Monument [federal, habitat restoration + others TBD]

**Current Monitoring Efforts:** Includes many agencies – Division of Environmental Quality, Fish and Wildlife, NOAA assistance, EPA, US Coast Guard, and others. Collecting information on some species, water quality, and other parameters. Water quality is primarily swimming water quality (i.e. bacterial contamination). USEPA has brought EMAP out for the first time but it's still new and hasn't yet been really integrated. Saipan, Tinian, Rota and Goat Island are the focus, as it's hard to get up north. Have some access via a NOAA vessel but that is every 2 years and there are challenges as to what CNMI actually gets out of that monitoring effort.

**Challenges and Capacity Needs:** Noted how similar Guam's issues were to CNMI's except for distance problem. **Jurisdictional size** – it's difficult to reliably access northern islands; **Personnel** – there are talented people in area but they are few - need a long-term effort for local capacity ; **Need to Learn about Connectivity and Resilience** – for instance, how do you use new climate change questions, sea level rise models, etc to make reasonable decisions; compliance; financing; alignment of goals at local, state, national and international levels; **Funding** – sometimes it's not about the amount it's the availability. For instance at the Managaha MPA, a \$5 landing fee is collected for every person who visits. \$1 million annually is raised by this system but it does not support the MPA.

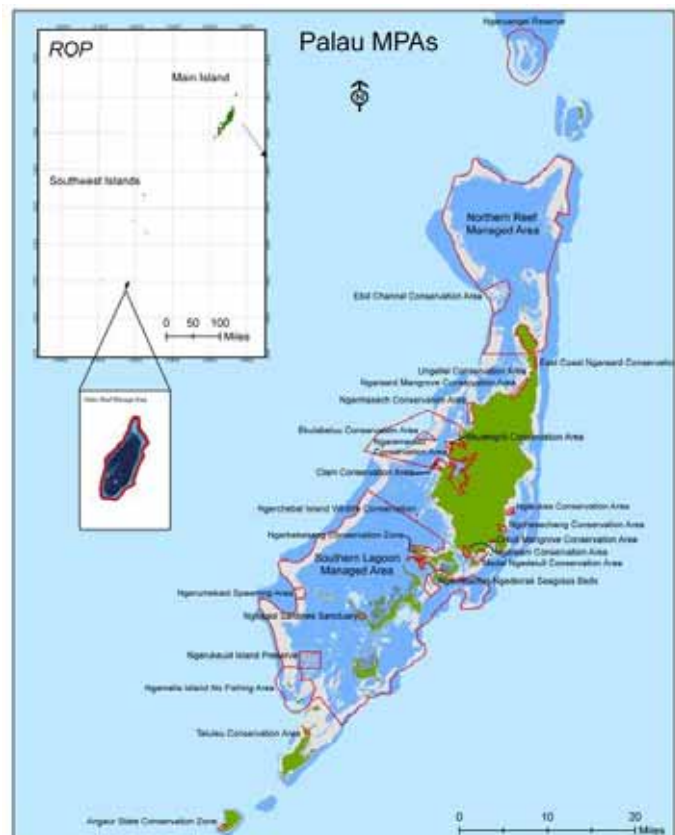


## Republic of Palau - Madelsar Ngiraingas: PALARIS

**Current Protected Areas:** Palau has 32 MPAs from northern tip to southernmost tip. They are across 14 states, but only those legislated have been included and there are many others that are locally designated and protected. Sites are representative of all habitats. Objectives include food security, plant resources, tourism, ecosystem function and biodiversity and mitigation. Uses include research, education, subsistence or traditional use, tourism and many others not specified. We need to look more at the appropriate level of use to meet the goals of the MPA. This is something we need to consider.

**Current Monitoring Efforts:** Most monitoring is done by PICRC and Palau Conservation Society. Seven MPAs have regular ecological monitoring. Two more have baseline assessments. PICRC does monitoring at sites inside and outside the MPAs in 22 states. Data collected include general condition; fish size, abundance, biomass, species counts; coral reef cover, richness, and recruits; invertebrates; spawning aggregations; sea-grass beds biomass and cover. Helen Reef has reef check. Koror enforcement authority does some work on visitor impact, though maybe not formally. Social survey to gauge perceptions, threats, and awareness. There is a need to align the social and biological information for a more comprehensive assessment

**Challenges and Capacity Needs:** There are not enough people and not enough with training; There is high turnover – not just recruitment but retainment is a major issue; There is no consistency or standards across sites; Too few resources – money, boats, and fuel; Governance confusion – few people are tasked with overseeing monitoring; Capacity needs for data use, storage, analysis and communication; Management planning – the connection of resource assessments to best management practices and strategies; Community involvement – communities have a sense of ownership but they defer responsibility to state or others; Real challenge in translation from science to people





# SUMMARY OF TUESDAY FEBRUARY 16

On the second day of the workshop, the presentations below were given followed by a review of the objectives for monitoring as well as small groups sessions and a plenary session to start to identify the essential set of indicators for the MC. Each full presentation is included on the meeting CD while minutes on the questions for each presentation are provided in Appendix Four.

## ***Presentation Summaries***

### **Dr. Peter Houk - Pacific Marine Resources Institute: Assessment of Coral Reef Monitoring Data in the RMI and FSM for the MC and Beyond**

An assessment of the monitoring data that is being collected and utilized in the Marshall Islands and in the Federated States of Micronesia was funded by the Micronesia Conservation Trust (MCT) and carried out by the Pacific Marine Resources Institute (PMRI). The purpose of the assessment was to summarize existing efforts; identify needs and questions; improve statistical confidence and other aspects of data; understand questions being asked relative to the data that is being collected, introduce a simplified tool for benthic monitoring, assist with database and data management structures, and discuss a framework for unified monitoring. The assessment found that large quantities of data exist. Most of this data, approximately 80%, is based in Government and NGOs. About 20% of the data is collected by communities. Most of the data remains unanalyzed. Analytical oversight is strongly needed for data. Additionally most programs are limited due to the larger reef area and capacity limitations. There is an excellent commitment of staff but limited data analysis and therefore the amount of information that is being shared is limited. Programs differ in their "infrastructure" in terms of staff, taxonomy, resources, etc. Any regional effort to improve monitoring needs to address the deficiencies first. There is a relatively low abundance of catch data, yet fish are the most prized resource. Future projects will include: collaborative monitoring and database development with Yap, Kosrae, and RMI; development of a Micronesia-wide data manipulation, analyses, and graphing manual; Data manipulation and analyses workshop(s); and integration with the MC database as soon as its available.



### **Dr. Supin Wongbusarakum – Social Science Research Institute, University of Hawai'i: Socio-economic Monitoring – Goals, Process, Tools**

Goals for Socioeconomic Monitoring: To inform management so that we are able to better sustain natural resources and enhance community well-being and development.

Integrated monitoring that has both biological and socioeconomic

Components communicate information to decision makers and managers for adaptive management

Process: Defining Objectives, Identifying Indicators and developing data collecting tools, collecting data, analyzing data, communicating results and adaptive management

Tools for Socio-economic Monitoring: Numerous guides exist and each is well adapted for specific uses - from SEM-Pasifika to How's Your MPA Doing to SocMon and the LMMA Learning Framework.



As the presentations concluded, the group began discussions on regional monitoring objectives, goals and needs. This session led to break out groups for more detailed work on specific components.

### *Objectives of Monitoring for the Micronesia Challenge*

**Facilitated by Dr. Richard Margoluis**

During this session, the participants took a step back to discuss the objectives of the monitoring that will be done under the MC. The MC indicators and monitoring methods eventually agreed upon should ultimately help us to understand:

- ♦ How well are we achieving our conservation objectives?
- ♦ Are we reaching overarching goals of the MC?
- ♦ What's our progress? How close are we? What Percentages on progress are we making?
- ♦ Under what conditions are we meeting our goals and objectives?
- ♦ Is my money being used to achieve effective conservation?
- ♦ How are communities affected? Are they benefitting?
- ♦ What are the things that are going to stop us from achieving our goal- political will? Regional strategy? Barriers?
- ♦ Obstacles and opportunities in achieving our goals
- ♦ Management gaps and how are we going to fill them
- ♦ Are we achieving our objectives at the sites?
- ♦ What percentage of sites are meeting their objectives?
- ♦ Are our site based management objectives helping us in achieving MC goals?
- ♦ Distribution of benefits – are they concentrated in one area geographically or across all areas?
- ♦ Monitoring will support Adaptive management by helping us understand our progress and how to change approaches if needed.



### ***Break Out Groups and Plenary to Identify the Essential Set of Indicators for the MC***

In the afternoon of the second day, we broke into four randomly selected groups to undertake the following tasks:

1. Review lists of targets and threats from the first MC Measures Working Group meeting. Add or subtract as needed
2. Review list of indicators add or subtract as needed.
3. Each participant was given five votes for the indicators to be used any way they want. (i.e. if they really liked one indicator they could use all five votes for it)
4. Prioritize the list of regional indicators to present back to the group for discussion.
5. Review and fill in the table of management issues.

#### **The Criteria for prioritization included:**

- ♦ **Relevance:** How critical is it to all mc jurisdictions that this indicator be measured regionally and communicated with target audiences?
- ♦ **Practicality:** How doable/realistic is it for all or most jurisdictions to measure this indicator at this point in time
- ♦ **Cost:** what level of human and financial resources will be required to measure the indicator?

After the small group sessions, a plenary was held to compile the results from the three groups. The first group presented their list of indicators and the others then highlighted what was different in the results from their group. The complete set of initial proposed MC essential indicators are included in Box 1.

**Group 1:**

Top 5 indicators (note the other groups that had the indicator as well follow in parentheses)

1. Coral reef resilience – includes community structure for coral reefs. (groups: 2, 3, 4)
2. Habitat loss (group: 2)
3. Number of violations / enforcement actions (group 2)
4. Density – size – biomass – species composition of reef fish (group: 2, 3, 4) especially herbivores
5. Percent buy in (group: 4)

**Additions from the other groups:****Group 3 (with other groups in parentheses)**

1. Climate change vulnerability may need a management indicator (groups: none)
2. Local marine resources use pattern; (groups: -4 included catch or harvest pressure) what's happening in terms of resource use at different times of year. \* consider – composite indicators need more discussion as they could encompass too many items
3. Demographics (groups: none)
4. Water quality (groups: 2, 4)

**Group 2 (with other groups that also had this indicator in parentheses)**

1. Percentage benthic cover – habitat loss through time (group: 4)
2. Level of harvest or extraction – habitat loss through time (coral for lime, mangroves, sand mining)
3. Percentage of stakeholders participating (group: 4)
4. Percentage and number of stakeholders changing behavior (group: 4)

**Group 4**

Results are covered in first three groups

A summary of the initial proposed MC essential indicators to be monitored across the region is found in Box 1.



Top left photo by Yimnang Golbuu; top right photo by Doreen deBrum; bottom photo by Trina Leberer

## BOX 1.

### SUMMARY OF INITIAL PROPOSED MC ESSENTIAL INDICATORS

1. Coral reef resilience – includes community structure for coral reefs
2. Habitat loss
3. Number of violations / enforcement actions
4. Density – size – biomass – species composition of reef fish especially herbivores
5. Percent buy in
6. Climate change vulnerability may need a management indicator (groups: none)
7. Local marine resources use pattern; (include catch or harvest pressure) what's happening in terms of resource use at different times of year. \* consider – composite indicators need more discussion as they could encompass too many items
8. Demographics
9. Water quality
10. Percentage benthic cover – habitat loss through time (coral for lime, mangroves, sand mining)
11. Level of harvest or extraction
12. Percentage of stakeholders participating
13. Percentage and number of stakeholders changing behavior



## Summary of Discussion on Climate Vulnerability

During the Plenary a discussion transpired on whether we should try to measure for climate change or climate change vulnerability in some way. The key question raised: How does measuring climate vulnerability measure progress? Although it was thought that it doesn't really tell us anything about what we are doing, there was concern that if we have an area we know is going to be highly impacted, we may reach conservation goals, but that progress won't count if the system is destroyed by climate change impacts. A suggestion was made that maybe it's not an indicator we would measure, but a factor that needs to be included in planning. For example, management actions will have to factor in sea level rise, which needs to be measured on a local level, because factors like local tectonic activity play a role. This long term view might not help us tomorrow, but it will matter in 10 or 20 years. In addition, researchers and large organizations are considering this on a global scale. We need to look at adaptation strategies to climate change as these issues bring more resources. The group agreed that this is a big issue and we're on the receiving end, so we need a stronger voice on the international level – in the intermediate and long term view as well as the immediate.

A proposed indicator:

Are your management actions or plans including consideration of climate change impacts in some way?

## Discussion about Score Card Concept

In addition to the plenary discussion on climate change vulnerability the group also discussed that it may be helpful to have a Scorecard that provides a periodic measure of progress toward key aspects of the MC. The participants agreed that this would be useful and it was decided to form a Scorecard group to develop this tool along-side the Ecological and socio-economic groups

## Plus/Delta for the Day

PLUS	DELTA
<ul style="list-style-type: none"> <li>◆ Break out groups got more people talking</li> <li>◆ Real cups instead of disposables</li> <li>◆ Learned more about Micronesia</li> </ul>	<ul style="list-style-type: none"> <li>◆ Please let some sunlight in the meeting room</li> <li>◆ Make sure people who were at first meeting are split more evenly in break out rooms</li> <li>◆ Clear instructions for breakout groups</li> <li>◆ Working with the indicators from last meetings it's hard to integrate socioeconomic factors</li> </ul>



Left photo by Doreen deBrum; right photo by Albon Ishoda

# SUMMARY OF WEDNESDAY FEBRUARY 17

On the third day of the workshop, the participants divided into small groups based on expertise (ecological, socio-economic, and management) and developed recommended protocols for monitoring each indicator. We were also hosted by PICRC to tour their aquarium facilities.

## Process for the Day

1. Groups were divided by their disciplines
2. Each group refined the indicators to be more effective for the specific discipline
3. The groups discussed and agreed to methods for measuring the refined indicators
4. Discussed the general capacity needed to do the monitoring based on the methods selected (number of people, level of expertise, funding)
5. We intended to report back to the group that afternoon but ran out of time so we reported back on Thursday February 18.

## Ecological Indicators and Protocols

The proposed protocols developed by the ecological breakout group are presented below in Table 2.

**Table 2. Ecological Indicators and Protocols**

<b>1. Benthos:</b>	<b>Key Questions:</b> <ul style="list-style-type: none"> <li>◆ Has there been a detectable change over time in coral community structure and benthic cover in managed vs. unmanaged sites?</li> <li>◆ Has there been a detectable change over time in key water quality parameters in managed vs. unmanaged sites based on bio-criteria?</li> </ul>	
<b>Indicators</b> <ul style="list-style-type: none"> <li>◆ Species per unit area</li> <li>◆ Benthic substrate ratios</li> <li>◆ Coral cover</li> <li>◆ Recruitment</li> <li>◆ Size class frequencies (maybe too complex; maybe use key species)</li> </ul>	<b>Survey Method</b> <ul style="list-style-type: none"> <li>◆ Benthic photograph quadrats (calibrated to 0.5 x 0.5 m) at 1m mark (50 photos) along 5—50 m transect (species per unit area, benthic ratios, coral cover)</li> <li>◆ 5 Belt Transect (0.30mX10m) or other methods to document presence of coral recruits</li> <li>◆ 8 - 1m<sup>2</sup> quadrats haphazardly tossed along the transect line (coral colony size data) - if time / expertise available</li> <li>◆ Genus level sufficient in general and species level for dominant benthic abundances</li> <li>◆ 1:1 ratio per habitat (e.g. back reef, patch, channel, seagrass, rubble, etc.)</li> <li>◆ All stations within 'managed' areas should have 'unmanaged' reference sites established at a 1:1 ratio</li> <li>◆ Number of sampling stations based on number needed to achieve adequate level of detection</li> <li>◆ Annually</li> </ul>	<b>Capacity Needed</b> <ul style="list-style-type: none"> <li>◆ 2 man-hours per sampling station to collect data</li> <li>◆ 4 man-hours per sampling station to enter data</li> </ul>
<b>2. Bleaching:</b>	<b>Key Question:</b> What are the patterns in extent, severity, and recovery for major bleaching events in managed and unmanaged areas?	
<b>Indicators</b> Incomplete	<b>Survey Method</b> Incomplete: but this seems to be more a question of survey design for benthic studies	<b>Capacity Needed</b> Incomplete

<b>3. Fish</b>	<b>Key Question:</b> Has there been a detectable change over time in key fisheries community structure (species, size, density and biomass) in managed vs. unmanaged sites?	
<b>Indicators</b> <ul style="list-style-type: none"> <li>◆ Density (abundance/area)</li> <li>◆ Species</li> <li>◆ Size</li> <li>◆ Biomass (length converted to weight based on average length-weight relationships)</li> </ul>	<b>Survey Method</b> <ul style="list-style-type: none"> <li>◆ Belt transects for key resident species (e.g. groupers) – 5 transects – 5m wide X 5 m tall X 50 m long</li> <li>◆ 20 minutes or 400 m long swim after to look for big, wide-ranging species</li> <li>◆ Typically 2 depths (3 m and 10 m)</li> <li>◆ 1:1 ratio per habitat (e.g. back reef, patch, channel, seagrass, rubble, etc.)</li> <li>◆ At least 1 pair (1 managed and 1 unmanaged area per pair)</li> <li>◆ Number of sampling Stations needed to achieve level of detection</li> <li>◆ Annually (but standardize time of the year and tide)</li> </ul>	<b>Capacity Needed</b> <ul style="list-style-type: none"> <li>◆ 2 man-hours (1 dive) per sampling station to collect data</li> <li>◆ 1 man-hour per sampling station to enter data</li> </ul>
<b>4. Perception of resource</b>	Questionnaires for key informants (e.g. how do you think big species are doing?) Sample size (10% of population)	
<b>Indicators</b> Incomplete	<b>Survey Method</b> Incomplete: this should perhaps be with the socio-economic group	<b>Capacity Needed</b> Incomplete
<b>5. Macro-invertebrates:</b> (Clams, trochus, sea cucumbers, urchins, lobsters, (COTs))	<b>Key Question:</b> Has there been a detectable change over time in key macro-invertebrate community structure (species, size, density and biomass) in managed vs. unmanaged sites?	
<b>Indicators</b> <ul style="list-style-type: none"> <li>◆ Density</li> <li>◆ Size</li> </ul>	<b>Survey Method</b> <ul style="list-style-type: none"> <li>◆ 5 – 2X50m transects</li> <li>◆ 1:1 ratio per habitat (e.g. back reef, patch, channel, seagrass, rubble, etc.)</li> <li>◆ At least 1 pair (1 managed and 1 unmanaged area per pair)</li> <li>◆ Number of sampling Stations needed to achieve level of detection</li> <li>◆ Annually (but standardize time of the year and tide)</li> </ul>	<b>Capacity Needed</b> <ul style="list-style-type: none"> <li>◆ 2 man-hours (1 dive) per sampling station to collect data</li> <li>◆ 1 man-hour per sampling station to enter data</li> </ul>
<b>6. Water Quality</b>	<b>Key Question:</b> Has there been a detectable negative change over time in key water quality parameters in managed vs. unmanaged sites? (no change or positive are good)	
<b>Indicators</b> <ul style="list-style-type: none"> <li>◆ bacteria</li> <li>◆ sediment</li> <li>◆ turbidity</li> <li>◆ pH</li> <li>◆ nutrients</li> <li>◆ temperature (in situ)</li> <li>◆ salinity</li> </ul>	<b>Survey Method</b> Incomplete	<b>Capacity Needed</b> Incomplete



## Socio-Economic Monitoring Indicators and Protocols

### 1. Percent Buy-In/Change in Attitude

Whose attitude:

- ♦ Leaders: (Who are leaders, What level leaders, Traditional vs. modern)
- ♦ Locals: Community members: People in or adjacent to MPAs, People with rights to or affected by MPAs, Resource owners

**MC Level: Leaders**

**Concepts:** *Need to work at regional level; Understand cost/trade-offs of participation in MC*

**Indicator:** #/% of “leaders” that buy into/support Micronesia Challenge goals

**Methods:** Primary: Formal Survey; Secondary: Key Informant Interviews

**Caveat:** Assumes formal surveys part of jurisdiction adaptive management and key questions can be added on to existing surveys

**Local Level: Community Members**

**Concepts:** *Conservation: Need to understand trade-off of preservation vs. restricted access) for long term access to resource base.*

**Indicator:** #/% of locals who buy into/support conservation (above concept).

**Methods:** Primary: Formal Survey; Secondary: Key Informant Interviews

**Caveat:** Assumes formal surveys part of jurisdiction adaptive management and key questions can be added on to existing surveys

**Capacity Issues:**

- ♦ Need Expertise in: Survey and Topic Guide Design, Data Collection, Data Management and Analysis, Sampling, Translation, Protocol Development);
- ♦ difficult to do given the current number of people and funding

### 2. Percentage of Stakeholders Participating

**Local Level: Community Members**

**Indicator:** #/% of local participation in conservation activities relevant to MC sites (according to each jurisdiction's definition of a MC site).

