

An Analysis of Issues Affecting the Management of Coral Reefs and the Associated Capacity Building Needs in the Commonwealth of the Northern Mariana Islands

FEBRUARY 2014





An Analysis of Issues Affecting the Management of Coral Reefs and the Associated Capacity Building Needs in the Commonwealth of the Northern Mariana Islands

PREPARED FOR:

Coral Reef Management Network in the Commonwealth of the Northern Mariana Islands &
National Oceanic and Atmospheric Administration's Coral Reef Conservation Program

PREPARED BY:

Glenn G. Page, President/CEO, SustainaMetrix
Audrey Swanenberg, Ecosystem Governance Analyst, SustainaMetrix
Taylor Maddalene, Ecosystem Governance Analyst, SustainaMetrix
Kyle King, Ecosystem Governance Analyst, SustainaMetrix

With advice, input and guidance by the members of the CNMI Jurisdictional Capacity Assessment Team:

*Fran Castro, Avra Heller, Steven Johnson, Trina Leberer, Sean Macduff,
Steven McKagan, Brooke Nevitt, Dana Okano, Sam Sablan and John Tomczuk*

February 2014

Table of Contents

Acknowledgements.....	3
Section One: Introduction.....	17
1.1 Scope and Purpose of this Assessment.....	17
1.2 Our Approach: Ecosystem-based Management.....	18
1.3 Our Approach: Adaptive Capacity.....	21
1.4 Additional Capacity Assessment Tools.....	22
Section Two: The Context for Coral Reef Management in the CNMI: Trends and Current Conditions.....	27
2.1 Introduction to Context in the CNMI.....	27
2.2 Importance of Social and Historical Context.....	27
2.3 Brief Summary of the Current State of the Coral Reefs in the CNMI.....	29
2.4 Major Biophysical Pressures and Drivers of Coral Reef Condition.....	31
2.5 Governance Context and Institutions Involved in Coral Reef Management and their Recent Development Over Time.....	36
Section Three: Findings Related to Coral Reef Management Capacity in the CNMI.....	39
3.1 Jurisdictional Coral Reef Initiative Management Process.....	39
3.2 Brief Review of Management Enabling Conditions (1 st Order Outcomes).....	46
Section Four: Priority Capacity Building Strategies.....	51
4.0 Scope of Available Financial Resources.....	51
4.1 Group 1 Recommendations: Politically Challenging Goals to Improve Formal Commitment to Coral Reef Conservation.....	53
4.2 Group 2 Recommendations: Using a Common Management Framework to Pursue Ecosystem-based Management at Priority Sites.....	66
4.3 Group 3 Recommendations: Tractable Projects.....	72
Section Five: Developing a Strategy for Building Adaptive Capacity.....	78
5.1 Three Phases of the Assessment of Coral Reef Management Capacity.....	78
5.2 Building a Long-Term Action Plan.....	79
5.3 Lessons Learned in Building Adaptive Capacity.....	80
5.4 Key Considerations For Developing A Post-Assessment Action Plan.....	81
5.5 Acting on the Grouping of Recommendations.....	82
5.6 Building Adaptive Capacity.....	83
Literature Cited.....	85
Appendix A: For More Information.....	88
Climate Change.....	88
Coastal Governance.....	88
Marine Conservation.....	89
Organizational Behavior.....	89
Sustainable Development.....	90

<i>Terrestrial Conservation</i>	90
Appendix B: Glossary	91
Appendix C: Timeline	95
Appendix D: Interviews.....	106
Appendix E: Portfolio of Training Modules	109
<i>Recommended Standard CNMI Coral Reef Management Training Course</i>	109
<i>Produce Modules for Distance Learning</i>	109
<i>Strategies for Cultivating Local Leaders</i>	110
<i>Principles for Building Adaptive Capacity</i>	110

Acknowledgements

We acknowledge the many contributions of all those who participated in the process of this capacity assessment including the site visit, multiple phone calls, emails and attempted telepathy with the diverse assemblage of colleagues in the Commonwealth of the Northern Mariana Islands. The kindness, hospitality, honesty and warmth that was displayed by all serves as the foundation for this document and hopefully creates the energy needed to implement a post-assessment action plan that includes a series of implementable activities for short- and long-term capacity building for effective coral reef management. Specifically, we acknowledge the involvement of Ana Agulto, Roman Benavente, Fran Castro, Doris Chong, Frankie Eliptico, Sue Ellis, Esther Fleming, Kate Fuller, John Furey, Nancy Gottfried, John Gourley, Gus Harb, Avra Heller, John Iguel, Steven Johnson, James Kearney, Tim Lang, Larissa Larson, Trina Leberer, Sean Macduff, Tony Mareham, Steven McKagan, Greg Moretti, Brooke Nevitt, Ryan Okano, Arnold Palacios, Bernie Palacios, Manny Pangelinan, Frank Rabauliman, Jack Reyes, Mathilda Rosario, Marlowe Sabater, Chech Sablan, Herman Sablan, Sam Sablan, Frannie Salas, Nicole Schafer, Richard Seman, Mike Tenorio, Mike Trianni, Patrick Ulechong, Kodep Uludong, Virginia Villagomez, Gene Weaver, Toshi Yamaguchi, as well as National Oceanic and Atmospheric Administration's Coral Reef Conservation Program staff Dana Okano and John Tomczuk.

The concepts and methods described in this document have evolved over many years and benefited from the ideas, experience and wisdom of many people, from scientists to spiritual leaders, from policy makers to practitioners. This document is a product of continued learning, based upon the art of convening and listening. Our goal is to improve our collective understanding and practice of the ecosystem approach by creating authentic engagement in meetings, gatherings and conversations to address the pressing issues of our time. Since the ultimate objective of this capacity needs assessment is to increase capacity for stewardship of coral reefs, we firmly believe the approach must integrate across sectors, social structures, and disciplines and take on a systems view that incorporates biophysical and social dimensions. We call this integrated approach the ecosystem approach. It is neither easy nor inexpensive to practice and requires continued investments in building capacity. The methods applied in this document draw from many sources including the work of Stephen B. Olsen, Director Emeritus of the Coastal Resources Center at the University of Rhode Island, a key author of *Increasing Capacity for Stewardship of Oceans and Coasts: A Priority for the 21st Century* (National Research Council, 2008) and the lead advisor of our consultant team. We have integrated methods and lessons learned from the fields of needs assessment for social interventions, innovations in interdisciplinary scholarship, developmental evaluation, capacity assessment practice and theory in the context of international development as well as complexity concepts drawn from ecosystem science. Because the methods are a composite of elements from a wide range of disciplines, they are experimental, and will be customized for each jurisdiction to match the context and capacity of the situation. This capacity assessment process has been designed in close consultation with NOAA CRCP.

Cover Photo: Ridge to reef perspective from above Laolao Bay. (Photo credit: Glenn Page, SustainaMetricx.)

Accronym List

Use of Acronyms in the Document: For the purpose of consistency and brevity, acronyms will be used and are spelled out in detail below. We recognize that there are some acronyms that may cause confusion such as the distinction between a national program and a program within the Commonwealth. When referencing an agency or program within the Commonwealth, (e.g. Coastal Resources Management program) the most abbreviated version will be used (e.g. CRM or CNMI CRM). When referring to the national program or agency, either the prefix U.S. will be used (e.g. U.S. CZMA program) or it will be spelled out in its entirety. If full names of the acronyms presented below are spelled out in the document, they are done so for the purpose of clarity.