**Methods:** Observation-Count participation at one time events and Survey for longer term processes

**Capacity Issues:**  
Need expertise in: Survey and Topic Guide Design, Data Collection, Data Management and Analysis, Sampling, Translation, Protocol Development



Left photo courtesy of the Palau Office of the President; right photo by Trina Leberer

### 3. Percentage and Numbers of Stakeholders Changing Behavior

Whose behavior change?

- ◆ Leaders (who are leaders, what level leaders, traditional vs. modern)
- ◆ Consumers
- ◆ Producers

#### Consumers

(1<sup>st</sup> Priority)

**Concept:** Consumption of target species/ products/size (to be determined)

**Indicator:** Presence/Absence of consumption of target species/products

**Methods:** Primary: Formal Survey; Secondary: Key Informant Interviews; Observation

**Caveat:** Assumes formal surveys part of jurisdiction adaptive management and can be added on to existing surveys

#### Producers

(2<sup>nd</sup> Priority)

**Concept:** Extraction of target species/ products/size (to be determined)

**Indicator:** Presence/absence of extraction of key species and products

**Methods:** Primary: Formal Survey; Secondary: Key Informant Interviews; Observation

**Caveat:** Assumes formal surveys part of jurisdiction adaptive management and can be added on to existing surveys

#### Leaders

(1<sup>st</sup> Priority)

**Concept:** Decisions considering conservation issues in development

**Indicator:** # of decisions that place priority on conservation

**Methods:** Existing Data

#### **Capacity Issues:**

Need expertise in: Survey and Topic Guide Design, Data Collection, Data Management and Analysis, Sampling, Translation, Protocol Development

The group also briefly discussed demographics and proposed the monitoring of livelihood sources (including consumption and income sources) through household surveys for possible inclusion in short list of indicators. Other suggested information for jurisdictions to consider tracking in the future included:

- ◆ Language
- ◆ Ethnicity
- ◆ Religion
- ◆ Age
- ◆ Sex
- ◆ Household size
- ◆ Education Level
- ◆ Occupation
- ◆ Population Density
- ◆ Immigration
- ◆ Internal Migration
- ◆ Marriage Status
- ◆ Community Rank & Title
- ◆ Length of time in the area



Photo by Trina Leberer

## **Score Card Indicators and Protocols**

The Scorecard group developed a set of indicators that could be measured periodically to provide design makers and practitioners with a periodic snapshot of progress toward key aspects of the MC (Box 2).

It was suggested that the Scorecard would be filled out once every six months in June and in December to correspond well with the semi-annual reporting to the Chief Executives of each country. The Scorecards would be submitted by the MC Focal Points in each jurisdiction and the information would be collected by different people depending on the indicator. But overall the MC Focal Point in each country would be responsible for making sure the information is collected and that the Scorecard is filled out and reported on.

### **BOX 2. PROPOSED SCORECARD INDICATORS AND METHODS FOR MONITORING**

- 1) Percent extent of near-shore marine areas under some form of conservation (was management)
  - How: GIS and spatial data
  - Who: Base it on jurisdiction (Focal Point is responsible)
  - Capacity: GIS Skilled Person, FSM and RMI will do it as a team.
  - Capacity in Place: Yes
  
- 2) Percent extent of near-shore marine areas under some form of conservation (was management) and demonstrating success (need to define—suggestions include number / percent / extent of sites that meet ecological indicators).
  - How: GIS, spatial data, and some effectiveness measure
  - Who: Base it on jurisdiction (Focal Point is responsible)
  - Capacity: GIS Skilled Person, FSM and RMI will do it as a team.
  - Capacity in Place: Not sure
  
- 3) Percent of progress of the jurisdiction towards each MC endowment goal
  - How: Measure current status against goal
  - Who: MCT
  - Capacity: ?
  - Capacity in Place: ?
  
- 4) Establishment of the jurisdiction sustainable finance mechanism
  - How: Simple yes, no, in progress answer provided by the Via Focal Points
  - Who: Focal Points
  - Capacity: ?

## **BOX 2. PROPOSED SCORECARD INDICATORS AND METHODS FOR MONITORING (CONT'D)**

- 5) The jurisdiction has an approved funding distribution mechanism
  - How: Simple yes, no, in progress answer provided by the Via Focal Points
  - Who: Focal Points
  - Capacity: ?
  - Capacity in Place: ?
  
- 6) Percent of sites with multi-sectoral (stakeholder) participation in governance with clear authority
  - How: Site surveys
  - Who: Focal Points and PAN coordinators
  - Capacity: ?
  - Capacity in Place: ?
  
- 7) Skilled people actively working at the site relative to the number of skilled people needed to achieve objectives
  - How: Site surveys
  - Who: Focal Points and PAN coordinators
  - Capacity: ?
  - Capacity in Place: ?
  
- 8) Capacity in Place: ?Funding source; amount of funding acquired relative to funding needed to meet core objectives
  - How: Via Focal Points
  - Who: Focal Points
  - Capacity: ?
  - Capacity in Place: ?
  
- 9) Jurisdictions have developed & implemented their capacity development strategies yes, no, in progress
  - How: Simple yes, no, in progress answer provided by the Via Focal Points
  - Who: Focal Points
  - Capacity: ?
  - Capacity in Place: ?

## **BOX 2. PROPOSED SCORECARD INDICATORS AND METHODS FOR MONITORING (CONT'D)**

- 10) The jurisdiction has an ongoing capacity development system (professional development)
- How: Simple yes, no, in progress answer provided by the Via Focal Points
  - Who: Focal Points
  - Capacity: ?
  - Capacity in Place: ?
- 11) Number of partnerships in place relative to the number you need to meet core objectives
- How: Via Focal Points
  - Who: Focal Points
  - Capacity: Yes
- 12) The jurisdiction has an applied Ecosystem based Climate Change adaptation strategies applied to its jurisdiction conservation plan
- How: Simple yes, no, in progress answer provided by the Via Focal Points
  - Who: Focal Points
  - Capacity: Yes
- 13) Percentage of sites with effective enforcement programs (as defined by their jurisdictions standards)
- How: Via Focal Points
  - Who: Focal Points
  - Capacity: Yes
- 14) Percentage of sites with active enforcement programs (as defined by their jurisdiction)
- How: Via Focal Points
  - Who: Focal Points
  - Capacity: ?
  - Capacity in Place: ?

Other options for monitoring violations include: % of successful prosecutions relative to the number of violations; % of compliance with permits relative to the number of violations; Number of repeat violators; Severity of violations; Number of violations relative to the number of users; Number of violations relative to the number of patrol hours; Number of reports not responded to violations; Number of fisheries violations; Number of environment violations

### Conclusions on Socioeconomic Indicators:

1. With some capacity support (trainings for some jurisdictions) all jurisdictions can monitor the socio-economic indicators. The Socioeconomic small group will follow up to provide support.
2. Remove Percentage /number of leaders changing behavior
3. The Socioeconomic Group will recommend if the indicator: effective enforcement programs (as defined by their jurisdictions standards), stays in or is removed. The rest of the MC group will confirm
4. The Socioeconomic Group will make a recommendation on what to do with the indicator: Percentage of sites with active enforcement programs (as defined by their jurisdiction).
5. The Socioeconomic Group will make a recommendation on if livelihoods should be measured and how.



### Discussion on the Score Card

- The indicator “sites under some form of conservation” should include some measure of effectiveness. Can’t this include some metrics from the other indicators, like the ecological set? Maybe an aggregate of other indicators? This was discussed in the breakout group but it would be very cumbersome to include in the 6 month update. The compromise was to include some measure of sites under management with a second set of criteria for “effective” management.
- The timeline seems unreasonable. Why every 6 months? Response: this was set around the Micronesia Chief Executives Summit, where MC reports updates. The summit is held roughly every six months.
- The Score Card seems to bleed into socioeconomic indicators. Response: The discussion was about indicators not really covered in the other two main categories. It wasn’t intended to replace the others or to take into consideration really specific, quantitative measures like the other two types of indicators.
- Maybe “Score Card” is a misnomer and it should be called “Snapshot” as it’s a general idea of status of the MC rather than a quantitative measure of progress toward MC goals.
- The Score Card should have a focus on process rather than include indicators from other groups.
- The questions look at the effectiveness of work going into the site rather than the effectiveness at the site.
- Charlene needs to present this information to MCES; focal points brief the chiefs on these issues. This is not disregarding the bio/socioeconomic indicators, and there can be some rollup, but with limited time, these bullet points are a general idea. Jurisdictions can tease out details and find more specific information as needed for better, more accurate gauges, but “scorecard” can help at regional meetings for updates.

# SUMMARY OF THURSDAY FEBRUARY 18

On the fourth day of the workshop the participants broke into jurisdictional groups to review capacity for monitoring the proposed indicators using the proposed protocol, adapted the indicators and protocols based on feedback from the jurisdictions, created small thematic working groups to follow up (ecological, socio-economic, score-card), developed a set of next steps, closed the meeting, and officially signed the minutes of the meeting.

## ***Plenary Discussion of Indicators, Capacity, and Next Steps:***

After each jurisdictional group discussed their capacity to monitor the indicators and identified their additional needs, a plenary was held to review their capacity, refine the indicators, and identify next steps. The first part of the plenary included a rapid review of the jurisdictions capacity to monitor these indicators (Table 3). (Indicators with No's or Maybe's are in bold)

- Y = Yes, the jurisdiction does have the capacity to monitor this indicator, although they still may want or need technical assistance.
- N = No, the jurisdiction does not have the capacity to monitor this indicator This may result in a suggestion to remove the indicator
- M = Maybe, the jurisdiction may be able to monitor this indicator with assistance



Table 3. Summary of capacity needs for monitoring indicators by jurisdiction.

Indicator	Palau	Chuuk	Pohnpei	Kosrae	Yap	RMI	CNMI	Guam
1. Coral/benthic	Y	Y	Y	Y	Y	Y	Y	Y
2. Fish (Density, species, size, biomass)	Y	Y	Y	Y	Y	Y	Y	Y
3. Perception of Resource status	Y	Y	Y	Y	Y	Y	Y	Y
4. Macro-inverts	Y	Y	Y	Y	Y	Y	Y	Y
<b>5. Water Quality</b>	<b>M</b>	<b>M</b>	<b>Y</b>	<b>M</b>	<b>M</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>
6. Percentage buy-in/Change in Attitude	Y	Y	Y	Y	Y	Y	Y	Y
7. % of Leaders that support MC goals	Y	Y	Y	Y	Y	Y	Y	Y
8. % of locals that support MC goals	Y	Y	Y	Y	Y	Y	Y	Y
9. % of stakeholders participating	Y	Y	Y	Y	Y	Y	Y	Y
<b>10. % /# of leaders changing behavior</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>Suggest take Out</b>	<b>N</b>
<b>11. % /# of consumers changing behavior</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>N</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>
12. % /# of producers changing behavior	Y	Y	Y	Y	Y	Y	Y	Y
13. Livelihood sources	Y	Y	Y	Y	Y	Y	Y	Y
<b>14. % of sites with effective enforcement programs (as defined by their jurisdictions standards)</b>	<b>M</b>	<b>N</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>
<b>15. % of sites with active enforcement programs (as defined by their jurisdiction) We must define this</b>	<b>Y</b>	<b>N</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>







### Plenary Discussion:

The purpose of the discussion was to better understand each jurisdiction's capacity to monitor each of the indicators and to determine if any of the proposed indicators should be changed or removed.

### Discussion on Ecological Indicators:

- The size class frequency for corals is a problem. It seems to be more a research-oriented measure and not really necessary for management monitoring; it's a problem for some jurisdictions because it will affect the ability to do these transects with a one-tank dive.
- Just noting recruitment and monitoring at the genus level might be a compromise so you get an idea of recruitment but don't have to do the more complicated protocol, which is too much detail for management questions in most jurisdictions. This would fit with the protocol for monitoring for the impacts of Climate Change.
- The Marshalls questioned the need for annual monitoring given the problems of access to sites and the number of people available to do the monitoring. Every second year might be a better target given the capacity within jurisdictions. Marshalls can commit to one site (including both managed and unmanaged areas associated with that site)
- Can some of the protocols be simplified? Better if less frequent, and some of the protocols streamlined. This will be more realistic for the jurisdictions.
- FSM – identified that there is different capacity from state to state and they identified agencies where they would seek capacity support
- PICRC will be testing the protocols in 4 jurisdictions.
- Water quality – for some jurisdictions this is already collected but for others it is way too much. The detail of water quality information discussed is too much and isn't really that valuable considering the management questions being asked.
- Suggestion: Scale things down to something more reasonable that goes into the score card on a more frequent basis. But then less frequently do a more intensive.



- Need a process to field test this more complicated protocol and find a simpler way to do more often. Maybe need to hold a small meeting to design the simpler protocol.
- PICRC will testing the protocol that emerges from this workshop in Four States with support of JICA
- Most jurisdictions can monitor Perception of Resource status but there may be some constraints in Funding, logistics, and translation is a challenge for RMI. Most jurisdictions could use suggestions on how to design the survey . Perhaps a connection to an expert (Dr. Supin Wongbusarakum was identified as a possible source for help)
- A question came up as to when will the baselines be established for these indicators.



#### Conclusions on Ecological Indicators:

1. Ecological monitoring group to create a simple protocol that will be done more often (and perhaps reported on a scorecard) and a more detailed protocol that will be done less often (for example once every three years). Great Barrier Reef has example.
2. Take out size class frequencies and only monitor to the genus level. But monitor coral recruits
3. Test out the protocol with support of PICRC and JICA
4. Hold a small group meeting to complete the design of the protocol.
5. Need to address the issue that each jurisdiction has only committed to monitoring one site (with a paired example of an area under management and one not under management). This may be too few sites .
6. Remove water quality monitoring from regional list
7. Dr. Supin Wongbusarakum or other experts will be requested to help design surveys for Perception of Resource status. The Socio-economic small group will follow this up.
8. It was decided that baselines for all the indicators should be established by: the end of 2012. Either the jurisdictions will need to build their capacity to establish the baselines (with support of partners) or the baselines will be established by a mobile team.

### Discussion on Socioeconomic Indicators<sup>1</sup>:

- Most jurisdictions can monitor the list of indicators but will need support on survey design and analysis in particular (Marshalls requested a training).
- You can add most of these indicators on to other surveys. So don't need to develop something just for MC.
- Carrying out the survey (every 3 to 5 Years is pretty standard)
- Testing for Four states will be for both ecological and social as part of the PICRC and JICA program
- What are the jurisdictions going to do about demographics? Is this going to be collected for MC specifically or can this information be taken from other sources? Census data may be used as many of the basic questions should be included in regular government census programs; the availability of this data just needs to be verified in each area.
- Guam noted major issues with regular socioeconomic monitoring as there is no program in place/ person or position in place with specific responsibility for this type of monitoring.
- A number of jurisdictions said they did not feel the indicator: Percentage /number of leaders changing behavior , is appropriate. It is politically sensitive as well as difficult to monitor.
- About half the groups wanted to delete the indicator: Percentage of sites with effective enforcement programs (as defined by their jurisdictions standards).
- Most of the jurisdictions agreed that they could monitor the percentage of sites with active enforcement programs (as defined by their jurisdiction) but that this indicator may need some clarification in particular on a general definition of what an "active" enforcement program is.
- Household government surveys that are typically held every five years can help in monitoring livelihood sources.



<sup>1</sup> The group met on 19 February while still together at the meeting and refined the list of final indicators under consideration to: 1) % of stakeholders participating in MC activities; 2) % of stakeholder in support of MC conservation strategies; 3) behavior change by consumers; 4) livelihood sources; and 5) perceived compliance (as a proxy for effective enforcement). They also drafted a list of survey questions to address these topics and hope to implement these questions as core indicators for future SEM-Pasifika surveys.

- Some of the participants recommended removing or adapting the following indicators:
  - Percent extent of near-shore marine areas under some form of conservation (and demonstrating success)
  - Skilled people actively working at the site relative to the number of skilled people needed to achieve objectives
  - Funding source; amount of funding acquired relative to funding needed to meet core objectives
  - The jurisdiction has an ongoing capacity development system (professional development)
  - Number of partnerships in place relative to the number you need to meet core objectives

#### Conclusions on Score Card

1. It was suggested to include some measure of sites under management with a second set of criteria for “effective” management
2. The Score Card group will follow up on the recommendations to remove or adapt the indicators above.



# RECOMMENDED INDICATORS

Based on the Plenary discussion held on Day Four of the workshop, the following set of indicators are recommended as the essential set needed to measure progress toward the MC goals (Boxes 3 and 4).

## BOX 3. RECOMMENDED INDICATORS

1. Corals and associated benthic cover in managed and unmanaged areas
  - Live coral cover
  - Benthic substrate ratios
  - Recruits
2. Density, Size, and Biomass of Key Fish Species in managed and unmanaged areas
3. Density and Size of Macro-invertebrates in managed and unmanaged areas
  - Clams, trochus, sea cucumbers, urchins, lobsters, crown of thorns starfish (COTS)
4. Perception of Resource Status
5. Percentage buy-in/Change in Attitude
6. Percentage of Leaders that support MC Goals
7. Percent of Locals that support MC Goals
8. Percentage of stakeholders participating
9. Livelihood Sources ((includes consumption and income sources)

Suggested to be removed or adapted:

10. Percent and number of consumers changing behavior
11. Percentage of sites with effective enforcement programs (as defined by their jurisdictions standards)
12. Percentage of sites with active enforcement programs (as defined by their jurisdiction)



Left photo by Emre Turak; right photo by Paul Collins



## BOX 4. MICRONESIA CHALLENGE SCORE CARD SUMMARY

1. Percent extent of near-shore marine areas under some form of conservation
2. Percent extent of near-shore marine areas under some form of conservation (and demonstrating success).
3. Each jurisdictions' percentage progress towards meeting their MC endowment goal
4. Status of each jurisdictions' sustainable finance mechanism
5. Status of each jurisdiction's funding distribution mechanism
6. Percentage of sites with a multi-sector governance mechanism that has management authority
7. Jurisdictions have developed and are implementing their capacity development strategies
8. Ecosystem based Climate Change adaptation strategies applied to jurisdiction conservation plans

Suggested to be removed or adapted:

9. Percent extent of near-shore marine areas under some form of conservation (and demonstrating success).
10. Skilled people actively working at the site relative to the number of skilled people needed to achieve objectives
11. Funding source; amount of funding acquired relative to funding needed to meet core objectives
12. The jurisdiction has an ongoing capacity development system (professional development)
13. Number of partnerships in place relative to the number you need to meet core objectives

## OTHER RECOMMENDATIONS AND NEXT STEPS

The working group was able to develop a condensed set of essential indicators to help measure progress toward the goals of the MC. However, there is a need to devote some more time to refining both these indicators and the protocols that will be needed to measure them. Also, a plan needs to be put in place on how to build the necessary capacity to measure these indicators in each of the jurisdictions.