AG - Attorney General (CNMI)

APASEEM - Asia Pacific Academy of Science,
Education and Environmental Management

ARRA - American Recovery and Reinvestment Act of
2009

BMPs - Best Management Practices

CAP - Conservation Action Plan

CNMI - United States Commonwealth of the
Northern Mariana Islands

CJMT - CNMI Joint Military Training

CRI - Coral Reef Initiative (CNMI)

CRM - Coastal Resources Management (CNMI)

CZMA - Coastal Zone Management Act of 1972 (U.S.)

DEQ - Division of Environmental Quality (CNMI)

DFA - Department of Finance and Accounting
(CNMI)

DFW - Division of Fish and Wildlife (CNMI)

DLNR - Department of Land and Natural Resources
(CNMI)

DoD - Department of Defense (U.S.)

DOI - Department of Interior (U.S.)

DPW - Department of Public Works (CNMI)

EIS - Environmental Impact Statement

EPA - Environmental Protection Agency (U.S.)

FY - Fiscal Year

FTE - Full Time Equivalent

GIS - Geographic Information Systems

J-CAT - Jurisdictional Capacity Assessment Team

LAS - Local Action Strategies

LBSP - Land-based Sources of Pollution

LID - Low Impact Development

MC - Micronesia Challenge

MCT - Micronesia Conservation Trust

MES - Micronesian Environmental Services

MINA - Mariana Islands Nature Alliance

MIRC - Mariana Islands Range Complex

MITT - Mariana Island Training and Testing

MMP - Marine Monitoring Program

MPA(s) - Marine Protected Area(s)

MVA - Marianas Visitors Authority (CNMI)

NGO(s) - Non-governmental Organization(s)

NMC - Northern Marianas College
NMC CREES - Northern Marianas College-
Cooperative Research Extension and Education Service
NMDOA - Northern Mariana Dive Operators
Association
NOAA CRCP - National Oceanic and Atmospheric
Administration Coral Reef Conservation Program
NOAA OCRM - National Oceanic and Atmospheric
Administration Office of Ocean and Coastal Resource
Management
NOAA OLE - National Oceanic and Atmospheric
Administration Office of Law Enforcement
NOAA PIFSC CRED - National Oceanic and
Atmospheric Administration Pacific Islands Fisheries
Science Center Coral Reef Ecosystem Division
NOAA PIRO - National Oceanic and Atmospheric
Administration Pacific Islands Regional Office
NPS - Non-point Source Pollution
NRCS - Natural Resources Conservation Service
NRM - Natural Resource Management (a degree
program a Northern Marianas College)

NSF - National Science Foundation
OEIS - Overseas Environmental Impact Statement
OMB - Office of Management and Budget (U.S.)
OPM - Office of Personnel Management (CNMI)
PIMPAC - Pacific Islands Marine Protected Areas
Community
PMRI - Pacific Marine Resources Institute
POC - Point of Contact
PSD - Priority Setting Document
STEM - Science, Technology, Engineering and Math
TNC - The Nature Conservancy
U.S. - United States of America
UoG - University of Guam
USACE - U.S. Army Corps of Engineers
USFWS - U.S. Fish and Wildlife Service
WESPAC - Western Pacific Regional Fishery
Management Council

Summary of Major Findings and Recommendations

This capacity assessment, commissioned by National Oceanic Atmospheric Administration’s Coral Reef Conservation Program, directly follows the coral reef management priority setting process facilitated by NOAA CRCP and initiated in the Commonwealth of the Northern Mariana Islands in 2009. In the CNMI, the priorities were summarized in the 2010 publication of “Commonwealth of the Northern Mariana Islands’ Coral Reef Management Priorities” (henceforth, the “PSD”). The PSD forms the lens for the capacity assessment process.

As outlined in **Section One** of this report, the consultant team facilitated a rapid, largely qualitative, participatory approach to gain the perspectives of a representative group of resource users, managers, upper-level administrators and funders who are engaged in coral reef management in the CNMI.

The primary purpose of this assessment is to examine the issues that affect capacity in the CNMI as it relates to implementing the priorities expressed in the PSD and present a set of near-term recommendations for addressing persistent capacity gaps and barriers. The recommendations are offered in an appreciation of the context of the CNMI. Implementation of the recommendations will require an implementation strategy that is adaptive. Based on the changing conditions, some recommendations may be dropped, others implemented as planned, and yet others arise as priorities that may not have been anticipated as part of this process. Indeed, the challenges facing coral reef management in the CNMI will require a long-term strategy for building adaptive capacity within the current governance system as well as an appreciation for what may be needed to change the existing system. As with the other jurisdictions that depend on the goods and services that coral reef ecosystems provide, the CNMI will need to honestly evaluate its current ecosystem governance paradigm and structures that support or impede it. Shifting to new governance pathways may be very difficult as it requires exploring new paradigms for economic growth and sustainable development that may challenge current opinions and worldviews, incentives, power relationships, and institutions operating at different scales that do not support such shifts (Olssen et al., 2010).

While many of the recommendations in this document focus on the CNMI agencies with authority to manage coral (CNMI CRI agencies: Division of Environmental Quality, Coastal Resources Management and Division of Fish and Wildlife) there are also federal agencies with authorities to manage corals (i.e. NOAA CRCP, USACE, DoD, DOI, NRCS, etc.) and they are fully expected and invited to participate in the review of the recommendations and to identify how each can contribute to the process and play a significant role for implementation of capacity building strategies.¹

Section Two of this report presents the context for coral reef management and why reefs are extremely valuable and important to the economy, culture and future of the territory’s approximately 54,000 residents (U.S. Census) and approximately 400,000 tourists annually (Marianas Visitors Authority). The combined areas of coral reef in the nearshore waters of the CNMI contain 45 km², with an additional 534 km² between 3-200 nautical miles. As in other

¹ In this introduction, federal agencies are referred to with their acronym and territorial agencies are spelled out for greater clarity for the reader who may be unfamiliar with the local agencies of the CNMI.

parts of the world, the coral reefs in the CNMI are fragile, subject to increasing pressures of over harvesting of marine resources, water quality decline from land use in adjacent watersheds, and climate change. While much of what we have found regarding capacity to manage coral reefs in CNMI shows an upward trajectory of building capacity over time, there are still persistent gaps and, increased adaptive capacity is needed to address increasingly complex, multi-scale, uncertain and dynamic management challenges.

Indeed, the challenges facing coral reef management in the CNMI, and the rest of the world, will require more than a strategy for building capacity within the current governance system where decision-making is often reactive and many challenges lie in the socio-political dimensions associated with resource conservation. As situations become less predictable and producing desired outcomes becomes less certain, the degree of complexity increases. Stakeholders offer different perspectives articulating competing values, and posing different solutions. While not uncommon, controversy can be both positive if facilitated well and negative if not. The more points of view there are and the greater the debate among different stakeholders, the more socially complicated the situation becomes. How these disagreements are handled is often initially unknown and only become knowable as the interactions unfold. Some of the disagreements center around the technical challenges associated with scientific evidence, proving cause effect relationships as to what may be more or less damaging to overall reef health. Other disagreements center on a perception of fundamental value differences relating to access, safety, traditional practices and often how to even define the challenge (Patton, 2012). The depth and source of disagreement can pose particularly challenging situations and the current governance structure is not well positioned to continually mediate, negotiate and facilitate compromise and consensus.

Section Three presents findings related to the capacity to manage coral reefs in the CNMI. We briefly review the recent progress that has been made in coral reef management in the CNMI and we utilize both “Process” and “Outcomes” analysis as tools to foster the building of adaptive capacity for the management of coral reefs in the CNMI. We apply the Management Cycle and the Orders of Outcomes framework as described in Section 1.2. These conceptual frameworks are applied to recent past and current coral reef management in the CNMI to help shape capacity building recommendations for the future.

In the CNMI, the issues are managed by an increasing number of agencies and organizations. Most agencies manage based upon their own mandates, policies, goals and objectives, some of which are complementary to what other agencies are doing, and sometimes competing or simply disconnected. Issues are being addressed by a widening range of federal, Commonwealth and local policies as well as through the conservation initiatives of the limited civil society sector. In the short run, this current governance structure, with its highly complex management context involving a myriad of actors means more effective management that requires the capacity to work effectively together. Highly complex management challenges must be met with quality coordination and collaboration. Even with this growing network, there are a number of issues at the global scale that are well outside any agencies control such as ocean acidification, sea level rise, increasing climate variability and other effects associated with global drivers of ecosystem change.

Therefore, an uncertain future is certain and preparing for it requires an adaptive learning-by-doing approach. Wisdom gained through thousands of years of traditional management of reefs is bringing insight into adaptive strategies in the CNMI. However, today’s challenges have no real historical analogue for the multi-scale and rapid

pace of change. While integrated engineering solutions are essential, the challenges today require a long list of competencies related to issue analysis, selecting options, securing formal commitment, implementing in shifting context and having the time, energy and methods to adaptively learn along the way. Interpersonal competencies are also needed to build emotional intelligence (i.e. mutually-beneficial professional relationship building, creative conflict resolution, etc.) to foster effective collaboration. This is not simple, and there is no clear and obvious path, panacea, or training program that will solve these challenges of enforcement and compliance, remove procurement barriers, solve staff recruitment and retention issues, transform science to better inform policy, and grow better relationships with local government and the legislature. Addressing these persistent barriers takes time, resources and collective commitment. Nevertheless, from an analysis of the issues, we have offered a set of recommendations to serve as a “road map” for the continued development of adaptive capacity.

Section Four presents a set of recommendations that are divided into three groups. The first group involves decisions that are highly political in nature. The ultimate timing, control and direction must be decided from the highest levels of government within the CNMI. We believe these actions are the most critical to build long-term adaptive capacity to manage coral reefs and promote Ecosystem-based Management in the CNMI. This first group begins with the priority to clarify the legal roles, mandates and responsibilities of local and federal partners and identify obvious areas of overlap. Building improved working relationships amongst the CRI Agencies was noted as a priority, and this process could begin with the reinvigoration of the CRI Science Committee. This group also includes recommendations related to improving enforcement programming, connecting with the tourism sector to “make the case” for investing in improved coral reef management, and recommends that efforts to streamline procurement and grants management processes should be continued. This group is also the most complex because they feature difficult political decisions that need to be made by senior officials in the CNMI who must factor in a wide range of extenuating circumstances. That said, we believe their adoption would support and strengthen the ecosystem services provided by coral reefs including coastal protection, cultural, recreational and property values, education and research. The second group requires increasing collaboration amongst implementing and funding partners to more fully realize the goals of Ecosystem-based Management. These recommendations involve a series of collaborative actions that can be done within a relatively small segment of the coral management network and focused on select geographies. The recommendations generally focus on increasing science to inform management (including human dimensions and economic valuation studies) and supporting public environmental stewardship through support for outreach and education efforts and building capacity for the nascent NGO sector.

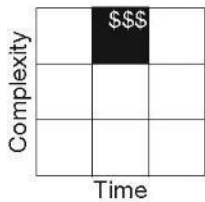
The third group is a range of actions that can be done at the scale of committees, task forces, within organizations, and by groups of individuals. These recommendations include actions that contribute to building adaptive capacity; yet their implementation can be controlled by a small group of people, an organization or a network of organizations. While this group is more commonly associated with the traditional capacity building tasks of developing and improving knowledge, skills and competencies, we believe investment here will have far greater return as long as attention is paid to implementing the two groups described above. Since this group may be considered “low hanging fruit” it could well be a place to begin to build momentum but the overall impact of an integrated capacity building strategy will only be realized if there is significant progress made in capacity building by all three groups.

Section Five concludes the report with a strategy for the development of a long-term capacity building action plan that will require contributions from all stakeholders to fully implement these recommendations. Creating capacity building action plans allows the wide range of implementing partners in government, civil society and market forces to more effectively preserve and protect coral reefs. Committing to a long-term capacity building strategy will require support and participation from resource management agencies, from local to federal, from large and small NGOs, from coalitions and funding partners, from resource users who depend on the coral reefs of the CNMI for their livelihood, and from upper-level administrators.

LEGEND

TIME SCALE	COMPLEXITY SCALE	MONETARY SCALE
Short = <1 year	Simple = Somewhat context independent recommendations such as “best practices” and “standard operating procedures” that have fairly high certainty of building capacity.	\$ - Less than \$5,000
Medium = 1 to 2 years	Complicated = Context is more important and the recommendation may require either coordination of technical expertise that may or may not be present in the system, or may require a degree of social engagement and relationship building that creates a common ground; i.e., either socially or technically complicated.	\$\$ - Between \$5,000 and \$20,000
Long = >2 years	Complex = Context is highly dependent and the recommendation may require strategies that are adaptively implemented and address dynamic, emergent, non-linear and complex conditions.	\$\$\$ - Between \$20,000 and \$100,000 \$\$\$\$ - Greater than \$100,000

EXAMPLE



This graphic shows project time scale of 1 to 2 years (**Medium**) with complexity scale equal to **High** and monetary scale between \$20,000 and \$100,000 (**\$\$\$**).

PRIORITIZATION

The prioritization was developed in consultation with the CNMI J-CAT members who were asked to rate each recommendation. The resulting top recommendations are presented in order of priority in this table and in this document. Please note, while prioritized, the recommendations are not intended to be implemented sequentially as a checklist. Rather, in complex and dynamic systems, adaptive capacity will be about building momentum with investments in relatively simple, inexpensive and quick forms of capacity building, and marking progress toward the larger systemic changes that are needed to effectively build adaptive capacity.

GROUP 1 RECOMMENDATIONS

Politically Challenging Goals to Improve Formal Commitment to Coral Reef Conservation

The recommendations in this section are politically challenging, and in many respects, accomplishing them will require actions beyond the reach of NOAA CRCP, the CRI Agencies and the larger coral reef management network in the CNMI. Nonetheless, there are concrete measures that NOAA and the CRI Agencies can take that can improve the likelihood of success and can lead to an improved climate for coral management and marine conservation in the state. A top priority to build the capacity for effective coral conservation in the CNMI is to generate high-level institutional and political support for coral reef conservation and management.