As a result, the workshop participants recommended the formation of small working groups to follow up and undertake the following tasks:

1. Refine the indicators and clarify the exact protocol for monitoring the indicators
2. In the case of the Ecological group develop a simpler protocol for more regular monitoring and a more thorough protocol for periodic monitoring.
3. Fill in any missing information on the capacity needed for monitoring the indicators
4. Clarify each jurisdictions' capacity needs
5. Recommend how capacity can be built for monitoring these indicators over time
6. Assist in the development of a data analysis and reporting approach for the indicators



### ***Ecological Indicators Working Group***

- To refine and simplify measures)
- Members
  - Yim (leader)
  - Pete
  - Darren
  - Kimura
  - Steven Victor
  - Anu
  - Steve Palik
  - Eugene
  - Dave
- Target date for first discussion is March 4<sup>th</sup>

### ***Socioeconomic Indicators Working Group***

- mainly to address capacity needs
- Members
  - Frank (leader)
  - Christy
  - Brooke
  - Tammy Jo
  - Marston
  - Supin
  - Madelsar
  - Albon
  - Noelle
  - Kam
- Target date for first discussion is Feb 19<sup>th</sup>
- Site Tests by Jacques and Noelle (Training starts in May)

## Score Card Working Group

- Members
  - Charlene (Leader)
  - Carol
  - Michael
  - Steven Victor
  - Lihla
  - Marianne
  - Doreen
  - Alissa
  - Nakaya
  - Adrienne
- Target date for first discussion is March 4<sup>th</sup>



## Other Next Steps

- Meeting Report (Draft due one month after the end of the workshop )
- Two week comment period
- Two weeks final
- Disks of presentations (at the conclusion of the workshop)
- Within One year from today....Each jurisdiction needs to define their management approach (management actions), define target species for monitoring, look at existing data and gaps.
- Continue sustainable funding search (MCT to lead)
- Keep up with progress of each Working Group (Trina)
- Next MC Measures meeting target is: (18 months)



# CONCLUSION

This second Micronesia Challenge Measures Group Workshop achieved its objectives. It introduced key practitioners to the PICRC/JICA Coral Reef Monitoring Program, shared important information from monitoring programs around the world, and helped all participants gain a better understanding of the Status of MPA management and monitoring in each jurisdiction, Management. The workshop participants identified and agreed on an essential set of indicators for ecological and socioeconomic factors and developed a “Score Card” or “Snapshot” tool to help quickly assess general progress in the MC. The workshop identified specific capacity needs and strategies to fill these needs to implement the protocol in each MC jurisdiction. The workshop did not go far toward its objective of developing a framework for testing and adopting monitoring protocols (for the purposes of both the CEPCRM and the MC), including timeframe and responsibility of each body/agency in the MC Measures Working Group. However, the workshop did form Biological, Socioeconomic, and Score Card working groups to refine the essential set of indicators and develop the approach building capacity and rolling out the monitoring of these indicators in the MC.

While the workshop was extremely fruitful, the key to long-term success is working hard to monitor and report on the final essential set of indicators. This will require a serious commitment on the part of each jurisdiction, the MC Coordinators, and key resource agencies. The PICRC/JICA project will be critical to building the capacity needed to support this commitment. The members of the MC Measures Group are enthusiastic to take on this fundamental aspect of the Micronesia Challenge and look forward to successful implementation of the monitoring approaches that resulted from the second MC Measures Group Workshop.



Photo by Yim Golbuu

## APPENDIX ONE: FULL WORKSHOP AGENDA

**Moving Toward Measuring Our Effectiveness:  
The 2<sup>nd</sup> Meeting of the MC Measures Working Group and PICRC JICA Coral Reef  
Monitoring Project Workshop  
February 15-19 2010  
Koror, Palau (Palasia Hotel)**

### Background

The Micronesia Challenge was launched in 2006 with a general but ambitious goal to “effectively conserve at least 30% of the near-shore marine resources and 20% of the terrestrial resources by 2020” for the five MC jurisdictions. In 2008, the 1<sup>st</sup> MC Measures Meeting took place to define a proposed process and timeline for the periodic measurement and analysis of progress made toward achieving the goals of the MC. Among the goals of this meeting were:

1. To establish a technical working group (Measures Group) focused on developing the process for the periodic measurement of progress made toward achieving the goals of the MC.
2. To identify regional overlaps and gaps associated with biological and social indicators related to natural resource management being collected across the MC jurisdictions.
3. To identify a shared set of results chains that are related to the MC goals.
4. To build consensus around a proposed set of relevant and useful categories of MC measures and corresponding indicators to be collected across the MC jurisdictions.

This second measures meeting is a follow-up to the first meeting, with the aim of producing a regional monitoring framework that will be tested and ultimately used to measure ‘effective conservation’ in the MC jurisdictions. Consequently, the needed capacity to implement this work will also be identified through this meeting.

The second measures meeting will also introduce the PICRC/JICA Project, “The Capacity Enhancement Project for Coral Reef Monitoring”, from here on referred to as the “Project”. The Project is a collaboration between Palau International Coral Reef Center (PICRC) and Japan International Cooperation Agency, which was initiated in July 2009. The Project aims to help establish community-based monitoring, focused both on ecological and social aspects, in and around MPAs to improve management of coral reefs, their associated ecosystems and resources. To do this, the Project intends to produce monitoring protocols consisting of selected test sites, core ecological and socio-economic indicators, established monitoring teams (with designated team leaders and activity timelines), selected relevant and useful monitoring methods (with determined monitoring frequency), operational data management and regular feedback of the findings for adaptive management of coral reefs. In short, the goal of the Project is to produce protocols applicable not only in Palau but also in other Micronesia Challenge jurisdictions. It is for this reason, the Project is co-hosting the 2<sup>nd</sup> MC Measures Working Group Meeting.

**Co-Hosts** Palau International Coral Reef Center (PICRC)/Japan International Cooperation Agency (JICA)  
Micronesia Challenge Regional Coordination Office  
The Nature Conservancy

**Facilitators** Setsuko Matsumoto, Creative Cooperation Service Japan  
Scott Atkinson, Sustainable Visions  
Richard Margoluis, Foundations of Success  
Trina Leberer, The Nature Conservancy

**Objectives of the meeting:**

1. Introduce PICRC/JICA project to the MC jurisdictions
2. Gain better understanding of:
  - Status of MPAs in each jurisdiction,
  - Management issues in the different MC jurisdictions that monitoring efforts can focus on, both ecological and social,
  - Status of monitoring including, objectives of monitoring, indicators, limitations, strengths/weakness, needs in each jurisdictions, (based on information already provided in the 1<sup>st</sup> MC Measures Meeting in June 2008 and any new information as preparatory work for this workshop)
3. Gain knowledge of different methods available for ecological and social monitoring, for assessing both the status of the health of the resources and the effectiveness of management strategies
4. Identify and agree on an essential set of indicators for both status and effectiveness for the MC and methods that we will test and recommend for adoption
5. Identify specific capacity needs and strategies to fill these needs to implement the protocol in each MC jurisdiction
6. Develop a framework for testing and adopting monitoring protocols, including timeframe and responsibility of each body/agency in the MC Measures Working Group.

**Presenters and Resource Experts:**

1. Dr. Seiji Nakaya (PICRC/JICA)
2. Mr. Tadashi Kimura (JICA/JWRC)
3. Dr. Peter Houk (PMRI)
4. Dr. Supin Wongbusarakum (UH)
5. Dr. Alison Green (TNC)
6. Dr. Christy Loper (NOAA)
7. Other resource people from different organizations (CI, SPREP, MCT, NOAA, etc., tbd)

**Outcomes and Deliverables:**

- Signed minutes of discussion
- Meeting report summarizing results, including current status of management effectiveness monitoring efforts, agreed-upon set of essential MC indicators, discussion on available monitoring protocols, and capacity needs (to be completed and disseminated post-meeting)
- Framework for testing and adopting monitoring protocols, including timeframe and responsibility of each body/agency in the MC Measures Working Group

**Agenda:**

Day 1 Monday, 15 February<sup>1</sup>

**Overview of current status and issues of management and monitoring of Marine Protected Areas**

Master of Ceremonies: Kambes Kesolei

Time	Session	Facilitator or Presenter
8:00	Registration	All participants
9:00	Opening address	H. E. Johnson Toribiong President
9:15	Welcome address (PICRC/JICA, MCRO, TNC)	Fabian Iyar, Charlene Mersai, Trina Leberer

<sup>1</sup> Members of Joint Coordination Committee for the PICRC/JICA project will be invited

Time	Session	Facilitator or Presentor
9:30	Japan's contribution to the nature conservation in the Pacific	H. E. Yoshiyuki Sadaoka Ambassador of Japan
9:35	Brief History of PICRC PICRC/JICA coral reef monitoring project	Fabian Iyar Dr. Seiji Nakaya
10:00	Introductions of participants, objectives of the workshop, overview of the workshop procedures	Scott Atkinson
10:30	<i>Morning Tea – presentation of a DVD on JICA biodiversity projects</i>	
10:45	Review the results of the first measures meeting that was conducted in Pohnpei including updated summary of objectives/current status/indicators of coral reef monitoring efforts around the region (based on preparatory work done by each jurisdiction)	Trina Leberer
11:15	Presentation on Palauan cases on Management of MPAs: Ebiil and PAN	Steven Victor, Joe Aitaro
11:45	<i>Lunch – Presentation on CNMI's methodology to incorporate existing management measures into the 30% determination</i>	Marriane Teregeyo, DFW, CNMI
13:00	Updates from each jurisdiction (or state) – overviews of management and monitoring issues.	Scott Atkinson
13:10	Marshalls	RMI representative
13:20	FSM (Chuuk, Kosrae, Pohnpei, Yap)	FSM rep.
13:30		
13:40		
13:50		
14:00	Guam	Guam rep.
14:10	CNMI	CNMI rep.
14:20	Palau	Palau rep.
14:30	<i>Afternoon Tea</i>	
15:00	Presentation on the different monitoring methods available out there, both strengths and limitations	Tadashi Kimura
15:50	Monitoring functional groups of herbivorous reef fishes as indicators of coral reef resilience	Dr. Alison Green
16:40	Wrap-up of day	Facilitators
17:00	SEM Pasifika group to meet	
18:00	<i>Welcome Reception – Palasia Hotel Poolside (hosted by JICA/PICRC and MCRO)</i>	

## Day 2 Tuesday, 16 February

### What should be measured and how?

Time	Session	Facilitator or Presentor
8:30	Overview of the day/Sorting out issues	Facilitator
8:50	Presentation on study to assess the monitoring programs in FSM and the Marshall Islands	Dr. Peter Houk
9:20	Presentation on social monitoring, different methods	Dr. Supin Wongbusarakum
9:50	Presentation on SEM Pasifika (Experience in socioeconomic monitoring in the Pacific)	Dr. Christy Loper
10:20	<i>Morning Tea</i>	
10:35	Presentation on strategy effectiveness measures developed for the Coral Triangle	Dr. Alison Green
11:05	Objectives of Monitoring for the Micronesia Challenge	Dr. Richard Margoluis

Time	Session	Facilitator or Presenter
11:30	<i>Lunch</i> - presentation on MC Database Project	PALARIS
13:00	Introduction to breakout group discussion on status monitoring <ul style="list-style-type: none"> <li>objectives, indicators and methods of ecological monitoring (Strength/weakness/future program)</li> <li>objectives, indicators and methods in SE monitoring</li> <li>minimum set of indicators to be monitored and capacity needs</li> </ul>	Facilitators
13:15	Facilitated breakout group discussion	
15:00	<i>Afternoon Tea</i>	
15:20	Presentation from groups and group discussion	Facilitator
17:30	<i>Free</i>	

### Day 3 Wednesday 17 February

#### Planning for doable monitoring

Time	Session	Facilitator or Presenter
8:30	Introduction to breakout group discussion for ecological, socio-economic, and score card breakout groups	Setsuko Matsumoto
9:00	Facilitated breakout group discussion	
10:00	<i>Morning Tea</i>	
10:15	Facilitated breakout group discussion (cont'd)	
12:00	<i>Lunch</i> - Aquarium Tour (PICRC)	Kambes Kesolei
13:30	Facilitated breakout groups discussion (cont'd)	
15:00	<i>Afternoon Tea</i>	
15:15	Presentation from groups and plenary discussion Wrap-up of the day	Facilitator
17:00	<i>Free</i>	

### Day 4 Thursday 18 February

#### Farther steps taken

Time	Session	Facilitator or Presenter
8:30	Introduction to assessing capacity needs by jurisdiction for monitoring minimum regional indicators	Scott Atkinson
8:45	Facilitated breakout group discussion	
10:00	<i>Morning Tea</i>	
10:15	Facilitated breakout group discussion (cont'd)	
12:00	<i>Lunch</i> - Presentation on regional activities of SPREP and SPC	Caroline Vieux and Franck Magron
13:30	Presentation from breakout groups and plenary discussion	Facilitators
15:30	<i>Afternoon Tea</i>	
15:45 -17:00	Presentation on the minutes of discussion and Q/A and Preparation of the minutes of discussions Wrap up of the workshop and next steps (Facilitators) Signing of the minutes Closing remarks	Facilitators / Rapporteur  Dr. Seiji Nakaya, Trina Leberer
18:30	<i>Farewell Party – Riptide Restaurant (hosted by TNC)</i>	

### Day 5 Friday 19 February

9:00	Field trip – Northern Reefs	
17:00	<i>Free</i>	

## APPENDIX TWO: INDICATORS FROM THE FIRST MC MEASURES WORKSHOP (JUNE 2 TO 6, 2008)

### SUGGESTED PRIORITY TARGETS AND INDICATORS FROM THE 1<sup>ST</sup> MC MEASURES WORKSHOP

- Coral reefs and associated habitats (e.g., seagrass)
  - Community Structure (Size class, Species Composition)
  - % Benthic Substrate Cover
  - Areal Extent (including area of seagrass; only seagrass indicator)
  - Condition (eg. Absence of disease, COTS)
- Freshwater ecosystems (rivers, streams, wetlands, and lakes)
  - Flow rates
  - Density, size, diversity of fauna
  - Water quality
- Native forest
  - % native forest cover (including areal extent)
  - Species Diversity and Abundance
  - Forest Structure (Age Class)
- Mangroves (same indicators as for native forest, plus the following)
  - Water Quality
  - Sediment Accretion
  - Level of harvest/extraction
- Native forest birds
  - For specific important bird species: Population Density and abundance
  - Age class structure (including # of breeding Pairs)
  - Geographic distribution of Habitat and Nesting Areas
- Reef fish
  - Density, Size and Species Composition (for specific valuable/important reef fish)
  - Specific population features (eg. SPAGS)



Top photo by Susi Menazza; Middle and bottom photos by Jez O'Hare



## SUGGESTED PRIORITY THREAT INDICATORS FROM THE 1ST MC MEASURES WORKSHOP

- Geographic distribution of the “10 Most Wanted” invasive species
  - Measured to assess the impact of conservation efforts designed to address the threats of invasive species and wood/NTFP (mangrove) extraction.
  - Years one and two: plant species only?
  - Years three and beyond: phase in invasive vertebrates and reptiles?
- Percent area of habitat lost through time
  - Measured to assess the impact of conservation efforts designed to address the threats of urban/housing development and wood/NTFP (mangrove) extraction. To be measured separately in terms of habitat loss/conversion as a result of: (a) urban development; (b) destruction from invasive species; and (c) climate change impacts (i.e., loss of coastline from sea level rise).
- Water quality
  - Measured to assess the impact of conservation efforts designed to address the threats of sedimentation and pollution. To be measured in terms of: (a) turbidity; and (b) nutrient loading.
- Size-class distribution of populations of key living resources and/or catch per unit effort (working group still in discussion on these two indicator choices)
  - Measured to assess the impact of conservation efforts designed to address the threat of over-fishing and –harvesting. Target species of concern across the region (e.g., certain reef fish species targeted for local food source, humphead parrotfish, etc.) need to be identified. Measured both via *in situ* observation of target species and through reported catch/harvest.
  - Focus on detecting shifts in population structure; e.g., loss of individuals at size classes indicative of age of reproductive maturation.
  - Still under discussion regarding how best to frame and measure this indicator.

## SUGGESTED INTERMEDIATE RESULTS INDICATORS FROM THE 1<sup>ST</sup> MC MEASURE WORKSHOP

- Benefits / Incentives
  - % of the population that receives benefits/incentives
- Change in attitudes (buy-in in leaders, stakeholders, developers)
  - % of buy-in
  - Change in attitudes
- Active participation
  - % of stakeholders participating
- Change in behavior (consumers, producer, stakeholders in relation to plans/agreements, etc)
  - % and # of stakeholders changing behavior.
- Policies and Regulations (implementation of policies, management plans, zoning, leaders taking actions)
  - P/A (policies/Regulations approved)
  - % / # of agencies participating
  - # of new policies / regulations
  - # of management plans objectives successfully met
- Enforcement
  - Person / hour of patrol
  - \$ dedicated to enforcement
- Compliance
  - % / # compliance in “x”

## SUGGESTED PROCESS VARIABLES

- Collaboration
- Participation
- Sharing data
- Communication
- Cross jurisdiction learning





## APPENDIX THREE: HOMEWORK FOR THE SECOND MC MEASURES WORKSHOP

Results of the Socio-economic pre-workshop survey compiled by Dr. Supin Wongbusarakum.

Jurisdiction/ State	Guam	CNMI	Kosrae	Palau	Pohnpei
Previous SE assessment	no	yes	yes	yes	yes
Year		2009	2008	2005, 2006, 2009, 2010 (in progress)	2006 and 2008
Usefulness		high	medium	high	medium
Indicators in previous assessment		number of profile of visitors age sex/gender education ethnicity language occupation perceived threats to coastal and marine resources perceived coastal management problems	awareness of rules and regulations enforcement compliance management success and failures stakeholders participation sources of household income types and levels of use by outsiders knowledge of coastal and marine resources perceived resource condition perceived threats to coastal and marine resources perceived coastal management problems dependence on coastal and marine resources	demographic marine activities (marine goods/services, dependency on resources, knowledge of marine resources) threats (perceived resource conditions, perceived threats to marine resources) management (awareness rules/regulations,	Local marine resource use patterns Local values and beliefs about marine resources Level of understanding of human impacts Perceptions of seafood availability Perceptions of local resource harvest Perceptions of non-market and non-use value Material style of life Quality of human health Household income distribution by source Household occupational structure Community infrastructure and business Number and nature of markets

Jurisdiction/State	Guam	CNMI	Kosrae	Palau	Pohnpei
<b>Indicators that should be included</b>	number of fishers  number of recreational users  consumption of fish  per capita income  value on healthy reef and ecosystem  number of tourists who uses marine resources	demographic information	awareness of rules and regulations  knowledge of coastal and marine resources  enforcement  compliance  management success and failures  perceived coastal management problems  perceived threats to coastal and marine resources  attitude toward coastal and marine resources	threats  managements	Local marine resource use patterns  Level of understanding of human impacts  Perceptions of local resource harvest  Material style of life  Local values and beliefs about marine resources  Perceptions of seafood availability  Perceptions of non-market and non-use value  Household occupational structure

Results of the Ecological pre-workshop survey compiled by Yimnang Golbuu.

Country/ Jurisdiction	State	Name of MPA	Size (if known)	Type (mangrove: MG; seagrass: SG; reef:CR)	Management Objectives (Fish stock replenishment: FSR; Habitat recovery: HR; Fisheries protection: FP)	Management body (state, national, NGO, etc.)	Monitoring (methods)
	Guam	Achang Reef Flat	4.85 km <sup>2</sup>	Seagrass, reef, mangrove	Fish stock replenishment, habitat recovery	Territorial Dept. of Agriculture	visual transects, documentation of illegal harvest
	Guam	Sasa Bay	3.12km <sup>2</sup>	Mangrove	Fish stock replenishment, habitat recovery	Territorial Dept. of Agriculture	documentation of illegal harvest
	Guam	Piti Bomb Holes	3.63km <sup>2</sup>	Seagrass, reef, special features	Fish stock replenishment, habitat recovery	Territorial Dept. of Agriculture	visual transects, documentation of illegal harvest
	Guam	Tumon Bay	4.52km <sup>2</sup>	reef	Fish stock replenishment, habitat recovery	Territorial Dept. of Agriculture	visual transects, documentation of illegal harvest
	Guam	Pati Point	20.00km <sup>2</sup>	reef	Fish stock replenishment, habitat recovery	Territorial Dept. of Agriculture	documentation of illegal harvest
USA (CNMI)	CNMI (Northern Islands)	Marianas Trench Monument Managaha Marine Conservation Area		Coral reef, seamounts, deepwater trench	Habitat protections, other objective to be determined	US Federal Govt. with possible inclusion of state govt.	NA
USA (CNMI)	CNMI (Saipan)	Forbidden Island	5.06 km	coral reef	Fisheries enhancement, habitat protection	State	Transect based in-waer surveys
USA (CNMI)	CNMI (Saipan)	Forbidden Island	2.5 km	coral reef	Fisheries enhancement, habitat protection	State	Transect based in-waer surveys
USA (CNMI)	CNMI (Tinian)	Tinian Sanctuary	9 km	coral reef	Fisheries enhancement, habitat protection	State	NA
USA (CNMI)	CNMI (Rota)	Sasanhaya Fish Reserve	0.84 km	coral reef	Fisheries enhancement, habitat protection	State	Transect based in-waer surveys
USA (CNMI)	CNMI (Saipan)	Lighthouse Reef Trochus Reserve	1.11 km	coral reef	Trochus enhancement	State	NA
USA (CNMI)	CNMI (Saipan)	Bird Island Marine Sanctuary	0.79 km	coral reef	Fisheries enhancement, habitat protection	State	Transect based in-waer surveys
USA (CNMI)	CNMI (Saipan)	Laulau Bay Sea Cucumber	1.58 km	coral reef	Sea Cucumber Enhancement	State	NA

		Reserve										
Palau	Kayangel	Ngeruangel Reserve	34.96 km <sup>2</sup>	atoll island, reefs, and lagoons	fisheries, tourism	state government	state government	fisheries, tourism	Quaterly monitoring by PCS up until 2007, PICRC monitoring yearly			
Palau	Ngerchelong	Ebil Conservation Area	19.11 km <sup>2</sup>	reef	protect spawning aggregations of reef fish	state government	state government	protect spawning aggregations of reef fish	PCS monthly until 2007, PCS with SCRFA July and Aug 2008 and April-Sept 2009, PICRC research study 2007-2009			
Palau	Ngardmau	Ileyaki Beluu Ngermasech to Bkulachelid Conservation Area	0.62 km <sup>2</sup>	reef	fisheries protection	state government	state government	fisheries protection	none			
Palau	Ngardmau	Mangrove conservation area (west coast)	2.93 km <sup>2</sup>	mangrove, seagrass, coral reef	fisheries protection	state government	state government	fisheries protection	PCS baseline 2007, follow up survey in 2008; PICRC quarterly fish and inverts			
Palau	Ngaraard		1.42 km <sup>2</sup>	mangrove		state government	state government		None			
Palau	Ngeremle ngui	Bkulengriil conservation area	1.5 km <sup>2</sup>	mangrove and reef flat	fisheries protection	state government	state government	fisheries protection	PCS and PICRC baseline 2006; Quaterly monitoring by State Government assisted by PICRC			
Palau	Ngeremle ngui	Tewachel Mlengui Grouper Spawning Area (Bkul a Beluu)		reef	fisheries protection	state government	state government	fisheries protection	none			
Palau	Ngatpang	Clam conservation area (Oruaol Libuchel Reef)		patch reef	fisheries protection	state government	state government	fisheries protection	none			
Palau	Ngatpang	Crab conservation area		mangrove	fisheries protection	state government	state government	fisheries protection	none			
Palau	Ngatpang	Fish conservation area		mangrove, seagrass, coral reef	fisheries protection	state government	state government	fisheries protection	none			
Palau	Ngatpang				fisheries protection	state government	state government	fisheries protection	none			

Palau	Ngermie ngui, Ngatpang, Aimeliik	Ngermeduu conservation area	98 km <sup>2</sup>	mangrove		state government	none
Palau	Melkeok	Melekeok nearshore waters		reef and seagrass	fisheries protection	state government	none
Palau	Melkeok	Ngerang Clam Conservation Area		reef flat	fisheries protection	state government	none
Palau	Ngchesar	Ngeluk conservation area	0.5 km <sup>2</sup>	patch reef	fisheries protection	state government	Monitoring by State Government assisted by PICRC, research by PICRC
Palau	Aimeliik	Ngerchebal Island Wildlife Conservation		island and reef	fisheries protection	state government	none
Palau	Aimeliik	Imul Mangrove Conservation Area		mangrove		state government	none
Palau	Airai	Ngcheschan mangrove conservation area	0.97 km <sup>2</sup>	mangrove		state government	none
Palau	Airai	Oikull mangrove conservation area	0.78 km <sup>2</sup>	mangrove		state government	none
Palau	Airai	Airai reef conservation area		mangroves, coral reef and seagrass	fisheries protection	state government	Monitoring by State Government assisted by PICRC
Palau	Airai	Ngeream conservation area	1.64 km <sup>2</sup>	mangrove		state government	none
Palau	Koror	Ngerkebesan Conservation Zone*		reef flat	Protect resources for tourist	state government	patrol by Koror State Rangers
Palau	Koror	Ngederrak conservation area*	5.98 km <sup>2</sup>	seagrass, reef flat, reef crest	Maintain fisheries and other resources	state government	patrol by Koror State Rangers

Palau	Koror	Ngerumeakaol Spawning area*	2.08 km2	reef	Protection of spawning aggregation site	state government	patrol by Koror State Rangers
Palau	Koror	Soft Coral Arch, Cemetery Reef, any marine lake, Ngkisaol Islet*		coral reef, marine lake, mangrove, seagrass	protect spawning populations of herring and maintain flora and fauna at popular dive sites	state government	patrol by Koror State Rangers
Palau	Koror	Ngerukewid Islands Wildlife Preserve	11.02 km2	islands, reefs and lagoons	Maintain the island in natural stage free from human interference	state government	patrol by Koror State Rangers
Palau	Koror	Ngemelis Island complex*	40.26 km2	islands and reefs	decrease erosion, protect coral reef from damage, and maintain water clarity and quality	state government	patrol by Koror State Rangers
Palau	Peleliu	Teluleu conservation area	0.83 km2	seagrass and reef flat		state government	initial assessment by PCS in 2009
Palau	Angaur	Angaur conservation area		seagrass and reef flat		state government	ecological monitoring by PICRC
Palau	Hatohobei	Helen Reef Reserve	163 km2	island, reefs and lagoons		state government	Patrolled by rangers, monitoring by rangers, baseline surveys
Palau	Koror	Rock island Southern lagoon management area**	621 km2	rock island, lagoons and barrier reefs		state government	patrol by Koror State Rangers
Palau	Ngaraard	Ungelel Conservation Area		mangrove		state government	none
Palau	Ngaraard	Marine Life Conservation Area		reef		state government	none
FSM	Yap	Riken Marine Managed Area	34.8251 Ha	patch reef, inner reef, channel, outer reef		Riken Village	
FSM	Yap	Ngulu Atoll-zone A	90514.2 Ha			Ngulu Atoll Resource Management Committee	yes/SE

FSM	Yap	Rumung	286.214 Ha					Local Municipal	
FSM	Yap	Nimpal Channel Marine Conservation Area	77.481 Ha	inner-reef, channel, outer-reef	Conservation/preservation of traditional fishing grounds	Community	fish count		
FSM	Yap	Ngulu Atoll-zone B	21508.9 Ha	patch reef, inner reef, channel, outer reef		Ngulu Atoll Resource Management Committee	yes/SE		
FSM	Yap	Ngulu Atoll-zone C	408.689 Ha	patch reef, inner reef, channel, outer reef		Ngulu Atoll Resource Management Committee	yes/SE		
FSM	Yap	Wacholab 2	99.3537 Ha			Wacholab Village			
FSM	Yap	Wacholab 1	22.9044 Ha			Wacholab Village			
FSM	Chuuk	Pulusuk Atoll	516.924 Ha	CR, MG, atoll		Traditional Closure (Clan)	no		
FSM	Chuuk	West Puluwat	1373.21 Ha	MG, CR		Traditional Closure (Clan)	no		
FSM	Chuuk	Southwest Pulpap	5077.84 Ha	CR		Traditional Closure (Clan)	no		
FSM	Chuuk	North Weno Marine	13.087 Ha	MG		Community Members	no		
FSM	Chuuk	SPAGS	706.251 Ha	inner-reef, channel, outer-reef	FP	Community Members	yes		

FSM	Chuuk	Namoluk Atoll	1583.91 Ha	nearshore marine		Traditional Closure (Clan)	no
FSM	Chuuk	Etal Atoll Marine	2657.41 Ha			Traditional Closure (Clan)	no
FSM	Chuuk	Esan Reef	2791.91 Ha			Traditional Closure (Clan)	no
FSM	Chuuk	Oneop Island	58.0875 Ha	nearshore marine		Traditional Closure (Clan)	no
FSM	Chuuk	Satowan Island	119.506 Ha			Traditional Closure (Clan)	no
FSM	Chuuk	Northwest Reef	2050.48 Ha			Community Members	no
FSM	Chuuk	Fonufon Reef	565.841 Ha	CR (patch reefs)	FP, HR	Community Members	yes
FSM	Chuuk	Grouper Spawning Site	900.871 Ha			Traditional Closure (Special)	no
FSM	Chuuk	Grouper Spawning Site	130.814 Ha			Traditional Closure (Special)	no
FSM	Chuuk	Kuop Atoll	11597.9 Ha	CR, atolls, lagoon	conserve traditional fishing grounds	Traditional Closure (Clan)	no
FSM	Chuuk	Namwanan Marine	166.74 Ha	MG		Traditional Closure (Clan)	no
FSM	Chuuk	Ununo-Fongen-Onogoch, Fefan	114.307 Ha	MG, CR	HR, FP	UFO Women Association	yes
FSM	Chuuk	Totiw	10.7996 Ha	CR	HR, FP	Community Members	yes
FSM	Chuuk	Southeast Reef	1235.28 Ha			Community Members	no
FSM	Chuuk	Esan Reef	63.5857 Ha	CR, atoll		Traditional Closure (Clan)	no
FSM	Chuuk	Feneppi	1.1862 Ha	inner-reef, channel, outer-reef	conserve traditional fishing grounds	Traditional Closure (Clan)	no
FSM	Chuuk	Ipis		inner-reef, channel, outer-reef	conserve traditional fishing grounds	Traditional Closure (Clan)	yes



FSM	Chuuk	Epinup Mangrove Conservation Site	21.3807 Ha	MG				Epinup Conservation Group	yes	
		Chuuck Lagoon						HPO/Marine Resources		
FSM	Pohnpei	Nahtik	924.575 Ha	MG, CR (inner and outer)		FP/FSR		Enipein community	yes	
FSM	Pohnpei	Sapwitik	153.713 Ha	CR, spawning aggregations		FP/FSR		Department of Land and Natural Resources (Div. of Marine Conservation and Forestry), Conservation Society of Pohnpei, Lenger community	yes	
FSM	Pohnpei	Kehpara	67.4776 Ha	CR, spawning aggregations		FP/FSR		State Government and Conservation Society of Pohnpei (CSP)	yes	
FSM	Pohnpei	Namwen Nangingh Stingray Sanctuary	29.1331 Ha	cultural site, stingray		cultural		traditional	no	
FSM	Pohnpei	Namwen Na Stingray Sanctuary	23.3013 Ha	stingray		cultural		traditional	no	
FSM	Pohnpei	Kepidau Deleur	451.818 Ha	CR, channel		FP, FSR		Department of Land and Natural Resources (Div. of Marine Conservation and Forestry)	yes	
FSM	Pohnpei	Dehpelik Marine Sanctuary	173.3 Ha	MG, CR		FP/FSR		Department of Land and Natural Resources (Div. of Marine Conservation and Forestry), CSP and community	yes	
FSM	Pohnpei	Enipein Mangrove Reserve	57.9451 Ha	MG		HR		State Government and community		

FSM	Pohnpei	Mwahnd Marine Sanctuary	792.67 Ha	CR, manta ray	FP, FSR	Department of Land and Natural Resources (Div. of Marine Conservation and Forestry), CSP and community	
FSM	Pohnpei	Pakin Reef	324.092 Ha	CR, atoll	FP, FSR	Pakin Community Association	no
FSM	Pohnpei	Uhrek	5.07499 Ha	beach habitat	FSR	Mwoalakoa community	yes
FSM	Pohnpei	Pahnruk	1394.78 Ha	CR	FP, FSR	Nanpei estate	no
FSM	Pohnpei	Dauenai Channel	413.045 Ha	CR, channel	FSR, HR, FP	Nanpei estate	no
FSM	Pohnpei	Pasa	1099.67 Ha	CR (giant clams)	FP, FSR	Nanpei estate	no
FSM	Pohnpei	Oroluk	46928.3 Ha	CR, atoll	FSR, HR, FP	State Government	no
FSM	Pohnpei	Minto Reef	4914.06 Ha	CR, atoll	FSR, HR, FP	Department of Land and Natural Resource	no
FSM	Pohnpei	Pwudoi Marine Sanctuary	71.0951 Ha	MG, CR	FSR, HR, FP	CSP, Pwudoi community	no
FSM	Kosrae	Awane	173.144 Ha	MG, SG, CR	FP, HR		
FSM	Kosrae	Kosrae Biosphere Reserve	512.93 Ha	MG, SG, CR	FP, HR, FSR		yes
FSM	Kosrae	Malem	20.8018 Ha	MG	HR		
FSM	Kosrae	Yela Watershed Terminalia Stand	520.356 Ha	MG	HR		
FSM	Kosrae	James Palis Marine Park	268.923 Ha	CR, SG	FSR, HR		yes
FSM	Kosrae	Trouchus Sanctuary	140.245 Ha	SG, CR	Trochus enhancement		yes
FSM	Kosrae	Weok	2.75805 Ha	CR, SG	FP, HR		yes
FSM	Kosrae	Yenyen Island	1.8835 Ha	MG, CR, SG	HR		
RMI	Namdrik	Namdrik Atoll (whole atoll)	16.19 km2		Hab pro, for enhance resilience and for food security, tourism expected	Co manage (community+Local gov)	No real monitoring is going on

RMI	Majuro	Wojja (Majuro Atoll)				Hab pro, for enhance resilience and for food security; tourism expected	Co manage (community+Local gov)	No real monitoring is going on
RMI	Majuro	Drenmeo (Majuro Atoll)				Hab pro, for enhance resilience and for food security; tourism expected	Co manage (community+Local gov)	No real monitoring is going on
RMI	Majuro	Bikirin (Majuro Atoll)				Hab pro, for enhance resilience and for food security; tourism expected	Co manage (community+Local gov)	No real monitoring is going on
RMI		(Majuro Atoll)				Hab pro, for enhance resilience and for food security	Co manage (community+Local gov)	No real monitoring is going on
RMI	Mili	Mili Atoll				Hab pro, for enhance resilience and for food security; tourism expected	Co manage (community+Local gov)	No real monitoring is going on
RMI	Rongerik	Rongerik Atoll				Hab pro, for enhance resilience and for food security	Co manage (community+Local gov)	No real monitoring is going on
RMI	Wotje Atoll	Erikub Atoll (whole atoll)				Hab pro, for enhance resilience and for food security	Co manage (community+Local gov)	No real monitoring is going on
RMI	Ailuk Atoll	Eneneman Pass			1 km2	Hab pro, for enhance resilience and for food security; tourism expected; Shellfish culture	Co manage (community+Local gov)	No real monitoring is going on
RMI	Ailuk Atoll	Marok Pass				Hab pro, for enhance resilience and for food security; tourism expected; Shellfish culture	Co manage (community+Local gov)	No real monitoring is going on
RMI	Ailuk Atoll	Agulue Pass			1 km2	Hab pro, for enhance resilience and for food security; tourism expected; Shellfish culture	Co manage (community+Local gov)	No real monitoring is going on
RMI	Ailuk Atoll	Enije Pass			1 km2	Hab pro, for enhance resilience and for food security; tourism expected; Shellfish culture	Co manage (community+Local gov)	No real monitoring is going on
RMI	Ailuk Atoll	Enije, Ailuk			1 km2	Hab pro, for enhance resilience and for food security; tourism expected; Shellfish culture	Co manage (community+Local gov)	No real monitoring is going on
RMI	Rongelap Atoll	Rongelap Atoll (whole atoll)			2723 km2	Hab pro, for enhance resilience and for food security	Co manage (community+Local gov)	No real monitoring is going on

RMI	Rongelap Atoll	Ailinginae Atoll (whole atoll)	1014 km2		Hab pro, for enhance resilience and for food security	Co manage (community+Local gov)	No real monitoring is going on
RMI	Bikini Atoll	Bikini Atoll (whole atoll)	2001 km2		Hab pro, for enhance resilience and for food security	Co manage (community+Local gov)	No real monitoring is going on
RMI	Arno Atoll	Arno, Arno (terrestrial&marine)	10 km2		Hab pro, for enhance resilience and for food security; Shellfish culture	Co manage (community+Local gov)	No real monitoring is going on
RMI	Arno Atoll	Arno, Arno	3 km2		Hab pro, for enhance resilience and for food security; Shellfish culture	Co manage (community+Local gov)	No real monitoring is going on
RMI	Arno Atoll	Arno #2 (terrestrial&marine)	6 km2		Hab pro, for enhance resilience and for food security; Shellfish culture	Co manage (community+Local gov)	No real monitoring is going on
RMI	Arno Atoll	Jabo (terrestrial&marine)	2 km2		Hab pro, for enhance resilience and for food security; Shellfish culture	Co manage (community+Local gov)	No real monitoring is going on
RMI	Arno Atoll	Ine (terrestrial&marine)	2 km2		Hab pro, for enhance resilience and for food security; Shellfish culture	Co manage (community+Local gov)	No real monitoring is going on
RMI	Arno Atoll	Arno - Matolen Lagoon	7 km2		Hab pro, for enhance resilience and for food security; Shellfish culture	Co manage (community+Local gov)	No real monitoring is going on
RMI	Arno Atoll	Matolen (terrestrial&marine)	2 km2		Hab pro, for enhance resilience and for food security; Shellfish culture	Co manage (community+Local gov)	No real monitoring is going on
RMI	Arno Atoll	Malel (terrestrial&marine)	2 km2		Hab pro, for enhance resilience and for food security; Shellfish culture	Co manage (community+Local gov)	No real monitoring is going on
RMI	Arno Atoll	Kirage (terrestrial&marine)	3 km2		Hab pro, for enhance resilience and for food security; Shellfish culture	Co manage (community+Local gov)	No real monitoring is going on
RMI	Arno Atoll	Lanar/Tenaku (terrestrial&marine)	3 km2		Hab pro, for enhance resilience and for food security; Shellfish culture	Co manage (community+Local gov)	No real monitoring is going on
RMI	Arno Atoll	Anearean Jarkwiji-Enelauraren (terrestrial & marine)	4 km2		Hab pro, for enhance resilience and for food security; Shellfish culture	Co manage (community+Local gov)	No real monitoring is going on
RMI	Arno Atoll		6 km2		Hab pro, for enhance resilience and for food security; Shellfish culture	Co manage (community+Local gov)	No real monitoring is going on