PAGE #	CAPACITY BUILDING STRATEGY / RECOMMENDATION / POTENTIAL PARTNERS		COMPLEXITY / TIME / COST
53	4.1A	<p>Clarify the Legal Roles, Mandates, and Responsibilities of Local and Federal Partners and Identify Obvious Areas of Overlap</p> <p>Recommended Leads: CRI Attorney, DEQ Attorney</p> <p>Potential Partners: NOAA CRCP, USFWS, EPA, National Park Service, DoD, DOI, NRCS, DLNR Attorney</p>	<p>A 3x3 grid with 'Complexity' on the y-axis and 'Time' on the x-axis. The bottom-left cell (Complexity 1, Time 1) is shaded black and contains a '\$' symbol.</p>
54	4.1B	<p>Clarify the Administrative and Criminal Pathways of Enforcement and Identify Where Appropriate Law Enforcement Training is Needed</p> <p>Recommended Lead: Office of the AG</p> <p>Potential Partners: PIMPAC, representatives from each of the CRI Agencies and their enforcement sections, NOAA Department of Justice</p>	<p>A 3x3 grid with 'Complexity' on the y-axis and 'Time' on the x-axis. The top-right cell (Complexity 3, Time 3) is shaded black and contains '\$\$\$'.</p>
54	4.1C	<p>Reinvigorate the CRI Science Committee to Work in Coordination Across all Three CRI Agencies</p> <p>Recommended Leads: POC, CRI, CRI Policy Committee, CRI Scientists, supervisors of the scientists, and some external well-recognized voice to help facilitate the process</p> <p>Potential Partners: NOAA, PMRI, MINA, MES, APASEEM, MMP, UoG, Sea Grant, NMC, Saipan's Fishermen's Association, WESPAC</p>	<p>A 3x3 grid with 'Complexity' on the y-axis and 'Time' on the x-axis. The top-middle cell (Complexity 3, Time 1) is shaded black and contains '\$\$\$\$'.</p>
56	4.1D	<p>Work with MVA and Other Partners to Explore Local Options and Strategies for Sustainable Finance for Natural Resource Management</p> <p>Recommended Lead: POC</p> <p>Potential Partners: TNC, MC Regional Office, MCT, DEQ, CRM, DFW, Micronesia Chief Executives Summit</p>	<p>A 3x3 grid with 'Complexity' on the y-axis and 'Time' on the x-axis. The middle-middle cell (Complexity 2, Time 2) is shaded black and contains '\$'.</p>

PAGE #	CAPACITY BUILDING STRATEGY / RECOMMENDATION / POTENTIAL PARTNERS		COMPLEXITY / TIME / COST
57	4.1E	<p>Fill Critical Vacancies and Identify Critical Hires in Near Future for Natural Resource Management Positions at CRM, DFW, DEQ</p> <p>Recommended Leads: DEQ, CRM, DFW, CRI Coordinating Committee</p> <p>Potential Partners: NOAA PIRO in the CNMI, EPA, USFWS, NOAA CRCP, DOI</p>	<p>Complexity</p> <p>Time</p>
58	4.1F	<p>Clarify Hiring Processes and Consider Options for Reform</p> <p>Recommended Lead: OPM</p> <p>Potential Partners: DEQ, CRM, DFW, DFA, OMB, Office of the AG, Office of the Governor</p>	<p>Complexity</p> <p>Time</p>
58	4.1G	<p>Clarify Procurement Processes and Consider Options for Streamlining</p> <p>Recommended Lead: Department of Finance, Procurement and Supply</p> <p>Potential Partners: DFW, DEQ, CRM, OMB, OPM, Office of the AG, Office of the Governor</p>	<p>Complexity</p> <p>Time</p>
60	4.1H	<p>Work with MVA to Make the Business Case for Improved Coral Reef Management</p> <p>Recommended Leads: MVA, CRI Policy Committee</p> <p>Potential Partners: Tourism operators (for a wide range of demographics of tourists)</p>	<p>Complexity</p> <p>Time</p>
61	4.1I	<p>Create Consistency for Public Federal Funds that Support Positions to Define Minimum Qualifications Using CRI as a Model</p> <p>Recommended Leads: CRI Agencies, Office of the AG, POC</p> <p>Potential Partners: OPM, NOAA CRCP, NOAA PIRO in the CNMI, EPA, USFWS, DOI</p>	<p>Complexity</p> <p>Time</p>
62	4.1J	<p>Review, Clarify and Update the CRI Executive Directive</p> <p>Recommended Leads: CRI Policy Committee, POC</p> <p>Potential Partners: Office of the Governor, Office of the AG, NOAA CRCP</p>	<p>Complexity</p> <p>Time</p>
62	4.1K	<p>Addressing Staff Retention within CRI</p> <p>Recommended Leads: OPM, Attorney for Civil Service Commission</p> <p>Potential Partners: OMB, DFW, DEQ, CRM</p>	<p>Complexity</p> <p>Time</p>

PAGE #	CAPACITY BUILDING STRATEGY / RECOMMENDATION / POTENTIAL PARTNERS		COMPLEXITY / TIME / COST
63	4.1L	<p>Revive the Joint Enforcement Task Force</p> <p>Recommended Leads: DFW, CRM, DEQ</p> <p>Potential Partners: OMB, OPM, Attorney for Civil Service Commission</p>	
64	4.1M	<p>Clarify Grants Management Processes and Consider Options for Streamlining</p> <p>Recommended Lead: Office of Grants Management under the Office of the Governor</p> <p>Potential Partners: DEQ, DFW, CRM, DFA, OMB, OPM, Office of the AG, Office of the Governor</p>	
65	4.1N	<p>Update Guide for Investors in the CNMI</p> <p>Recommended Lead: CRM, Saipan Chamber of Commerce, Saipan Economic Development Council.</p> <p>Potential Partners: DFW, DEQ</p>	

GROUP 2 RECOMMENDATIONS

Using a Common Management Framework to Pursue Ecosystem-based Management at Priority Sites

This group of recommendations will require a collaborative and coordinated approach to management at select priority sites, and involve interconnected systems and engagement with multiple resource users, government entities, NGOs and funders.

PAGE #	CAPACITY BUILDING STRATEGY / RECOMMENDATION / POTENTIAL PARTNERS		COMPLEXITY / TIME / COST
66	4.2A	<p>Science to Inform Management: Social Science to Better Define Human Dimensions and Relationships to the Coral Reef</p> <p>Recommended Lead: Social Science Task Force/Working Group/Committee proposed in Recommendation 4.1C</p> <p>Potential Partners: DEQ Coral Reef Project Coordinator, PMRI, NMC, PIMPAC, MC, Rare, TNC, NOAA Science Center, NOAA CRCP, CRI Education and Outreach Coordinator</p>	
67	4.2B	<p>Science to Inform Management: Update Economic Value of Coral Reefs Study</p> <p>Recommended Lead: External Consultant, potential future Social Science Task Force/Working Group/Committee proposed in Recommendation 4.2A, CRM</p> <p>Potential Partners: NMC, UoG, MC Measures Working Group, Micronesia Conservation Trust, PIMPAC</p>	