RMI	Jaluit Atoll	Dri Bako Mo-Pinglep	51 km2			Hab pro, for enhance resilience and for food security	Traditionally managed (community+Local gov)	No real monitoring is going on
RMI	Jaluit Atoll	Mejai - Bird Island (terrestrial&marine)	4.9 km2			Hab pro, for enhance resilience and for food security	Traditionally managed (community+Local gov)	No real monitoring is going on
RMI	Jaluit Atoll	Matolen Mo	5.6 km2			Hab pro, for enhance resilience and for food security	Traditionally managed (community+Local gov)	No real monitoring is going on
RMI	Jaluit Atoll	Dri Bako Mo-Pinglep (Bokwen-Aruboe)	9 km2			Hab pro, for enhance resilience and for food security	Traditionally managed (community+Local gov)	No real monitoring is going on
RMI	Jaluit Atoll	Jitoken Mo	5 km2			Hab pro, for enhance resilience and for food security	Traditionally managed (community+Local gov)	No real monitoring is going on
RMI	Jaluit Atoll	Loraa Mo-Ae	5 km2			Hab pro, for enhance resilience and for food security	Traditionally managed (community+Local gov)	No real monitoring is going on
RMI	Jaluit Atoll	Nono Mo-Imroj	0.9 km2			Hab pro, for enhance resilience and for food security	Traditionally managed (community+Local gov)	No real monitoring is going on
RMI	Jaluit Atoll	Jea Ko Mo-Imroj				Hab pro, for enhance resilience and for food security	Traditionally managed (community+Local gov)	No real monitoring is going on
RMI	Jaluit Atoll	Bar Mo-Imiej	1 km2			Hab pro, for enhance resilience and for food security	Traditionally managed (community+Local gov)	No real monitoring is going on
RMI	Jaluit Atoll	Karajraj Kan Mo-Jabor	1 km2			Hab pro, for enhance resilience and for food security	Traditionally managed (community+Local gov)	No real monitoring is going on
RMI	Jaluit Atoll	Enninto Mo-Ae	1 km2			Hab pro, for enhance resilience and for food security	Traditionally managed (community+Local gov)	No real monitoring is going on
RMI	Likiep Atoll	Aujaraj-Likiep				Hab pro, for enhance resilience and for food security; tourism expected	Co manage (community+Local gov)	No real monitoring is going on
RMI	Likiep Atoll	Anenuaan-Likiep				Hab pro, for enhance resilience and for food security; tourism expected	Co manage (community+Local gov)	No real monitoring is going on

Country/ Jurisdiction	State	Name of MPA	Number of people living in the MPA	main use (if not no-take	Year Established	Coordinates (if known) or map showing location	Designated by (national, state, traditional, international, mixed)
	Guam	Achang Reef Flat	2163	private recreation	1997		Territorial government
	Guam	Sasa Bay	1666	boat mooring	1997		Territorial government
	Guam	Piti Bomb Holes	1666	commercial and private recreation	1997		Territorial government
	Guam	Tumon Bay	18012	tourist and private recreation	1997		Territorial government
	Guam	Pati Point	19,474	military base, recreation	1997		Territorial government
USA (CNMI)	CNMI (Northern Islands)	Marianas Trench Monument	0	Tourism, research, limited fishing	2009	See included maps	US President
USA (CNMI)	CNMI (Saipan)	Managaha Marine Conservation Area	0	Tourism/recr eation	2000	See included maps	CNMI Legislature
USA (CNMI)	CNMI (Saipan)	Forbidden Island	0	Tourism/recr eation	2000	See included maps	CNMI Legislature
USA (CNMI)	CNMI (Tinian)	Tinian Sanctuary	0	Tourism/recr eation	2007	See included maps	Tinian Legislature
USA (CNMI)	CNMI (Rota)	Sasanhaya Fish Reserve	0	Tourism/recr eation	1994	See included maps	Rota Legislature
USA (CNMI)	CNMI (Saipan)	Lighthouse Reef Trochus Reserve	0	Fishing	2000	See included maps	CNMI Legislature
USA (CNMI)	CNMI (Saipan)	Bird Island Marine Sanctuary	0	Tourism/recr eation	2001	See included maps	CNMI Legislature
USA (CNMI)	CNMI (Saipan)	Laulau Bay Sea Cucumber Reserve	0	Tourism/recr eation, fishing, research	2000	See included maps	CNMI Legislature
Palau	Kayangel	Ngeruangel Reserve	0		1996		State law
Palau	Ngerchelung	Ebiil Conservation Area	0		1999		State law

Palau	Ngardmau	Ileyaki Beluu Ngermasech to Bkulachelid Conservation Area	0		2005		State law
Palau	Ngardmau	Mangrove conservation area (west coast)	0		1998		State law
Palau	Ngaraard	Bkulengriil conservation area	0		1994		State law
Palau	Ngeremlengui	Tewachel Mlengui Grouper Spawning Area (Bkul a Beluu)	0		2006		State law
Palau	Ngeremlengui	Clam conservation area (Oruaol Libuchel Reef)	0		1987		State law
Palau	Ngatpang	Crab conservation area	0		1999		State law
Palau	Ngatpang	Fish conservation area	0		1999		State law
Palau	Ngeremlengui, Ngatpang, Aimeliik	Ngermeduu conservation area	0		1999		State law
Palau	Melkeok	Melekeok nearshore waters	0		1997		State law
Palau	Melkeok	Ngerang Clam Conservation Area	0		1999		State law
Palau	Ngchesar	Ngelukes conservation area	0		2002		State law
Palau	Aimeliik	Ngerchebal Island Wildlife Conservation	0		2006		State law
Palau	Aimeliik	Imul Mangrove Conservation Area	0		2002		State law
Palau	Airai	Ngcheschang mangrove conservation area	0		1994		State law
Palau	Airai	Oikull mangrove conservation area	0		2002		State law
Palau	Airai	Airai reef conservation area	0		2005		State law
Palau	Airai	Ngeream conservation area	0		1997		State law
Palau	Koror	Ngerkebesang Conservation Zone*	0		2002		State law
Palau	Koror	Ngederrak conservation	0		2001		State law

		area*										
Palau	Koror	Ngerumekaol Spawning area*	0					1976				State and national law
Palau	Koror	Soft Coral Arch, Cemetery Reef, any marine lake, Ngkisaol Islet*	0	tourism				1999				state
Palau	Koror	Ngerukewid Islands Wildlife Preserve	0					1956				State and national law
Palau	Koror	Ngemelis Island complex*	0	tourism				1995				State law
Palau	Peleliu	Teluleu conservation area	0					2001				State law
Palau	Angaur	Angaur conservation area	0					2006				State law
Palau	Hatohobei	Helen Reef Reserve	0					2001				State law
Palau	Koror	Rock island Southern lagoon management area**	0					1997				State law
Palau	Ngaraard	Ungelel Conservation Area	0					2007				State law
Palau	Ngaraard	Marine Life Conservation Area	0					1990				State law
FSM	Yap	Riken Marine Managed Area										Declared and run by local communities
FSM	Yap	Ngulu Atoll-zone A										Declared and run by local communities
FSM	Yap	Rumung										Declared and run by local communities
FSM	Yap	Nimpal Channel Marine Conservation Area	200					2008				Traditional (2006) & public declaration (2008)
FSM	Yap	Ngulu Atoll-zone B										Declared and run by local communities
FSM	Yap	Ngulu Atoll-zone C										Declared and run by local communities



FSM	Yap	Wacholab 2							Declared and run by local communities
FSM	Yap	Wacholab 1							Declared and run by local communities
FSM	Chuuk	Pulusuk Atoll							Declared and run by Indigenous peoples
FSM	Chuuk	West Puluwat							Declared and run by Indigenous peoples
FSM	Chuuk	Southwest Puluwat							Government-delegated management
FSM	Chuuk	North Weno Marine							Declared and run by Indigenous peoples
FSM	Chuuk	SPAGS							Declared and run by local communities
FSM	Chuuk	Namoluk Atoll							Declared and run by Indigenous peoples
FSM	Chuuk	Etal Atoll Marine							Declared and run by Indigenous peoples
FSM	Chuuk	Esan Reef							Declared and run by Indigenous peoples
FSM	Chuuk	Oneop Island							Declared and run by Indigenous peoples
FSM	Chuuk	Satowan Island							Declared and run by Indigenous peoples
FSM	Chuuk	Northwest Reef							Declared and run by Indigenous peoples
FSM	Chuuk	Fonufon Reef							Declared and run by Indigenous peoples
FSM	Chuuk	Grouper Spawning Site							Declared and run by Indigenous peoples
FSM	Chuuk	Grouper Spawning Site							Declared and run by Indigenous peoples
FSM	Chuuk	Kuop Atoll							Declared and run by Indigenous peoples
FSM	Chuuk	Namwanan Marine							Declared and run by Indigenous peoples
FSM	Chuuk	Ununo-Fongen-Onongoch, Fefan							Declared and run by local communities

FSM	Chuuk	Totiw							Declared and run by Indigenous peoples
FSM	Chuuk	Southeast Reef							Declared and run by Indigenous peoples
FSM	Chuuk	Esan Reef							Declared and run by Indigenous peoples
FSM	Chuuk	Feneppi							Declared and run by Indigenous peoples
FSM	Chuuk	Ipis							Collaborative management
FSM	Chuuk	Epinup Mangrove Conservation Site							Declared and run by local communities
FSM		Chuuck Lagoon							
FSM	Pohnpei	Nahtik							
FSM	Pohnpei	Sapwitik							
FSM	Pohnpei	Kehpara							
FSM	Pohnpei	Namwen Nangingih Stingray Sanctuary							traditional
FSM	Pohnpei	Namwen Na Stingray Sanctuary							traditional
FSM	Pohnpei	Kepidau Deleur							
FSM	Pohnpei	Dehpehk Marine Sanctuary							
FSM	Pohnpei	Enipein Mangrove Reserve							
FSM	Pohnpei	Mwahnd Marine Sanctuary							
FSM	Pohnpei	Pakin Reef							
FSM	Pohnpei	Uhrek							
FSM	Pohnpei	Pahnruk							
FSM	Pohnpei	Dauenai Channel							
FSM	Pohnpei	Pasa							
FSM	Pohnpei	Oroluk							
FSM	Pohnpei	Minto Reef							
FSM	Pohnpei	Pwdoi Marine Sanctuary							
FSM	Kosrae	Awane							

FSM	Kosrae	Kosrae Biosphere Reserve						
FSM	Kosrae	Malem						
FSM	Kosrae	Yela Watershed Terminalia Stand						
FSM	Kosrae	James Palis Marine Park						
FSM	Kosrae	Trouchus Sanctuary						
FSM	Kosrae	Weok						
FSM	Kosrae	Yenyen Island						
RMI	Namdrik	Namdrik Atoll (whole atoll)						
RMI	Majuro	Woja (Majuro Atoll)						
RMI	Majuro	Drenmeo (Majuro Atoll)						
RMI	Majuro	Bikirin (Majuro Atoll)						
RMI		(Majuro Atoll)						
RMI	Mili	Mili Atoll						
RMI	Rongerik	Rongerik Atoll						
RMI	Wotje Atoll	Erikub Atoll (whole atoll)						
RMI	Aiuk Atoll	Eneneman Pass						
RMI	Aiuk Atoll	Marok Pass						
RMI	Aiuk Atoll	Agulue Pass						
RMI	Aiuk Atoll	Enije Pass						
RMI	Aiuk Atoll	Enije, Aiuk						
RMI	Rongelap Atoll	Rongelap Atoll (whole atoll)						
RMI	Rongelap Atoll	Ailinginae Atoll (whole atoll)						
RMI	Bikini Atoll	Bikini Atoll (whole atoll)						
RMI	Arno Atoll	Arno, Arno (terrestrial&marine)						
RMI	Arno Atoll	Arno, Arno						
RMI	Arno Atoll	Arno #2 (terrestrial&marine)						
RMI	Arno Atoll	Jabo (terrestrial&marine)						
RMI	Arno Atoll	Ine (terrestrial&marine)						
RMI	Arno Atoll	Arno - Matolen Lagoon						
RMI	Arno Atoll	Matolen (terrestrial&marine)						

RMI	Arno Atoll	Malel (terrestrial&marine)						
RMI	Arno Atoll	Kirage (terrestrial&marine)						
RMI	Arno Atoll	Lanar/Teaku (terrestrial&marine)						
RMI	Arno Atoll	Anearean						
RMI	Arno Atoll	Jarkwij-Enelauren (terrestrial & marine)						
RMI	Jaluit Atoll	Dri Bako Mo-Pinglep						
RMI	Jaluit Atoll	Mejai - Bird Island (terrestrial&marine)						
RMI	Jaluit Atoll	Matolen Mo						
RMI	Jaluit Atoll	Dri Bako Mo-Pinglep (Bokwen-Aruboe)						
RMI	Jaluit Atoll	Jitoken Mo						
RMI	Jaluit Atoll	Loraa Mo-Ae						
RMI	Jaluit Atoll	Nono Mo-Imroj						
RMI	Jaluit Atoll	Jea Ko Mo-Imroj						
RMI	Jaluit Atoll	Bar Mo-Imiej						
RMI	Jaluit Atoll	Karajraj Kan Mo-Jabor						
RMI	Jaluit Atoll	Enninto Mo-Ae						
RMI	Likiep Atoll	Aujaraj-Likiep						
RMI	Likiep Atoll	Anenuaan-Likiep						

Country/ Jurisdiction	State	Name of MPA	Species protected	Restrictions	Management Activities (eg., enforcement)
	Guam	Achang Reef Flat	reef, fish, inverts, corals, sea turtles	no take except for seasonal fish, by permit only	enforcement, monitoring, public education and outreach
	Guam	Sasa Bay	mangroves, reef fish,	No take	enforcement, monitoring, public education and outreach
	Guam	Piti Bomb Holes	sea grass, reef fish, corals	no take except for seasonal fish, by permit only	enforcement, monitoring, public education and outreach
	Guam	Tumon Bay	reef fish, inverts, corals	take allowed for seasonal species with specific methods	enforcement, monitoring, public education and outreach
	Guam	Pati Point	reef fish, inverts, corals	rod and reel allowed from shore for any species	enforcement, monitoring, public education and outreach
	CNMI (Northern Islands)	Marianas Trench Monument	coral reef and vent associated taxa		To be determined
USA (CNMI)	CNMI (Saipan)	Managaha Marine Conservation Area	All	no commercial fishing	Fisheries Enforcement, Coastal Zone Enforcement, Permitting of recreation activities.
USA (CNMI)	CNMI (Saipan)	Forbidden Island	All	No take	Fisheries Enforcement, Coastal Zone Enforcement, Permitting of recreation activities.
USA (CNMI)	CNMI (Tinian)	Tinian Sanctuary	All	No take with the exception of seasonal take of juvenile goatfish, juvenile carangids (jacks), and mackerel scad	Fisheries Enforcement, Coastal Zone Enforcement, Permitting of recreation activities.
USA (CNMI)	CNMI (Rota)	Sasanhaya Fish Reserve	All	No take	Fisheries Enforcement, Coastal Zone Enforcement, Permitting of recreation activities.
USA (CNMI)	CNMI (Saipan)	Lighthouse Reef Trochus Reserve	Trochus niloticus	No harvest of trochus	Fisheries Enforcement, Coastal Zone Enforcement, Permitting of recreation activities.
USA (CNMI)	CNMI (Saipan)	Bird Island Marine Sanctuary	All	No take	Fisheries Enforcement, Coastal Zone Enforcement, Permitting of recreation activities.
USA (CNMI)	CNMI (Saipan)	Laulau Bay Sea Cucumber Reserve	Sea Cucumbers	No harvest of sea cucumbers	Fisheries Enforcement, Coastal Zone Enforcement, Permitting of recreation activities.

Palau	Kayangel	Ngeruangel Reserve	Fishing, taking of turtles and eggs, seabirds and eggs, any other extractive activities, building of fires, building of infrastructure	Quaterly monitoring by PCS up until 2007, PICRC monitoring yearly
Palau	Ngerchelong	Ebill Conservation Area	Entry, Fishing	PCS monthly until 2007, PCS with SCRFA July and Aug 2008 and April-Sept 2009, PICRC research study 2007-2009
Palau	Ngardmau	Ileyakl Beluu	All type of fishing, removal of sand, rocks and corals, entrance to the conservation area, pollution into the area	none
Palau	Ngardmau	Ngermasech to Bkulachelid Conservation Area	All type of fishing, removal of sand, rocks and corals, entrance to the conservation area, pollution into the area	PCS baseline 2007, follow up survey in 2008; PICRC quarterly fish and inverts
Palau	Ngaraard	Mangrove conservation area (west coast)	Non-traditional or subsistence use, Non-educational activity	None
Palau	Ngeremlengui	Bkulengriil conservation area	Entry, Fishing without proper permit (Uses except for subsistence use)	PCS and PICRC baseline 2006; Quaterly monitoring by State Government assisted by PICRC
Palau	Ngeremlengui	Tewachel Mlengui Grouper Spawning Area (Bkul a Beluu)	no fishing during the summer June 1-August 31 of each year	none
Palau	Ngatpang	Clam conservation area (Oruaol Libuchel Reef)	Harvest of clams	none
Palau	Ngatpang	Crab conservation area	Collection of crabs	none
Palau	Ngatpang	Fish conservation area	Fishing	none
Palau	Ngeremlengui, Ngatpang, Aimeliik	Ngermeduu conservation area	Non sustainable development, activities with significant impact to the environment	none
Palau	Meikeok	Melekeok nearshore waters	Fishing with nets	none
Palau	Meikeok	Ngerang Clam Conservation Area	Harvesting of Giant Clams	none
Palau	Ngchesar	Ngelukes conservation area	Entry, Fishing and Collecting	Monitoring by State Government assisted by PICRC, research by PICRC

Palau	Aimeliik	Ngerchebal Island Wildlife Conservation	birds, animals and marine life	Killing or taking of birds, animals and marine life; Lighting of fires; Cutting or destroy any plants; Remove any plants and animals in both land and waters	none
Palau	Aimeliik	Imul Mangrove Conservation Area	plants in the mangroves	Cut or remove any plants, soil, sand, rocks or minerals	none
Palau	Airai	Ngcheschang mangrove conservation area	not specified	Non-traditional or subsistence uses, non-educational use, cutting and felling trees	none
Palau	Airai	Oikull mangrove conservation area	not specified	Non-traditional or subsistence uses, non-educational use, cutting and felling trees	none
Palau	Airai	Airai reef conservation area	fish	Boat entry, Fishing	Monitoring by State Government assisted by PICRC
Palau	Airai	Ngeream conservation area	not specified	Non-traditional or subsistence uses, non-educational use, cutting and felling trees	none
Palau	Koror	Ngerkebesang Conservation Zone*	all marine flora and fauna	Fishing and taking of any marine flora and fauna	patrol by Koror State Rangers
Palau	Koror	Ngederrak conservation area*	all marine flora and fauna	Fishing, Hunting, Taking of any marine flora or fauna; Use any motorized watercraft Ngederrak Reef.	patrol by Koror State Rangers
Palau	Koror	Ngerumeakaol Spawning area*	not specified	Fishing all year round.	patrol by Koror State Rangers
Palau	Koror	Soft Coral Arch, Cemetery Reef, any marine lake, Ngkisaol Islet*	any flora and fauna, erau (Spratelloides delicatulus), mekebud (Herklotsichthys quadrimaculatus), teber (Athrionomus lacunosus)	Take, capture, net, catch, contain restrict or remove any species of flora and fauna, alive or dead	patrol by Koror State Rangers
Palau	Koror	Ngerukewid Islands Wildlife Preserve	marine and terrestrial fauna and flora	Entry, fishing and collecting; building of fires	patrol by Koror State Rangers

Palau	Koror	Ngemelis Island complex*	protection of marine ecosystem	Operation of motor vessel between and through the islands	patrol by Koror State Rangers
Palau	Peleliu	Teluleu conservation area	not specified	No entry, no fishing, not swimming, no boating	initial assessment by PCS in 2009
Palau	Angaur	Angaur conservation area	not specified	Fishing, taking any marine flora and fauna	ecological monitoring by PICRC
Palau	Hatohobei	Helen Reef Reserve	fish	Fishing	Patrolled by rangers, monitoring by rangers, baseline surveys
Palau	Koror	Rock island Southern lagoon management area**	not specified	Set aside areas for Palau citizens and residence only	patrol by Koror State Rangers
Palau	Ngaraard	Ungelel Conservation Area	not specified	not specified	none
Palau	Ngaraard	Marine Life Conservation Area	not specified	Non-portable net fishing in Ulimang, Ngkeklaui, Elab and east sides of Chool County	none
FSM	Yap	Riken Marine Managed Area		No Take	
FSM	Yap	Ngulu Atoll-zone A		No Take	
FSM	Yap	Rumung		No Take	
FSM	Yap	Nimpal Channel Marine Conservation Area	Habitat and all species protection	No Take Zone	Enforcement, biological monitoring
FSM	Yap	Ngulu Atoll-zone B		Multiple Use	
FSM	Yap	Ngulu Atoll-zone C		Habitat Protection	
FSM	Yap	Wacholab 2		No Take	
FSM	Yap	Wacholab 1		No Take	
FSM	Chuuk	Pulusuk Atoll		Special Purpose	
FSM	Chuuk	West Puluwat		Special Purpose	
FSM	Chuuk	Southwest Puluwat		Special Purpose	
FSM	Chuuk	North Weno Marine		Special Purpose	
FSM	Chuuk	SPAGS		UNKNOWN	
FSM	Chuuk	Namoluk Atoll		Special Purpose	
FSM	Chuuk	Etal Atoll Marine		Special Purpose	
FSM	Chuuk	Esan Reef		Special Purpose	
FSM	Chuuk	Oneop Island		Special Purpose	
FSM	Chuuk	Satowan Island		Special Purpose	



FSM	Chuuk	Northwest Reef	Special Purpose	Special Purpose
FSM	Chuuk	Fonufon Reef	Special Purpose	Special Purpose
FSM	Chuuk	Grouper Spawning Site	Special Purpose	
FSM	Chuuk	Grouper Spawning Site	Special Purpose	
FSM	Chuuk	Kuop Atoll	Special Purpose	
FSM	Chuuk	Namwanan Marine	Special Purpose	
FSM	Chuuk	Ununo-Fongen-Onongoch, Fefan	Transitional	
FSM	Chuuk	Totiw	Special Purpose	
FSM	Chuuk	Southeast Reef	Special Purpose	
FSM	Chuuk	Esan Reef	Special Purpose	
FSM	Chuuk	Feneppi	Special Purpose	
FSM	Chuuk	Ipis	Special Purpose	
FSM	Chuuk	Epinup Mangrove Conservation Site	Multiple Use	
FSM	Pohnpei	Chuuck Lagoon	UNKNOWN	
FSM	Pohnpei	Nahtik	No Take	
FSM	Pohnpei	Sapwitik	No Take	
FSM	Pohnpei	Kehpara	No Take	
FSM	Pohnpei	Namwen Nangingh Stingray Sanctuary	No Take	
FSM	Pohnpei	Namwen Na Stingray Sanctuary	UNKNOWN	
FSM	Pohnpei	Kepidau Deleur	Conservation	
FSM	Pohnpei	Dehpehk Marine Sanctuary	No Take	
FSM	Pohnpei	Enipein Mangrove Reserve	No Take	
FSM	Pohnpei	Mwahnd Marine Sanctuary	No Take	
FSM	Pohnpei	Pakin Reef	No Take	
FSM	Pohnpei	Uhrek	Sanctuary	
FSM	Pohnpei	Pahnruk	No Take	
FSM	Pohnpei	Dauenai Channel	No Take	
FSM	Pohnpei	Pasa	No Take	
FSM	Pohnpei	Oroluk	No Take	
FSM	Pohnpei	Minto Reef	No Take	

FSM	Pohnpei	Pwudo Marine Sanctuary				Sanctuary	
FSM	Kosrae	Awane					
FSM	Kosrae	Kosrae Biosphere Reserve					
FSM	Kosrae	Malem					
FSM	Kosrae	Yela Watershed Terminalia Stand					
FSM	Kosrae	James Palsis Marine Park					
FSM	Kosrae	Trouchus Sanctuary					
FSM	Kosrae	Weok					
FSM	Kosrae	Yenyen Island					
RMI	Namdrik	Namdrik Atoll (whole atoll)				Ramsar	
RMI	Majuro	Woja (Majuro Atoll)				Community	
RMI	Majuro	Drenmeo (Majuro Atoll)					
RMI	Majuro	Bikirin (Majuro Atoll)					
RMI	Majuro	(Majuro Atoll)					
RMI	Mili	Mili Atoll					
RMI	Rongerik	Rongerik Atoll					
RMI	Wotje Atoll	Erikub Atoll (whole atoll)				Mo	
RMI	Ailuk Atoll	Eneneman Pass				subsistence only	
RMI	Ailuk Atoll	Marok Pass				subsistence only	
RMI	Ailuk Atoll	Agulue Pass				subsistence only	
RMI	Ailuk Atoll	Enije Pass				subsistence only	
RMI	Ailuk Atoll	Enije, Ailuk				subsistence only	
RMI	Rongelap Atoll	Rongelap Atoll (whole atoll)				subsistence only	
RMI	Rongelap Atoll	Ailinginae Atoll (whole atoll)				special reserve-no take	
RMI	Bikini Atoll	Bikini Atoll (whole atoll)				special reserve-no take	
RMI	Arno Atoll	Arno, Arno (terrestrial&marine)				subsistence only	

RMI	Arno Atoll	Arno, Arno			special reserve-no take	
RMI	Arno Atoll	Arno #2 (terrestrial&marine)			subsistence only	
RMI	Arno Atoll	Jabo (terrestrial&marine)			subsistence only	
RMI	Arno Atoll	Ine (terrestrial&marine)			subsistence only	
RMI	Arno Atoll	Arno - Matolen Lagoon			special reserve-no take	
RMI	Arno Atoll	Matolen (terrestrial&marine)			subsistence only	
RMI	Arno Atoll	Malel (terrestrial&marine)			subsistence only	
RMI	Arno Atoll	Kirage (terrestrial&marine)			subsistence only	
RMI	Arno Atoll	Lanar/Tenaku (terrestrial&marine)			subsistence only	
RMI	Arno Atoll	Anearean			special reserve-no take	
RMI	Arno Atoll	Jarkwij- Enelauraren (terrestrial & marine)			special reserve-no take	
RMI	Jaluit Atoll	Dri Bako Mo- Pinglep			special reserve-no take	
RMI	Jaluit Atoll	Mejal - Bird Island (terrestrial&marine)			special reserve-no take	
RMI	Jaluit Atoll	Matolen Mo			special reserve-no take	
RMI	Jaluit Atoll	Dri Bako Mo- Pinglep (Bokwen- Aruboe)			special reserve-no take	
RMI	Jaluit Atoll	Jitoken Mo			special reserve-no take	
RMI	Jaluit Atoll	Loraa Mo-Ae			special reserve-no take	
RMI	Jaluit Atoll	Nono Mo-Imroj			special reserve-no take	
RMI	Jaluit Atoll	Jea Ko Mo-Imroj			special reserve-no take	
RMI	Jaluit Atoll	Bar Mo-Imiej			special reserve-no take	
RMI	Jaluit Atoll	Karajraj Kan Mo- Jabor			special reserve-no take	
RMI	Jaluit Atoll	Enninto Mo-Ae			special reserve-no take	
RMI	Likiep Atoll	Aujaraj-Likiep			subsistence only	
RMI	Likiep Atoll	Anenuaan-Likiep			subsistence only	

Input from Micronesia Jurisdictions on Climate Change and MPAs  
Compiled by Dr. Supin Wongbusarakum

April 8, 2010

Jurisdiction	Climate = issue in mgt planning & decision	Biggest climate issue in MPA	Involved in program integrating climate in mgt work	Prepared to include climate in mgt	Needed
Kosrae	Yes, a major issue in partnership with state government agencies	Sea level rise and coastal erosion. In the past few years, storm surges breaking corals in MPAs	Yes Kosrae Conservation Society is part of Emergency Coordinating Committee in Kosrae, especially in env. awareness programs. With other state govts, partner in CC workshops to learn and know how to mitigate threats.	Include in management. It is a big issue to tackle with.	technical and financial capacity
Pohnpei	Yes	Coastal erosion	Not yet	Some extend, need to explore cases	Capacity building
Yap	Yes, on small islands and atolls	Coastal erosion and bleaching	Not at the moment	Pohnpei	Needs training and capacity building first
Chuuk	Yes	Coastal erosion Sea level rise Limited	Yes	Limited	MPA design incorporating climate change aspects such as reef resilience, etc. into monitoring and mgt More technical expertise
Palau	Yes	Bleaching (loss of coral) loss of habitat loss of resources Sea level rise Ocean acidification Fresh water lens in low-lying and atoll islands	Yes, Northern reef	Some	More understanding/awareness of climate change and vulnerability in communities and among decision makers/leaders

Jurisdiction	Climate = issue in mgt planning & decision	Biggest climate issue in MPA	Involved in program integrating climate in mgt work	Prepared to include climate in mgt	Needed
RMI	Yes, already integrated climate lens in national conservation area plan (Reimaanlok)	Coastal erosion Sea level rise Salt water intrusion Coral bleaching Loss of livable land Land degradation	Yes, Reimaanlok-climate lens incorporation Coastal mgt framework and local mgt plan	Yes, but require (see next column)	Research findings Capacity building and knowledge mgt HR development Capital to implement
CNMI	Yes	Bleaching, ENSO, increased storms, ocean acidification, coastal inundation	Yes	Yes, in progress	Understanding In water parameter measurement (temp, ph) Coastal assessment (sea level and erosion)
Guam	Yes	Coral bleaching decline in health Ocean acidification Sea level rise Erosion, loss of beach and intertidal habitats Degraded water quality Possible increases of storm frequency and severity, altered rainfall patterns, more extreme event	Yes	Understand concepts, can include in mgt but concerned with capacity	Much more robust socioeconomic monitoring Need to understand community resilience Must improve rapid response ability (carry out biological and socioeconomic assessments to understand resiliency of both reefs and people) Much broader awareness among communities and leaders (currently not a major discussion topic) More education, outreach, training Emphasize connection b/w climate change and quality of life

## APPENDIX FOUR: FULL MEETING MINUTES

Monday 15 February

**President Johnson Toribiong** opened the meeting with remarks to the participants. Excerpts of his statement follow:

I am pleased and honored this morning to represent the people and the government of the Republic of Palau to welcome you. Palau is very proud and honored to host this conference, the 2<sup>nd</sup> Micronesia Challenge Monitoring meeting and PICRC-JICA sponsored monitoring project.

It is my hope that this conference will move the Micronesia Challenge and our challenge to preserve and protect our environment to the full realization of our goals and objectives.

My policy is to promote collaboration and cooperation between all organizations and people of the region to pool their resources and energy to protect our environment, especially our marine resources. We in Palau have moved forward on the commitment to preserve and protect our environment – to promote the health of our oceans, our land and our air. Because we believe, as I know you do, that we are stewards of our natural resources. We do not own our resources, we only hold them for the benefit of future generations.

In Palau, under our constitution, we are obligated to preserve and protect and conserve our beautiful and healthful environment. Throughout Micronesia, we share the same traditional practice to preserve our environment. We have always look to our marine environment for our livelihood.

I am happy and proud to join you this morning – and to share that it is the commitment of my administration to work with you toward the achievement of our ambitious goals, and to help promote the goals of the Micronesia Challenge and Palau International Coral Reef Center.

Palau has extended our economic zone as the first international shark sanctuary.

We have adopted the Protected Area Network – PAN – and implemented it by funding it through the green fee. For every visitor who comes to Palau, we assess a departure fee of \$15 to fund our protected area network.

We also have a traditional practice and custom – the bul – to protect areas. We are one of the first islands to declare an area as sanctuary; the 70 islands were declared a sanctuary in the mid 1950s by our local Legislature.

I have also invited the presidents of the Parties to the Nauru agreement to hold a conference next week to try to conserve our tuna stocks, and to make the harvesting of tuna sustainable, and to maximize the benefits to the island states who own the fishing grounds. Virtually all the presidents will be here.

In my proposed supplemental budget I have also included a requirement that each of our states must establish a marine sanctuary or they will not be eligible to receive funding; this will allow our fish, turtles and dugong to be preserved.

It is my hope that the goals and objectives of the Micronesia Challenge, Palau International Coral Reef Center and all the organizations will work together to bring these great ideas to reality – from the conference to actual hands on protection of our environment.

Thank you to the sponsors – PICRC, TNC, JICA and others.

I hope your stay in Palau will be enjoyable while doing your very best to move the Micronesia Challenge toward the final goal of protecting and promoting the conservation of our marine and terrestrial resources. I have confidence in all of you – to make our region the leading, shining example.

I'd like to leave by giving you food for thought – from the Indian revolutionary Mahatma Ghandi: The earth can provide for the need of every man, but not his greed.

**Fabian Iyar**, of PICRC, welcomed the group.

**Charlene Mersai** of the Micronesia Challenge Regional Office and **Trina Leberer**, of The Nature Conservancy Micronesia program, welcomed participants and expressed their hope that the meeting would tackle issues critical to the region.

**His Excellency Yoshiyuki Sadaoka**, Japanese Ambassador to Palau, addressed the conference. His speech follows:

Remarks by H.E. Mr. Yoshiyuki Sadaoka, Ambassador Extraordinary and Plenipotentiary, Embassy of Japan, on the occasion of the 2<sup>nd</sup> Meeting of the MC Measures Working Group and PICRC/JICA Coral Reef Monitoring Project Meeting, February 15, 2010, 9:30 a.m., Palasia Hotel Palau, Koror

President Toribiong, Dr. Tellei, all distinguished guests from Micronesian countries, ladies and gentlemen, good morning.

It is my great pleasure and honor to make my first public speech at this very important meeting as the first resident full Ambassador after I presented my credentials to President Toribiong last Wednesday.

Firstly, I would like to place Micronesia Challenge into the context of recent Japanese efforts to mitigate global environmental issues. As declared at PALM 5 in Hokkaido, Japan, we are islanders. To bequeath the coming generations with the bountiful marine ecosystem is of crucial significance for us as islanders. Proper management of our marine ecosystem, based on meticulous scientific research and monitoring, is the duty for all of us. In this regard, the Government of Japan strongly supports the Micronesian Challenge and the Palau International Coral Reef Center. Furthermore, I would like to emphasize Japan's earnest efforts to tackle global climate change. Prime Minister Hatoyama has manifested that Japan will reduce emission of greenhouse gases by 25 percent by year 2020. The Government of Japan now stands ready to mitigate imminent crisis due to the global warming. Significance of Coral Reef Protection arises here also, since coral reefs contribute to produce livelihoods for islanders. Also, Japan will have the honor to host the COP 10 meeting of the Convention of Biological Diversity in the coming October. Needless to say, it is our common duty to protect the tremendous biodiversity in coral reefs of the Micronesian region.

As the Ambassador of Japan, kindly allow me to remark on Japanese contribution to preserve Marine Ecosystem in the Micronesian region. The Government of Japan donated 8.3 million U.S. dollars to build the Palau International Coral Reef Center in Koror. Fortunately, the institute enjoys its fame through many articles in international publications. The Center's aquarium also enhances tourism development of the Republic of Palau. These achievements are the fruits of our first technical cooperation named "Palau International Coral Reef Center Strengthening Project." In view of the importance of capacity building of this beautiful island nation, Japan has dispatched many experts in various domains including coral reef ecology, sea weed taxonomy, and aquarium exhibition. Having successfully completed the said first project, Japan launched the second technical cooperation project named "Capacity enhancement project for coral reef monitoring." In this project, Japan envisions to codify standard monitoring protocol to enable the people of Micronesia to evaluate and manage their own reefs. Let me recognize the tremendous contribution of our devoted experts, Dr. Nakaya and Mr. Takeda standing over there, to empower people of Micronesia. [Japan has also dispatched a young volunteer, Ms. Nakanishi, as an environmental education officer.] These attempts mirror Japan's sincere challenge to strengthen the capability of the people of Micronesia.

In conclusion, as the first resident Ambassador of Japan in Palau, and as an islander, I would like to reiterate that Japan will further contribute to your common endeavor to bestow invaluable coral reef ecosystem for the next generations. Thank you, indeed, for your attention.

**Fabian Iyar** gave a brief history of the Palau International Coral Reef Center and its role in the workshop.

Center opened in 2001 with the mission to be a self sustaining center of excellence for marine research, education, and training. The goal is far reaching and PICRC finds it to be a continuing challenge.

The origin of the center dates back to the early 1990s to decide where to locate the center in the region – it was envisioned as a way to address global issues

Palau was fortunate to secure the center for a number of reasons: relative safety; natural diversity; close proximity of research areas with relatively easy access

In 1993 Japan, the US and Palau agreed on a common agenda for cooperating in global perspectives.

In 1997 the Japan International Cooperation Agency conducted a project formulation study

The PICRC Act became law in 1998 and construction began in 1999

Phase 1 of the PICRC – JICA strengthening project began in October 2002 and finished in October 2006

Construction of the center at \$7.3 million

JICA technical assistance – at \$3.5 million

Dispatch of Japanese experts

Provision of machinery and equipment

Phase 2 of the PICRC-JICA partnership began in July 2009

Capacity building in different areas

Monitoring and MPAs

**Seiji Nakaya** provided information on his role in the workshop and in the larger JICA-PICRC partnership

- New project for coral reef monitoring, given that MPAs are an effective conservation tool
- Palau has existing network of protected areas
- Monitoring is essential for MPA management
- PICRC's technical contribution is expected to help Palau and the region determine the best monitoring options to understand MPA effectiveness and progress toward conservation goals
- New collaboration with the Micronesia Challenge – international and regional initiative
- Important for JICA, PICRC to collaborate with these larger initiatives

Monitoring goals

- Must follow accepted protocols
- Must answer management questions
- Community based work with assistance from PICRC
- Statistically robust data
- Take into account both ecological and socioeconomic indicators

Project framework

- 3-year duration from 2009 to 2012
- Goal – technical capacity of PICRC is enhanced in monitoring required for management of MPAs
- Output – System to support monitoring of MPAs will be developed
- Partnerships enhanced between PICRC, internal initiatives and the MC jurisdictions

Inputs from PICRC

- Counterpart personnel
- Facilities and funding

Inputs from JICA

- Short and long term experts
- Equipment
- Training in Japan and/or 3<sup>rd</sup> countries

Workshop objectives:

- Introduction of the PICRC – JICA project
- Clear understanding on the status of MPAs, management issues and monitoring issues
- Identify an essential set of indicators
- Method for ecological and socioeconomic monitoring
- Capacity needs
- Determine near future actions

What does the monitoring protocol look like?

- Includes understanding of the MPAs to be monitored
- Locations
- Objectives
- Current uses

Determine monitoring objectives and appropriate indicator

Decide how to monitor

- Reconnaissance visits
- Understanding capacity needs
- Formation of study teams
- Monitoring needs – based on indicators tied to objectives
- Determine protocols – site selection, controls, sampling design, pre test, process to obtain consent from stakeholders, monitoring work and quality control

Data management – who collects and formats the data; in what form is it kept; who will store, compile and analyze this data. How does feedback return to those who need the information to make management decisions?