67	4.2C	<p>Collaborate Across Natural Resource Agencies To Define Agenda for Response to Department of Defense Readiness</p> <p>Recommended Leads: Office of the Governor, CRM, Directors from all CRI Agencies</p> <p>Potential Partners: NOAA, USFW, EPA, DoD</p>	
68	4.2D	<p>Conduct Lessons Learned Process for First Generation of Tasi Watch for Continued Program Development</p> <p>Recommended Lead: MINA</p> <p>Potential Partners: TNC, Education and Outreach Working Group, Enforcement Task Force</p>	
68	4.2E	<p>Create a Coordinated Education and Outreach Program between DEQ, CRM, DFW and potentially other NGO partners for the Priority Sites</p> <p>Recommended Lead: CRI education and outreach coordinator</p> <p>Potential Partners: DEQ education and outreach coordinator, (future) CRM and DFW education and outreach coordinators, National Marine Educational Association, MINA, Tano/Tasi Working Group in Guam, La Tausangi in American Samoa</p>	
69	4.2F	<p>Develop a System of Communication to Increase Quality of Engagement with Local Communities at Priority Sites</p> <p>Recommended Lead: Education and Outreach Working Group</p> <p>Potential Partners: Rare, TNC, MINA, SeaWeb</p>	
70	4.2G	<p>Reach Out to Support Local High School Students to Increase Engagement at Priority Sites</p> <p>Recommended Lead: Education and Outreach Working Group, Education and Outreach Coordinator</p> <p>Potential Partners: Public and private high schools, Department of Education, KKMP, NMC and NRM</p>	
71	4.2H	<p>Apply Lessons Learned from Laolao Bay Watershed Restoration Efforts</p> <p>Recommended Lead: DEQ</p> <p>Potential Partners: DFW, CRM, ARRA, NRCS, DLNR, NOAA Habitat Conservation - Restoration Center</p>	
71	4.2I	<p>Native Plant Nursery for Restoration at Priority Sites (Possible Training Program at Juvenile Detention Center)</p> <p>Recommended Lead: DLNR Division of Forestry</p> <p>Potential Partners: CRM, DEQ, MINA, NMC CREES, Rare, Forestry Advisory Council</p>	

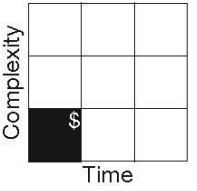
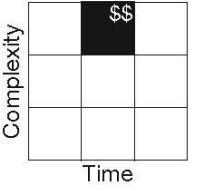
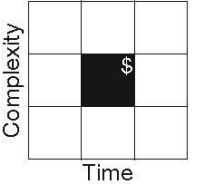
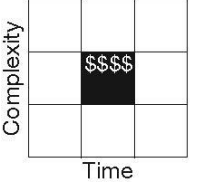
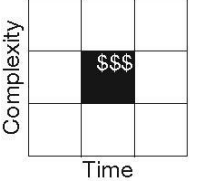
72	4.2J	<p>Develop Lessons Learned from CAP Process and Management Plans Recommended Lead: CRI, POC Potential Partners: TNC, Pacific Islands Franchise for the Conservation Coaches Network, MINA</p>	
----	------	--	--

GROUP 3 RECOMMENDATIONS

Tractable Projects

This group of recommendations includes programs and trainings that focus on building a range of technical, financial, social, institutional and political capacities. Individuals, a small group of people, an organization, or a network of organizations can implement this group of recommendations.

PAGE #	CAPACITY BUILDING STRATEGY / RECOMMENDATION / POTENTIAL PARTNERS		COMPLEXITY / TIME / COST
72	4.3A	<p>Continue to Develop Opportunities for the CRI Internship as well as the Coral Fellowship / Link NRM Students with Academic and Professional Development Opportunities Recommended Lead: NRM Potential Partners: UoG, NMC, PMRI</p>	
73	4.3B	<p>Support NGO/Civil Society Development Recommended Leads: All NGOs in the CNMI (TNC, MINA, MIC, etc.) Potential Partners: An organization with expertise in NGO development (such as the Stanford Center for Social Innovation)</p>	
74	4.3C	<p>LBSP: BMP Tour – Engage Mayors, Churches, Elders, Community Groups, Fishermen’s Associations in “Ridge to Reef” Demonstration Projects Recommended Lead: Municipal Councils Potential Partners: CRM, DEQ, DPW, local churches, Mayor’s Council, Contractors’ Association, Community Associations, MINA</p>	
74	4.3D	<p>LBSP: Implement Comprehensive Monitoring Of Post-Construction Site Inspections Recommended Lead: CRM, DEQ Potential Partners: DPW, DEQ, Contractors Association, DLNR, Municipal Councils, CNMI Zoning Board</p>	

PAGE #	CAPACITY BUILDING STRATEGY / RECOMMENDATION / POTENTIAL PARTNERS		COMPLEXITY / TIME / COST
75	4.3E	<p>LBSP: Establish Procurement Process that Incentivizes Certified Professionals</p> <p>Recommended Lead: CRM, DEQ</p> <p>Potential Partners: DPW, Municipal Councils, Contractors Association, Office of the AG</p>	
75	4.3F	<p>Connect to Existing Curriculum Standards in Public Schools that are Locally-appropriate in order to Increase Stewardship Message</p> <p>Recommended Lead: The CNMI Board of Education, Public School System</p> <p>Potential Partners: MINA, NRM Education Program, MMT</p>	
76	4.3G	<p>LBSP: Define (Current and Possible Future) Site Development Process, Time to Permit, Clear Rules/Regulations, and Incentives for Contractors and Investors to Follow Rules</p> <p>Recommended Lead: CRM, CNMI Zoning Board</p> <p>Potential Partners: DPW, DEQ, Office of the AG, Legislature</p>	
77	4.3H	<p>Create Attorney Positions at Each of the CRI Agencies</p> <p>Recommended Lead: Office of the AG</p> <p>Potential Partners: DEQ, CRM, DFW, federal agencies/funders to pay for lawyers</p>	
77	4.3I	<p>LBSP: Develop Inventory of Professionals Associated with Site Development and Initiate Certification Process for Low Impact Development</p> <p>Recommended Lead: DEQ</p> <p>Potential Partners: CRM, DPW, Municipal Councils, CNMI Zoning Board</p>	

Section One: Introduction

1.1 Scope and Purpose of this Assessment

This capacity assessment is a component of the coral reef management priority setting process facilitated by the [NOAA CRCP](#) and initiated in 2009. The stated purpose of this process was “to develop place-based, local coral reef management priorities” for the seven U.S. state and territorial coral reef jurisdictions, including CNMI. In the CNMI, the priorities were identified in the 2010 publication of “Commonwealth of the Northern Mariana Islands’ Coral Reef Management Priorities” (henceforth, “PSD”). The PSD forms the lens for the capacity assessment process. The PSD includes, in Appendix Three, a brief summary of governance capacity issues in the CNMI entitled “Preliminary Identification of Capacity Gaps.” In September 2011, NOAA CRCP hired SustainaMetrix as part of a competitive bid process to conduct a more detailed assessment across all seven jurisdictions including the CNMI, which expands on this initial intent to address capacity gaps in ecosystem governance for coral reef management in the CNMI. This report summarizes the findings of our capacity assessment conducted in the CNMI between April 2013 and September 2013, including a 10-day site visit to the CNMI from June 14 to June 24, 2013, review of over 80 background documents, over 50 interviews, and ongoing collaboration with the CNMI Jurisdictional Capacity Assessment Team (J-CAT).

The PSD indicates “specific priority locations for activities” (or “priority sites”) at which to apply key goals and objectives. The PSD highlighted Laolao Bay Watershed (Saipan), Garapan Watershed (Saipan), and Talakhaya Watershed (Rota) and the existing MPAs as priority sites. The PSD guided our initial approach to the capacity assessment, essentially framing the assessment in terms of the capacity present in the system to accomplish the goals and objectives detailed in them. From this starting point, we adaptively deployed a set of methodological tools aimed at building an understanding of the coral reef management system and illuminating current capacity gaps, as well as persistent barriers to building capacity, as they related to realizing the goals and objectives in the PSD.