Project strengthens PICRC capacity to collaborate with MC jurisdictions

- Sharing protocols useful to and acceptable to MC jurisdictions to collect scientifically robust data
- Data compilations and management on a regional database
- Feedback to adaptive management



**Trina Leberer** of the Nature Conservancy provided an overview of the first MC measures meeting in 2008

The primary product at the end of the workshop is a monitoring protocol for marine environment areas.

Review status of MPAs in each jurisdiction, and management issues that monitoring efforts can focus on– monitoring protocol spec for marine environment

Review monitoring status of jurisdictions

Resulting protocol needs to be useful throughout the region – taking into account objectives to determine indicators and recognizing limitations, strengths and weaknesses

Identify specific capacity needs to implement regional monitoring program

Review the results of the first measures meeting that was conducted in Pohnpei in 2008

Pohnpei 2008 – President Mori gave us our charge – we must recognize 2 target audiences. Not just donors, legislatures, and outside audiences, but our grandmothers.

How can we show progress and tell our stories? And remember our grandmothers – information needs to make sense, to be clear and accessible to people

Why did we come together?

5 objectives. Establish measures working group to develop the way forward

Identify overlaps and gaps in indicators being collected regionally – lots of existing monitoring.

Identify shared results chains

Propose a set of regional mc measures

Help guide mc messages.

Sources of information – results from homework assignment; summary of CAP results across Micronesia; MIC network; SEM Pasifica

Shared strategies – threats – targets

Similar threats and strategies to deal with them

Biological – 19 indicators – 208 from other sources

Can't measure it all – need criteria for prioritization

Importance – how critical is it to the MC that this indicator be measured regionally and communicated with target audiences?

Practicality – how realistic is it for all or most to measure at this time?

Cost

Sensitivity – will it tell us what we need to know?

Review from first meeting:

Outputs

Prioritized strategies – awareness and communication

Compliance and enforcement

Habitat/process restoration

Invasive/ problematic species control

Policies and regulations

Site/area management

Threats

Over harvest

Sedimentation

Invasive species

Housing and urban develop

Pollution

Wood and ntfp extraction

Climate change— Specific strategies? Keep climate change front and center. What is going to happen in our islands in 10 – 50 yrs?

Habitats

Coral reef associated

Freshwater

Mangroves

Native forest

Native forest birds

Reef fish

Results chains

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Identified indicators

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15 target indicators

4 suggested threat indicators

12 suggested intermediate result indicators (including many SEM indicators)

5 suggested process indicators

Policy, enabling environ. Regional cooperation etc

Key workshop outputs

Things to keep in mind for this meeting:

Are we missing any targets?

Are we missing any indicators?

Identify a minimum set of indicators for the region that we can and should measure. If need to add, think about what can be taken away.

**Steven Victor** –

Presentation on Ebiil and Palau's protected area network (PAN).

Case study of the first marine PAN site

Overview of protected areas in Palau – Many marine and terrestrial areas.

PAN history – the concept came about as result of 1998 coral bleaching. But Palau is not new to marine conservation; it first established a protected area in the mid 1950s; a group of islands in the Rock Islands with 1 mile radius of marine areas around it.

TNC 1994 – began working with community to create a nature reserve at tip of Palau. Legislation followed in 2003. It took a couple years to decide what the network should look like. Not just marine – sediment is a big issue besides overfishing.

2006 sustainable financing plan – spearheaded by TNC - thanks to their hard work

CAP assessment in 2006. Identify additional areas that need protection. A lot put in place. But in perspective, and connected into a system. So conserve biodiversity and help effects of climate change.

Positive cost includes conservation of important resources. But consider also negative cost – development areas and nearby areas.

Process underway in FSM

Jan 2008 – only freshwater lake in Micronesia. First PAN site. May 2008 ambassador of Taiwan - presented \$500k as part of Palau's MC endowment.

May 2008 – president signed legislation establishing green fee. \$15 will go to very good use. It took about a year to actually implement [started collecting this departure fee in November 2009].

Ebiil – grouper aggregation site in northern reef lagoon

2 aggregation sites. Known today and still in existence; there used to be many but all are fished out except for two protected areas. –

Ebiil has been studied since 1980s. It is a well studied area. Also known that grouper is in decline even with efforts to close area.

Closed in 2000. Ngarchelong state adopted PAN regs.

Closed from April til the end of July. In October 2003 – closure extended permanently.

Management planning began in 2009. But plans get written and shelved. We need to actually use them.

Mgmt plan completed in Sept 09

Green fee – has brought in more than \$200k since November

Ebiil – objective of mgmt plan

Maintain economically important fish and invertebrate populations. Document increases by 2012

Minimize violations within conservation area by building capacity of state government to undertake surveillance and enforcement activities. Reducing interactions to near negligible levels by end 2011

Promote awareness and understanding among the community, managers and other stakeholders of conservation area rules and provisions, the status and changes of marine resources at site, and impact of human activities and mgmt actions

Maintain the coral reef habitats and marine biodiversity at Ebiil at current levels to ensure healthy ecosystem and to appeal to tourism

Develop and implement components of a sustainable financing program for the conservation area, including promotion of dive tourism that successfully meets 25 percent of conservation area's operating costs by 2012

## Marianne Teregeyo

### Micronesia Challenge for the CNMI

CNMI defines “near shore” as the 0 to 100m depth contour, consistent with Fisheries Council and NOAA fisheries to define the coral reef ecosystem.

CNMI divides management into fisheries and benthic resources, but only focuses on fisheries.

Framework approach considering the area of coral reef, management effectiveness, biomass

CNMI includes northern and southern islands but this report and the calculations don't take into account the northern islands

Management effectiveness considers 3 measures:

Legal outreach. Laws, regulations, and awareness of laws and regulations of resources

Enforcement – officer knowledge of laws and regulations; violations; level of enforcement

Research management – aspect data collection, analysis, etc.

Biomass – species or species group that utilizes coral reef ecosystem

Sources of biomass data include Division of fish and wildlife, MARAMP data, etc.

Framework process – describe resource and estimate biomass with low/high estimates

Identify pertinent management measure

Enforcement is heavily weighted

Example – sea cucumbers

Heavily harvest in the 1980s; a major fishery involved

Moratorium was put in place

Low nearshore fishing efforts in northern islands, with new bottomfish management plan

Area around Farallon de Medina restricted

National Marine Monument recently declared

## Tadashi Kimura

Case study – southern Japan and COTS issue in 1983

Organization of a national monitoring program in Japan

1972 – Iriomote National Park

1977 – 4 marine parks in Sekisei Lagoon

1983 COTS problem – the government paid a lot of money to try to remove the starfish.

Needed to monitor the recovery of the reefs and determine signs of a new outbreak.

Area around Ishigaki Island – shallow lagoon with barrier reef and patch reef areas.

This was the target for monitoring, particularly within the 4 mpa site

Try to manage the whole barrier reef.

COTS destroyed most of the corals, but some survived and tried to recover

Needed monitoring sites in with reef; needed to decide the monitoring method

Area of 20km by 10km

Considered manta tows as a way to cover broad areas, but patchy areas made tows difficult

Complex topography, difficult to do single tows

Line transects or quadrats – would need thousands of lines, difficult with small budget

End choice – timed swims for coral cover and COTS

Simple, within budget, but can cover entire area in 20 days with 2 researchers, a boat and a driver

Average 5 spots per day – spot check – 15 minute snorkeling swim

Coral health by coral cover - >50%

COTS =>2 individuals within 15 minutes is first sign of disturbance, greater than 10 in 15minutes a disturbance is already underway

Coral disease is now a problem

In early stages of monitoring we didn't know what it was; just noted strange deaths of corals. Noted something strange without knowing specifics

We were told – not scientific enough

But we got enough information to provide recommendations for management

We can save money with this method and use the money to exchange information and development better management

Beginning of coral monitoring history. Since we started in the 1980s, the government recognized monitoring is important for other areas

Started in southern Japan; extended all over Japan up to near Tokyo (coral community, but not a reef)

Temperate + subtropical areas – 2 different types of marine environment

Try to cover all to find the condition of corals

When we select the sites – try to find a local scientist to conduct the monitoring.

Continuity + expense. Not always formal positions; even dive operators with academic backgrounds or skill sets can do this work

The lesson we learned – simple monitoring is enough to help managers reach decisions

Our program – focus on limited purpose. Monitoring depends on purpose

Continuity + expense. Not always formal positions; even dive operators with academic backgrounds or skill sets can do this work

The lesson we learned – simple monitoring is enough to help managers reach decisions

Our program – focus on limited purpose. Monitoring depends on purpose

Saves cost when you focus on specific purpose. Also – its easy to collect data and show results. But challenge is to provide feedback from monitoring results to conservation activities

How to use the results of the monitoring is important. We need to consider this when we set up the monitoring program – translation of monitoring into simple language for managers and decision makers

#### Questions

- Day time only for the swims? Yes 15 min swim; 50m x 50m to survey a single patch reef

- Extermination methods? Physically pick up starfish

- How were sites selected? Not random. Also resurvey sites – so coordinate by GPS

- Do you have differences between observers and how do you account for that? We have training before monitoring and adjust the estimation rate. 23 sites – every year we meet with local researchers.

#### Alison Green

IUCN. Climate change in coral reefs. Climate change is here. It's going to have profound impacts on our coral reefs. Need to consider this in designing MPAs and monitoring.

Role of herbivores. Monitoring functional groups of herbivorous reef fishes as indicators of coral reef resilience. Process of coral reefs, not just patterns. Traditional coral reef monitoring focuses on patterns. Coral cover, groupers. Status of reef right now vs how likely reef is to recover after major disturbance.

We want to get people thinking about processes that are important in coral reef recovery. As there are more and more frequent disturbances – like bleaching – how well they recover is key

Resilience is the ability of a system to cope with change, maintain its functions and recover following a disturbance.

Ie – recover coral cover, not change to algae dominated area.

Key factors facilitate resilience:

Supply of larvae.

Good water quality.

Substratum consolidation.

Biological conditioning. Ie Indonesia, dynamite and rubble movment. (pink coralline algae – bio factors)

Key factors impede resilience

Lack of larvae

Poor water quality

Unconsolidated substratum

Dense stands of macroalgae - no space for little corals to recruit – after disturbance macalgae takes over really quickly. After major disturbance. Reefs turn into algae because no herbivores to clean out.

For Asia pacific – reef fish tend to be important herbivores, though urchins and others are significant in other regions.

Parrot fish, surgeons, rabbits, angels, damsels, batfish, rudderfish.

What we tend to count are food fish, carnivores. Need to count herbivores. Not all herbivores are the same. You can't just count them all.

Functional groups of herbivorous reef fishes.

Identify – 4 main groups of herbivorous reef fish that play a role in reef resilience

1 –Scrapers and small excavators –

feed on macroalgae before it's established.

Scrap substratum bare – provide areas for settling.

2 Large Excavators – some of them are really large – bumphead parrotfish.

Major agents of bioerosion.

50 tons of dead and live coral per year.

Major player in coral reef ecology. Half diet is live coral.

One of the first to disappear under fishing pressure. Keeping biodiversity high is important

3 grazers.

surgeons - large schools of surgeons, parrots.

Eat off surface but without scraping

3 grazers.

surgeons - large schools of surgeons, parrots.

Eat off surface but without scraping

most surgeons, rabbits, little angels, though larger angels are different. Ringtail surgeonfish - -detritivores

4 browsers.

Feed on large macroalgae. Play a critical role. If macro gets beyond young stage – only browsers can turn it back.

diverse group. Not common numerically but quite a different bunch.

Rudder fishes, batfishes – only sp of fish documented to reverse a coral algal phase shift. Some unicorn fishes. One rabbit fish. 2

parrotfishes

How do you monitor functional groups of reef fishes?

2 protocols – underwater visual census

--rapid assessment – timed swims

-- long term monitoring methods. Rigorous for monitoring change over time.

Identify fish by taxa and assign functional groups later

5 50m belt transects + long swim 400m assess abundance of big excavators

Include families. Don't stop counting other sp, but add. Record taxa ie by family and assign functional groups later.

Make sure you're counting the right families.

Rudderfish – Kyphosidae (all browsers)

Batfishes – Ehippidae (all browsers)

Angels -Centropyge (all grazers)

Rabbitfishes – Siganidae (all grazers except caniculus)

Parrots – genus –

Scarus, hipposcarus scrapers

Bulbo., cetoscaras excavators

Coldomus, leptoscarus – browsers

Surgeons. Not all herbivores.

Planktivores – Acanthurus (4) not on reef, in water column. Easy to identify by behavior

Ctaneokaetus – detritivores. Small brown. Comb shaped teeth – combing out detritus

Others are all grazers/grazer-detritivores

Unicorns –

Complex. Browsers throughout entire life. Some only as juveniles, then as adults are planktivores.

Simplifying protocol

Focus on main groups of herbivorous reef fishes (# and size)

Leave out some that are hard to identify

Leave in/don't change.

All rudderfishes

All batfishes

All parrotfishes. Learn to genus level.

Surgeonfishes (learn the ones to exclude)

Changes –

rabbitfishes

Leave out unicornfish

Leave out angelfish.

Protocol for corals. Coral recruitment.

(also sea urchins but in this part of the world – fish are more important)

Bleaching response plan in CNMI.

Sampling sizes are not high enough to get statistical info for fish?

Recommendation to tie coral and fish so better statistical information. Designed to be tied to coral protocol. Do fish and coral at once.

Monitoring protocol – others that are utilized for different trophic levels other than fish? People are good at assigning other levels – carnivores, piscivores, etc. we focused on herbivores because they are so critical in coral reef resilience, and because they are often lumped together. But quite different. Apex predators – role in resilience – etc

We've thought thru role of herbivores. Now look at roles of the others ie detritivores.

Does protocol go so far as to guide analysis?

Wasn't prepared to public protocol without advice on analysis. High tech version, computer literate pcs. If not – series of identifying most important thing. 3 most important factors – diversity of functional groups, biomass of herbivores (all about biomass not size),

Does protocol go so far as to guide analysis?

Wasn't prepared to public protocol without advice on analysis. High tech version, computer literate pcs. If not – series of identifying most important thing. 3 most important factors – diversity of functional groups, biomass of herbivores (all about biomass not size), biomass of big parrotfish because they have such a big contribution. Principal component analysis. Example done both ways. Pca/table –high med low in terms of factors, came out close.

Tuesday 16 February 2010

### **Peter Houk**

Presentation on study to assess the monitoring programs in FSM and the Marshall Islands

Questions and discussion:

*Do you think the analysis is going to shed some light on what worked, and what didn't?*

*Will this help choose best indicators for regional purposes?*

Looking at MPA effectiveness- consider fish abundance in a single area. We need to look at the community – fish are dynamic – so we look at a group and not a single species over time. An important factor would be local fishermen's catch.

That's the goal – the main goal is to get data to generate information. My goal is to get data in a useful format to produce those metrics.

Alissa noted that Pete's report was one of the reasons FSM didn't articulate capacity needs in the jurisdiction report.

Albon noted that the fish counts are useful, especially when dealing with communities. Fish are the focus and ecology is more on the scientific side. For communities, in his experience in the Marshalls, the approach is through fisheries for food security. Then they work from the fish to the whole ecosystem. After the introduction they start doing more introduction and awareness on the whole ecosystem. In the Marshalls this is the way they start to engage the community to look at the whole system.

Pete noted that fish are just one component of a complex ecosystem, but if that approach works it's useful.

In response to Scott's question about what effort is needed to increase statistical power, Pete noted it varied across jurisdictions. The design and focus that everyone wants – at the site level – underlies the basic approach that gave good information.

### **Supin Wongbusarakum**

Presentation of social monitoring, different methods

Questions and discussion:

*How do you address the problem of statistical validity, especially in very small communities where you don't have numbers? You can do a census – no sampling, but cover everyone. In larger communities, socioeconomic monitoring is on top of all else and you may not have resources to do the right type of sampling methods. The guidelines mention 30 households. But it depends on the numbers, so the way you report it is important. If you know your sample is small from a large group – report it, don't claim it's larger than it is.*

What is the purpose of your work? To publish or to find information for management?

*Managers want a bit more focus – which tool will suit us best, so we don't have to read all the material and work it out on our own? And once we've chosen a tool, is there opportunity to work with people on the ground? We want to know what we can use and implement, not just what exists.*

There is no one tool that can be tailored well to all sites. In the case of the PICRC survey for Ebiil, we couldn't just tell people “use SEM Pasifika.” You need to know what the objectives are, then develop the tool.

Even among a minimum set – it's not easy to pick and find a few comfortable with implementing. It's not just about the tool but building capacity of people to be comfortable with conducting the assessment.

*How can we use the results of socioeconomic surveys for management processes?* You have already determined assessment objectives based on management objectives. What kind of information you will get – what kind of data that can be interpreted and used to support management objectives. For example, if you want to look at enforcement – if enforcement is working. You'd ask households about compliance – “do you witness violations?” [Don't ask directly, because people won't admit it if they are violating the rules.] Get a percentage for violations, those who comply, and answer how enforcement is working. Then go back to management strategies and decide what you need to change.

With interviews, you get more in-depth data. If you find a high percentage of people not following the rules, it's worth asking what are the reasons people don't comply.

You need to involve management in the data you're collecting.

*How should we deal with social change? Traditional systems are changing – and given these changes – how do you deal with that change and is it meaningful to describe a traditional system at a given point in time?* There's not a good answer, but it could depend on the individual social system, the location. One of the things we do in assessment – in trying to examine an issue – then provide information to people who might have to deal with it. Dealing with it is different from assessing it. For instance – oral history, about how a resource was managed in the past. If it's different from today, do you have information on the change and maybe on what influenced the change. This is something you have to report to policy/decision makers and discuss how to deal with it.

**Christy Loper**

Presentation on SEM Pasifika

Questions and discussion:

*How do you collect this information? Especially at the Micronesia Challenge level?* To date, assessments are done at the site level, usually one or two per jurisdictions.

*What percentage of the assessment that were done were on going, and how many were one time assessments?* It's discrete assessment, not ongoing monitoring; it's a new program, and many are useful if done every three to five years. You don't need more frequent monitoring, as you get survey fatigue and there's usually not rapid change.

Information differs between levels – site, jurisdiction, regional.

Some demographic information can come from secondary sources, like the census. Certain things are best through individual or household surveys, like awareness of rules and regulations. To get accurate information, ask people directly. Other things could be asked through key informants, or by documenting oral history. We need to think about this as we go forward – what things are easier to collect, and what are more realistic to collect?

Challenges are site based. Information collected should be applicable to the site. It's a new shift to require a core set – and we've gone to one or two sites per jurisdiction, but we need to look at coverage at a broader level.

One issue is differences in data collection – the same indicator can be looked at in different ways. A “simple” question about income sources can be asked in a lot of ways: Income at an individual or household level? Are you giving open ended choices or categories? Do you consider all income sources or just the top three? Are you ranking choices or providing just a list?

To compare data across all sites, these need to be standardized to ensure they are comparable.

There are issues in terms of funding, capacity, and ability to use information for management.

There is some funding through NOAA (competitive) and “leftover” SPREP funding. Many projects are not expensive in terms of funding, but in terms of staff time.

**Alison Green**

Presentation on strategy effectiveness measures developed for the Coral Triangle

Questions and discussion:

*Did you address benefits to people/the community?* We're not capturing this well.

We need to look at measuring success in a changing world – it will change profoundly in the face of climate change? What is success going to look like? What is it we should be aiming for in the long term? This is our biggest scientific challenge.

*Can you provide more detail on choosing resilient locations? What about fisheries and coastal management elements? Did you include those as well?*

There is a great interest in fisheries in region – the next strategy we through will be approaches to fisheries, ecosystem based approaches and integrated coastal management.

*Did you consider community resilience?* At the moment our focus is on ecological resilience, so community resilience wasn't included but we recognize we need to do this.

*Trying to measure success for an entire region is complicated. How has this focus allowed you to measure for a region?* Now, I think we could do it, after going through the process. You'd put together what the countries need to do – then feed this information into a regional picture. From TNC's point of view, for the time and resources put into this, is it successful? Did this result in effective conservation?