The 2009 NOAA CRCP document “Coral Reef Conservation Program Goals and Objectives 2010-2015” (henceforth, 2010-2015 Goals & Objectives) acknowledges that while threats to coral reefs are diverse and operate at a range of scales, from local fishing pressures and regional pollution impacts to the global drivers of climate change and ocean acidification, the document concludes that “within each threat... [there is a] common need to select and work in priority coral reef areas to ensure a holistic and integrated management approach to support healthy, resilient coral reef ecosystems.” In the CNMI, this directive was expressed by the creation of ten priority objectives in the PSD under four priority goal headings to be addressed primarily at the three priority sites and the MPAs. The primary purpose of this assessment is to examine capacity in the CNMI as it relates to the priorities expressed in the PSD. In the strictest sense, as envisioned by these high-level NOAA CRCP document (the PSD and the 2010-2015 Goals & Objectives) the scope of our work in the jurisdiction is to assess the capacity to manage coral reefs in the CNMI as it relates to the PSD goals and objectives, made operational at the priority sites.

That being said, we recognize the complexity inherent in managing coral resources and realize that issues are often interrelated, dynamic, and constantly evolving. We realize that approaches and capacities will need to be adaptive and relevant to the local context, link across a range of topics (that require a broad range of competencies and capabilities),

and exist at a variety of scales beyond priority sites in order to adequately address the challenge of managing the CNMI's marine resources. One of the challenges of this capacity assessment, which we believe in many ways mirrors the challenges of coral management, has been to balance the need to aim our inquiry flexibly across multiple scales and topics with the critical need to preserve focus on the more circumscribed issues laid out by the PSD goals and objectives. This is discussed in more detail at the end of this Section (Section 1.6). Experience with building adaptive capacity around the world suggests that Ecosystem-based Management is complex, does not follow a simple recipe, and interactions can be volatile, unpredictable, and unknowable in advance. Indeed, high uncertainty of how to produce a desired result can fuel disagreement and if disagreement intensifies, it can expand the parameters of uncertainty creating less desirable outcomes and escalating conflict.

1.2 Our Approach: Ecosystem-based Management

Our approach to conducting this capacity assessment, which we believe aids in creating the required flexibility, is described in the document prepared by SustainaMetric [“Coral Reef Management Capacity Assessment Methodology”](#) which was submitted to, and approved by, NOAA CRCP in February 2012. Our methodology builds off of a conceptual framework known as “Ecosystem-based Management”, or simply “the ecosystem approach” ([NRC, 2008](#); [Olsen et al., 2009](#); [McLeod and Leslie, 2009](#)). NOAA CRCP expressly endorses the ecosystem approach in its 2010-2015 Goals & Objectives document and in the language included in the preliminary capacity assessment appendices in most of the jurisdictional PSDs (including the CNMI). Simply put, the ecosystem approach acknowledges that ecosystems and the people that live within and in proximity to them, and depend on them for goods and services, must be understood and managed as a dynamically linked, interdependent system. The ecosystem approach requires a fundamental management paradigm shift that transcends single-species management, as well as the more holistic consideration of larger natural systems (e.g. watersheds, coral reefs), to explicitly include the human and social dimensions. It further accepts that natural and social systems are dynamically linked and that changes in one realm have impacts in the other and that these impacts can include self-reinforcing feedbacks (Figure 1).

In our approach to the assessment of adaptive capacity to the practice of Ecosystem-based Management, we have complemented a core philosophy with a peer-reviewed set of tools, methods and a common vocabulary to achieve the goal of a rapid diagnostic approach that can generate a set of actionable recommendations (please see Appendix A: For More Information). The common vocabulary terms are defined in Appendix B: Glossary. These methods are designed for application in a variety of locations, embracing the local context as well as the complexity and dynamism of the coupled social and natural ecosystem. Our purpose is to help assess capacity of a given management system's readiness and capability to pursue management actions that are realistic with the current operational realities and that seek a more holistic approach to understand, consider and adapt to changes in the coupled human/natural system. This capacity assessment process is done in a relatively rapid and synoptic manner. Our goal is to provide products and services that can generate useful recommendations for short-term action 1-3 years, that have the best likelihood of meaningful success given current situational dynamics and politics. Among these tools are two related frameworks for assessing the maturity of an Ecosystem-based Management program and its progression along a series of steps toward program success, growth and long-term goal attainment. We have designed these to be simplifying frameworks that feature systems thinking and complexity concepts to enhance innovation in management and use of findings.

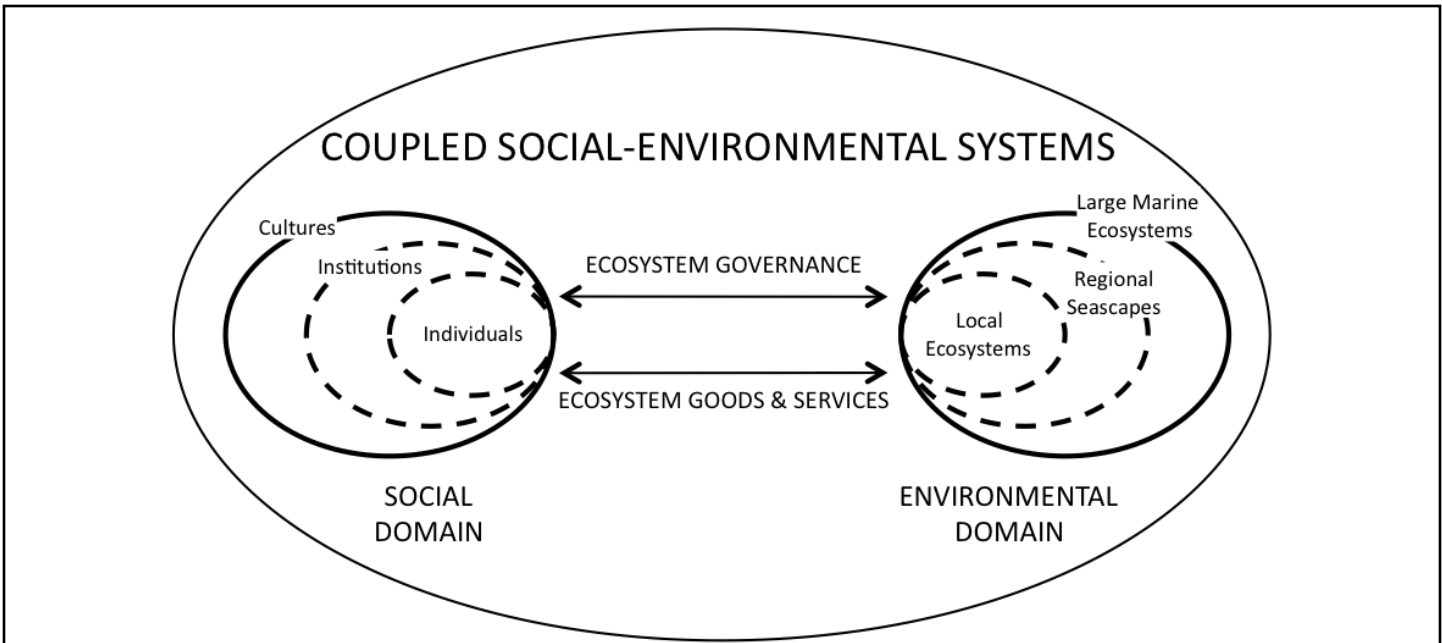


Figure 1: Dynamic human and ecological systems are referred to as “coupled social-ecological systems.”. Interactions between the social and ecological domains occur over multiple geographic scales, and understanding connections across scales is critical to long-term success. Figure adapted from McCleod and Leslie (2009).