*Did you involve communities in the design of the network?*

We really went into this as a scientific exercise – the people in the PNG program felt it wasn't a good opportunity to include stakeholders. You would raise the expectations of people in the community, who want help, and might be let down if the area isn't identified as priority. So looked at resilience principles, identified priority areas, then worked with communities.

We had a lot of criticism for doing it this way, and the fact that it worked is a testament to the PNG team. We were lucky.

It's not always the right approach and in the Solomons it's the exact opposite. That's a better model for stakeholder engagement.

*When you go to the communities, how do you explain resilience – purely ecological terms? And do you use traditional knowledge to help identify resilient areas?* The field teams are part of the community. We included traditional knowledge in the design – not in terms of resilience specifically but to identify turtle sites, spawning aggregations, etc. If this is successful – we won't know until time has passed.

*How long did it take you to get information for the design?* In the MPA design process there are principles to apply, the minimal information you need to do this, determination of what information you have and what you need. It was about 2 years for the process.



## Irene Mercader-Guzman - Presentation on MC database development at PALARIS

### Using MS Access

Right now everything is set – we have containers for info that we need. But I understand they are still in the process of consolidating the data and agreeing. Two outputs for the charts. Samples given.

As with others – it's up to users, so everyone understands what we are talking about,

- Database – how do people update data? That's still in the process. As of now, Palau doesn't have capability of hosting a website for this purpose because bandwidth isn't as high. That's one of the issues – there's lots of issues. We're supposed to be provided with server, and the idea is to have info available to everybody through internet
- Connection linking database. Technical side. Decision is up to the people here.
- Clearing house mechanism in FSM functions as a database as well. They've has successes and some challenges.

The idea was – not finished – no standardized method, indicators, etc, but opportunity to develop database, start work but be flexible then agree on things. Then can use database. Arose – for such a long time we've been having problems of data in the region; we have stories from around the region about data problems. Maybe this can help. All jurisdictions here – have a discussion – Irene can design the system if we tell her what we need. We need to work to complete database and get it done. We were hoping this workshop will give us the ideas to finalize this.

### Discussion

- It would be useful to have nice system set up to push button and provide graph quickly. Social monitoring – we asked to provide spreadsheets on status and conditions of MPA. Are you looking at putting in measures (once decided) linking data – providing information and linking us up to show how we are doing on the challenge as a whole?
- Do you combine fish + benthic data? Tie ins for cause and effect, or at least relationship? For instance if fish numbers are down, but coral cover is down also, is this related to bleaching? How are you doing the accounting? What areas in the MPA, the status of the system, etc.
- We need to emphasize the need for meta data, which is as important as data itself. What you are counting? For instance - data about fish – did you count only a certain type? What was the objective? Often you get data and don't know how to use it because you don't know assumptions. Meta data should be in database. –could be included.
- Can you include links, etc, to other information so others can find it? It's up to you how you will standardize the data – by site, or site id? Each piece of information is supposed to be standardized so everybody can link to that.
- Wondering about the background for the database – others are doing the same thing, so what was the rationale to develop your own? All these databases have been out there for a long time. In Micronesia we have problems with data management, and with the MC projects, we wanted to have this as a backup – keep the data and have this regional backup, with the idea that it can be linked to others. But that's up to the jurisdictions – it's their data and they control it.
- It's not geared as saying “this reef is healthy and this is not.” It's getting numbers to the point where people can use them.
- After the workshop – finalize this based on the results of the workshop – develop methods on how to use it and work with the islands to get people to the database. Those are things we have to think about.
- Funding is discrete. It's not easy to update or change the design – the stress is on standards for data and coding. It's easy to add data, but not to change the design. Adding more data is not a problem but the design is critical.
- Would be helpful for organizations, donors, the government and communities to show success and progress. It's important to have a minimum standard of quality. There wasn't an existing database that fit the needs of the region.
- We know there's issues with data – the database is a repository, a backup. We have humidity and heat and power issues. Lots of computer problems. We need to start using this; we launched it as a region. The focal points thought it was a good idea.
- We need to transmit information to the repository. Maybe regional org can help set up the structure to support that data. With other countries in region – we need to decide quickly what would be flow of data and find a mechanism to backup data.
- The key is everyone needs to agree what the tracking and process is. Maybe others are willing to host and manage this, i.e. reef base, set up a web based access for us to use. It can be hosted elsewhere to backup and use the information.

Wednesday 17 February, 2010

**Richard Margoluis** - discussions in break out groups

Step back, and consider why are we doing monitoring. ... Define objectives of assessment. Not management.

- What do we want to get out of the monitoring?
- What is the purpose of the monitoring?
- How well are we achieving our conservation objectives – are we reaching overarching goals of the MC?
- What's our progress? How close are we? Percentages what progress are we making?
- Under what conditions are we meeting our goals and objectives?
- Is my money being used to achieve effective conservation? Cost effectiveness questions.
- How are communities affected? Are they benefitting?
- What are the things that are going to stop us from achieving our goal- political will? Regional strategy? Barriers? [What do we need to know before we even do our monitoring?]
- Monitoring obstacles/ opportunities in achieving our goals
- What is the gap remaining? How are we going to fill them?
- Are we achieving our objectives at the sites? What percentage of sites are meeting their objectives?
- Are our site based management objectives helping us in achieving MC goals?
- Distribution of benefits – one concentrated area geographically or across all areas?
- Adaptive management

Break out groups

- Review lists of targets and threats. Add/subtract as needed
- Review table of management issues.
- Review list of indicators add/subtract as needed.
- Each participant will get 5 votes for the indicators to be used any way they want. (i.e., if you really like one indicator – use all 5 votes for it)

Prioritized list of regional indicators to present back to the group for discussion.

--First group will present overall. The others will present what was different and what was similar.

Criteria for prioritization

- Relevance: How critical is it to all mc jurisdictions that this indicator be measured regionally and communicated with target audiences?
- Practicality: How doable/realistic is it for all or most jurisdictions to measure this indicator at this point in time
- Cost: what level of human and financial resources will be required to measure the indicator?

**Group 1**

Top 5 indicators

1. Coral reef resilience – includes community structure for coral reefs (+2, 3, 4)
2. Habitat loss (+2, no, no)
3. Number of violations / enforcement actions (+2, no, no)
4. Density – size – biomass – species composition of reef fish (+2, 3, 4) especially herbivores
5. Percent buy in (no, no, 4)

**Group 3**

6. Climate change vulnerability (no, no, no) may need a management indicator
7. Local marine resources use pattern; (no, no, no -4 included catch or harvest pressure) what's happening in terms of resource use at different times of year. \* consider – composite indicators need more discussion as they could encompass too many items
8. Demographics (no, no, no)
9. Water quality (no, 2, 4)

**Group 2**

10. Percentage benthic cover – habitat loss through time (4)  
Level of harvest or extraction – habitat loss through time (coral for lime, mangroves, sand mining)
11. Percentage of stakeholders participating (4)
12. Percentage and number of stakeholders changing behavior (4)

**Group 4** results are covered in first three

#### Group climate change vulnerability discussion

- How does this measure progress? It doesn't tell us anything about what we are doing. But if you have an area you know is going to be highly impacted, we may reach conservation goals, but that progress won't count if the system is destroyed by climate change.
- Maybe it's not an indicator, but a factor that needs to be included in planning.
- Sea level rise as an example – it needs to be measured on a local level, because factors like local tectonic activity play a role. This long term view might not help us tomorrow, but it will matter in 10 or 20 years. Management actions will have to factor in sea level rise. You need the information to plan well, but not as an “indicator.”
- Vulnerability risk assessment vs. indicator
- Look at climate change, but not as an indicator. Researchers and large organizations are considering this on a global scale. We need to look at adaptations to climate change as these issues bring resources. Keep them in mind – they bring major resources to the table. It's a big issue and we're on the receiving end. We need a stronger voice on the international level – in the intermediate and long term view as well as the immediate question.
- Could the indicator be something along the lines of – are your management actions or plans including consideration of climate change impacts in some way? It's a management indicator, that you are taking this into account in your planning processes.

#### **Plus/ Delta?**

##### *Plus*

Break out groups got more people talking  
 Real cups instead of disposables  
 Learned more about Micronesia

##### *Delta*

Please let some sunlight in the meeting room  
 Make sure people who were at first meeting are split more evenly in break out rooms– balance  
 Clear instructions for breakout groups  
 Work with indicators from last – hard to integrate socioeconomic

Thursday 18 February 2010

#### Discussion on ecological indicators

- The size class frequency for corals is a problem. It seems to be more a research type measure and not really necessary for management monitoring; it's a problem for some jurisdictions because it will affect the ability to do these transects with a one-tank dive.
- Just noting recruitment might be a compromise so you get an idea of recruitment but don't have to do the more complicated protocol, which is too much detail for management questions in most jurisdictions.
- The Marshalls questioned the need for annual monitoring given the problems of access to sites and the number of people available to do the monitoring. Every second year might be a better target given the capacity within jurisdictions.
- Can some of the protocols be simplified? Better if less frequent, and some of the protocols streamlined. This will be more realistic for the jurisdictions.
- PICRC will be testing the protocols in 4 sites.
- Water quality – for some jurisdictions this is already collected but for others it is way too much. The detail of water quality information discussed is too much and isn't really that valuable considering the management questions being asked.
- Vote to remove water quality consideration from regional list as it is too much.

#### Discussion on socioeconomic indicators

- What is the frequency of the monitoring process? Is something that has to be done every year? Most won't change rapidly and can be monitored on 3-5 year time frame.
- Can jurisdictions have access to experts to help frame these questions and the protocols? Need guidance to develop the tools to accomplish this monitoring.
- What are the jurisdictions going to do about demographics? Is this going to be collected for MC specifically or can this information be taken from other sources? –Census data may be used as many of the basic questions should be included in regular government census programs; the availability of this data just needs to be verified in each area.
- Guam noted major issues with regular socioeconomic monitoring as there is no program in place/ person or position in place with specific responsibility for this type of monitoring.

#### Discussion on scorecard indicators

- The question about “sites under some form of management” should include some measure of effectiveness – can't this include some metrics from the other indicators, like the ecological set? Maybe an aggregate of other indicators? This was discussed in the breakout group but it would be very cumbersome to include in the 6 month update – the compromise was to include some measure of sites under management with a second set of criteria for “effective” management.
- Timeline seems unreasonable – why every 6 months? This was set around the Micronesia Chief Executives Summit, where MC reports updates. The summit is held roughly every six months.
- The scorecard seems to bleed into socioeconomic indicators. The discussion was about indicators not really covered in the other two main categories. It wasn't intended to replace the others or to take into consideration really specific, quantitative measures like the other two types of indicators.
- Maybe “scorecard” is a misnomer and it should be called “snapshot” as it's a general idea of status of the MC rather than a quantitative measure of progress toward MC goals.
- A focus on process rather than the specific indicators in the other groups.
- The questions look at the effectiveness of work going into the site rather than the effectiveness at the site.
- Charlene needs to present this information to MCES; focal points brief the chiefs on these issues. This is not disregarding the bio/socioeconomic indicators, and there can be some rollup, but with limited time, these bullet points are a general idea. Jurisdictions can tease out details and find more specific information as needed for better, more accurate gauges, but “scorecard” can help at regional meetings for updates.

## APPENDIX FIVE: SUMMARY MINUTES

Moving Toward Measuring Our Effectiveness: The 2<sup>nd</sup> Meeting of the MC Measures Working Group and PICRC/JICA Coral Reef Monitoring Project Workshop

Purpose:	
To enhance regional capacity of monitoring of MPAs for improved management of near shore resources, the Workshop, “Moving Toward Measuring Our Effectiveness: The 2nd Meeting of the MC Measures Working Group and PICRC/JICA Coral Reef Monitoring Project Workshop” was co-hosted by Japan International Cooperation Agency, Palau International Coral Reef Center, Micronesia Challenge Regional Office and The Nature Conservancy. The following information was obtained through discussions below:	
Items	Descriptions
<ul style="list-style-type: none"> <li>➤ Issues of management               <ul style="list-style-type: none"> <li>• Lack of management plan or strategy</li> <li>• Insufficient finance</li> <li>• Personnel issues (numbers and training)</li> <li>• Lack of political will</li> <li>• Enforcement difficulties</li> <li>• Tourism impacts</li> <li>• Military buildup</li> </ul> </li> <li>➤ Issues of monitoring               <ul style="list-style-type: none"> <li>• Local capacity                   <ul style="list-style-type: none"> <li>○ Training and skill sets</li> <li>○ Recruitment and retention</li> </ul> </li> <li>• Resources                   <ul style="list-style-type: none"> <li>○ Financial</li> <li>○ Human resources</li> </ul> </li> <li>• Geographic issues                   <ul style="list-style-type: none"> <li>○ Large spatial areas</li> <li>○ Isolation of many sites</li> <li>○ Increasing impacts of climate change</li> </ul> </li> <li>• Capacity needs vary widely by jurisdiction. More specific capacity assessments are done by respective jurisdiction teams</li> </ul> </li> </ul>	<p>The primary focus for all MPAs in the region is fisheries – a few sites have additional objectives but the overwhelming majority focus on fisheries resources.</p> <p>Each jurisdiction’s current MPA status and monitoring situation is described below.</p> <ul style="list-style-type: none"> <li>➤ Palau           <ul style="list-style-type: none"> <li>• 32 sites in 14 states; all habitats represented</li> <li>• Most monitoring is done by PICRC with some assistance from PCS, others</li> <li>• Data include general condition, information on fish, coral and seagrass.</li> <li>• A social survey to gauge perceptions and threats exists. There needs to be closer alignment between social and biological monitoring.</li> </ul> </li> <li>➤ FSM           <ul style="list-style-type: none"> <li>• 4 states with 607 islands and 3 million square miles of ocean. Sites throughout communities.</li> <li>• Guided by strategic development plan principles to manage and protect the nation’s natural environment</li> <li>• Current monitoring efforts vary by state but focus on biological data with some socioeconomic information collected</li> </ul> </li> <li>➤ RMI:           <ul style="list-style-type: none"> <li>• 40+ sites coordinated by national effort but managed and implemented at local or community level</li> <li>• Under national framework Reimaanlok, including integration climate lens in resource management</li> <li>• Monitoring includes coral disease, COTS, water quality data, pollutants and others. Some socioeconomic data.</li> <li>• Need coordination between monitoring programs for better understanding of effectiveness.</li> </ul> </li> <li>➤ Guam           <ul style="list-style-type: none"> <li>• 5 sites passed in 1997 and enforced since 2001</li> <li>• Monitoring is required by legislation creating preserves. Focus on fish stocks, with some data on coral and other parameters</li> <li>• Little socioeconomic information captured, but enforcement data and water quality available.</li> </ul> </li> <li>➤ CNMI           <ul style="list-style-type: none"> <li>• 6 sites and federal marine monument</li> <li>• Monitoring efforts via many partner agencies. Information on species and water quality. Primary focus is on 3 main islands but some monitoring occurs for northern islands with NOAA assistance</li> </ul> </li> </ul>

Items	Descriptions
<ul style="list-style-type: none"> <li>➤ Indicators               <ul style="list-style-type: none"> <li>• At the 2008 MC Measures Working Group meeting, a preliminary set of targets and indicators for both marine and terrestrial sites as agreed upon by the 5 jurisdictions.</li> <li>• During breakout sessions and discussions, the jurisdictions worked through ecological and socio-economic indicators to refine the first list, agree upon priority indicators for region wide use, and develop protocols for collecting data in a standard format.</li> </ul> </li> </ul>	<p>Priority indicators identified to be monitored:</p> <ul style="list-style-type: none"> <li>➤ Ecological               <ul style="list-style-type: none"> <li>• Corals/ benthic cover                   <ul style="list-style-type: none"> <li>○ Species per unit area</li> <li>○ Benthic substrate ratios</li> <li>○ Recruitment</li> <li>○ Size class frequencies (use key species if too complicated)</li> <li>○ Coral cover</li> </ul> </li> <li>• Fish – Food fishes, herbivores, key species                   <ul style="list-style-type: none"> <li>○ Density</li> <li>○ Size</li> <li>○ Biomass</li> </ul> </li> <li>• Macroinvertebrates – Food species, important functional species                   <ul style="list-style-type: none"> <li>○ Density</li> <li>○ Size</li> </ul> </li> </ul> </li> <li>➤ Socioeconomic               <ul style="list-style-type: none"> <li>• Percent buy-in/ Change in Attitude                   <ul style="list-style-type: none"> <li>○ Leaders <i>Need to work at regional level; understand cost/trade-offs of participation in MC</i> Number/percent of leaders that buy into/support the MC goals and concepts</li> <li>○ Locals – community members: people in or adjacent to MPAs; people with rights to or affected by MPAs; resource owners <i>Conservation (understand trade-off of preservation vs. restricted access)</i> Number/percent of locals who buy into/support concept</li> </ul> </li> <li>• Percentage of Stakeholders Participating                   <ul style="list-style-type: none"> <li>○ Community members Number/percent of local participation in conservation activities relevant to MC sites according to each jurisdiction’s definition of a site</li> </ul> </li> <li>• Percentage and numbers of stakeholders changing behavior                   <ul style="list-style-type: none"> <li>○ Consumers <i>Consumption of target species/products/size (TBD)</i> Presence/absence of consumption of target species/products</li> <li>○ Producers <i>Extraction of target species/products/size (TBD)</i> Presence/absence of extraction of key species and products</li> </ul> </li> <li>• Livelihood resources for both consumption and income generation</li> </ul> </li> </ul>

Items	Descriptions
<p>➤ Indicators A third group to capture a “snapshot” of regional progress toward MC goals created primarily qualitative, process oriented indicators to use as a tool to help leaders assess the status of the MC and regional needs.</p>	<p>➤ Snapshot Broad qualitative questions that will be used to help leaders determine progress of MC on a regional scale at roughly 6 months intervals. Most are “yes, no, progress made” questions that can be answered by key individuals in each jurisdiction.</p> <ul style="list-style-type: none"> <li>• Percent extent of near shore marine areas under some form of conservation</li> <li>• Percent of progress toward each MC endowment goal</li> <li>• Status of jurisdiction’s finance mechanism</li> <li>• Percentage of sites with governance mechanisms with authority</li> <li>• Skilled people actively working at the site relative to the number of skilled people needed to achieve core objectives</li> <li>• Funding source; amount of funding relative to funding needed to meet core objectives</li> <li>• Jurisdictions have developed their capacity development strategies</li> <li>• Ongoing capacity development system (professional development programs)</li> <li>• Number of partnerships in place relative to the number needed to meet core objectives</li> <li>• Ecosystem based climate change adaptation strategies applied to jurisdiction conservation plans</li> <li>• Percentage of sites with effective enforcement programs as defined by their jurisdiction’s standards</li> <li>• Percentage of sites with active enforcement programs as defined by their jurisdiction</li> </ul>

**Monitoring methods**

For each indicator, monitoring methods were identified as below:

- Ecological monitoring
  - Coral
    - Photo quadrats
    - Random points
    - Belt Transects
  - Fish
    - Belt transects
    - Timed swim
  - Macroinvertebrates
    - Transects
- Socioeconomic monitoring
  - Formal surveys
  - Key informant interviews
  - Observation
  - Existing data
- Snapshot/Score card  
Information will be collected through questionnaires for key individuals within each jurisdiction.

**Next steps**

- Smaller group meetings via calls and emails to address concerns with indicators and protocol
  - Working group leads designated and targets for discussion dates are set
  - TNC and MC will check in with group leads to monitor progress
- Meeting report
  - Draft in one month
  - Two week comment period
  - Minutes and working materials
  - CD of presentations
- Each jurisdiction needs to define their management approach, define target species for some of the surveys, and look at existing data and gaps within one year.
- Next MC Measures Working Group Meeting

## APPENDIX SIX: ACKNOWLEDGEMENTS

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Photo by Michelle Bai