The first of these tools is the **Management Cycle** (Figure 2), which gives a clear and straightforward presentation of the main steps through which a program should progress through linked cycles of adaptive management.

These steps are:

- Analysis of problems and opportunities (Step 1);
- Formulation of a course of action (Step 2);
- Formalization of a commitment to a set of policies and a plan of action and the allocation of the necessary authority and funds to carry it forward (Step 3);
- Implementation of the policies and actions (Step 4); and,
- Evaluation of successes, failures, learning and a re-examination of how the issues themselves have changed (Step 5).

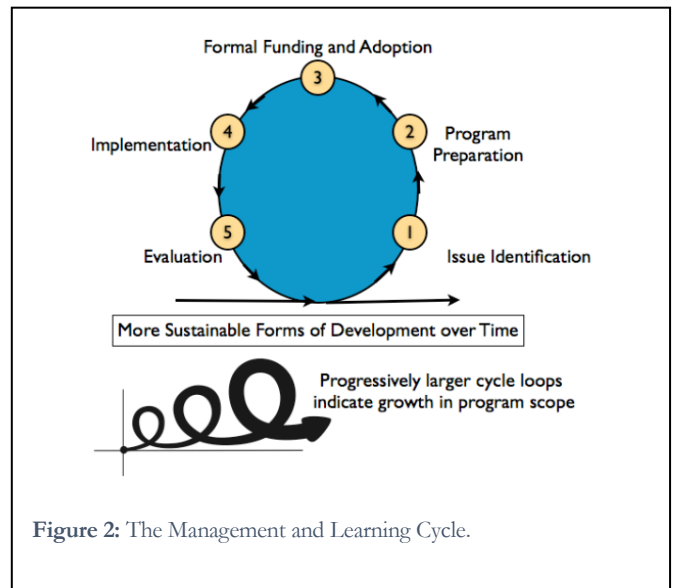
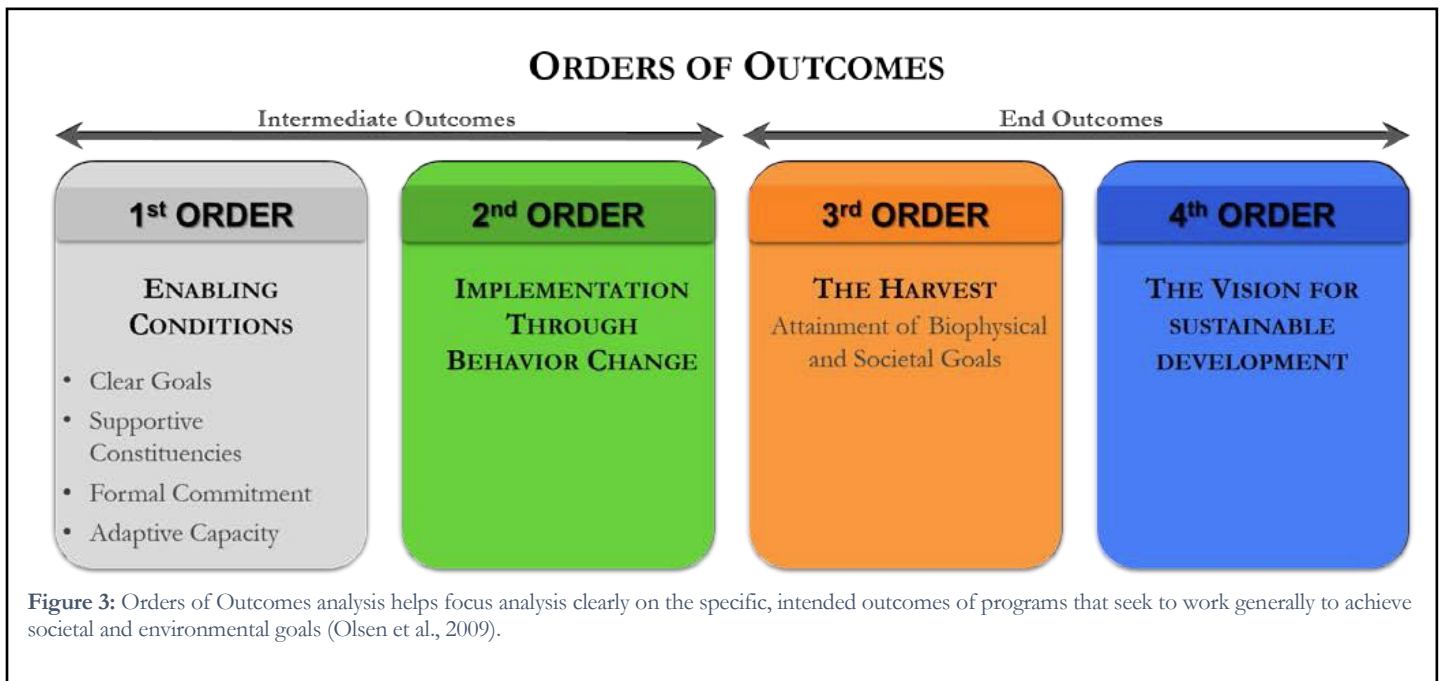


Figure 2: The Management and Learning Cycle.

These steps are imagined as a cycle, in that evaluation and learning in Step 5 can and should inform a new round of analysis, matching program formulation with the situation and context (ideally more ambitious and innovative as time progresses), the securing of additional formal commitment, new program implementation, followed by reflection and so on. Ideally, thoughtful progression through these linked cycles facilitates true “adaptive management.”

The second tool, **Outcome Analysis**, is envisioned as a complement to the Management Cycle and is intended to help focus analysis clearly on the specific, intended outcomes of programs that seek to work generally to achieve societal and environmental goals (Figure 3).

This tool helps to disaggregate and characterize the goals of a program into well-defined Orders of Outcome that can be readily discussed, analyzed and compared across disparate settings (e.g. priority areas or the seven U.S. Flag coral jurisdictions). Within the Orders framework, the four Orders of Outcome progress from assembling the enabling conditions for success through to the realization of long-term, sustained social and natural systems health, with two intermediate steps:



- **First Order Outcomes:** Assembling the enabling conditions for the successful implementation of a plan of action;
 1. Clear, time-bound and unambiguous goals that describe both realistic and desired societal and biophysical conditions that may be reached in the near-term (such as 5-10 years);
 2. Supportive and informed constituencies for attainment of the desired goals;
 3. Formal commitment for a desired plan of action to meet the goals; and,
 4. Sufficient institutional capacity to implement the plan of action to meet the goals.
- **Second Order Outcomes:** Successful program implementation resulting in the desired behavioral change that is required to meet the goals;
- **Third Order Outcomes:** Achievement of target environmental and societal conditions as defined in the 1st Order - this is fully expected to be adaptive; and,
- **Fourth Order Outcomes:** Guiding long-term vision towards a purpose, such as sustainable development, that may include sustaining and maintaining the target outcomes over the long-term.

While, the “Preliminary Identification of Capacity Gaps” presented in Appendix Three of the PSD makes explicit reference to the necessity of addressing capacity gaps and enabling conditions in coral reef management for program success, it does not expressly refer to the enabling conditions within the Orders framework. Doing so simply recognizes that assembling the key enabling conditions is a 1st Order Outcome; that is, there are appropriate first order goals that must be achieved before programs can be mounted that seek to change behaviors (2nd Order), in order

to achieve targeted social and environmental outcomes (3rd Order), which can then be institutionalized to achieve a stable, sustainable and healthy social and environmental norm (4th Order).

With respect to this (or any) capacity needs assessment, it is important to recognize that having the capacity present within an organization (e.g. CRI agencies) is only one piece of a whole that also includes setting clear and realistic goals, having supportive constituencies, and obtaining formal commitment across all levels of the government. That said, the CRI Agencies are at the center of a larger, complex system of coral reef management entities within the CNMI, including local government, several NGOs, and other local as well as federal managing agencies. This necessitates a broader view of “capacity” beyond the financial, personnel and equipment resources that reside within the target organizations.

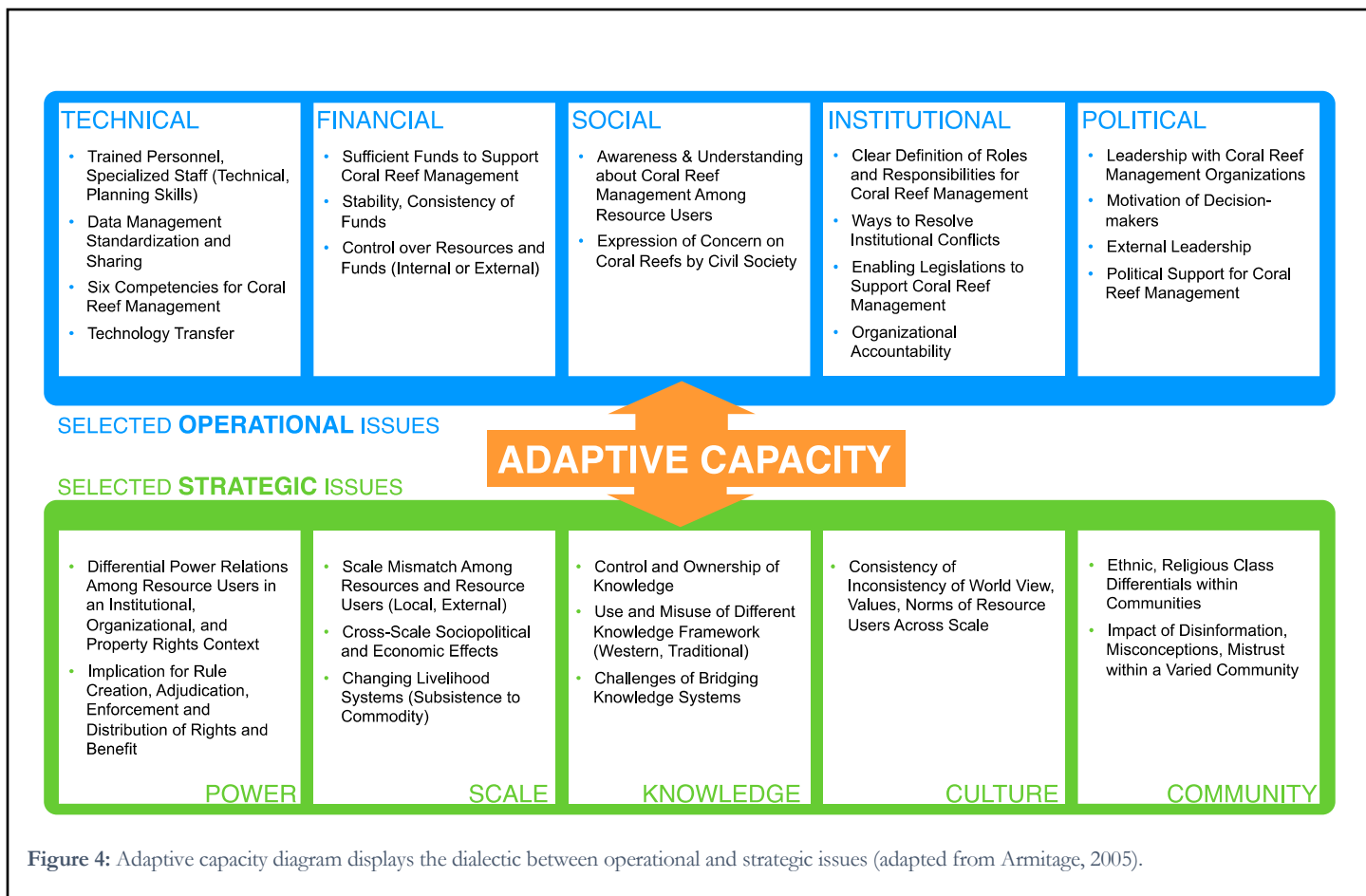
It is our intent in this capacity assessment to apply these analytical tools (The Management Cycle and the Orders of Outcome) to create a common language in order to examine the capacity present in coral reef management system in the CNMI. While the concepts and vocabulary may be unfamiliar to some, we believe that they provide a clear and well-developed methodological framework for both process and outcomes that will help coral practitioners across the CNMI, from local site managers to high-level government official, clearly evaluate and compare plans and programs that intend to improve social and environmental outcomes.

1.3 Our Approach: Adaptive Capacity

While employing the tools and language of Ecosystem-based Management can add great clarity to the process of identifying issues, developing goals and the plans to accomplish them, and engaging in meaningful reflection and learning, it is equally important to recognize that the process is inherently complex, dynamic and highly contextual. Social and environmental conditions are undergoing constant change, and the nature of this change, and how best to respond to it, can vary significantly from place to place. Acknowledging this, and creating robust methods to detect, understand and respond to change in a contextually relevant manner (i.e. “adaptive capacity”) is essential.

Accomplishing this in the complex and multi-level system that exists to manage and protect coral reefs in the CNMI presents many unique challenges. Building resilient and flexible management regimes that can sense, learn from, and adapt to operational and strategic issues that emerge and evolve at a variety of scales across federal, state and local natural resource management programs (Figure 4) will be increasingly critical to long-term, sustainable and successful management of natural systems around the globe ([Armitage, 2005](#)). This process explores both operational and strategic issues for building adaptive capacity and aggregates the findings by providing a set of actionable recommendations described in Section 4. For this application, the unit of analysis is on the larger coral reef management system, not on specific individuals or specific organizations’ depths and breadth across these issues of adaptive capacity.

In the remainder of this Section, we review the specific methods we used to gather data about coral reef management in the CNMI and analyzed and integrated it into a coherent description of the challenges and opportunities for further developing the adaptive capacity of the system to respond to management issues. We review the findings and explain the development of our recommendations for sequencing and prioritizing capacity building activities that meet the management needs as understood from the perspective of adaptive capacity and Ecosystem-based Management.



1.4 Additional Capacity Assessment Tools

The capacity assessment work began with a detailed document review and discussions with key NOAA CRCP personnel, as well as a review of the current literature, developing an understanding of the “project pipeline”, pressing issues, and preparation of a timeline to grow an understanding of recent activities in coral reef management in the CNMI. This review was used initially to illuminate capacity gaps as well as to underscore existing management capacity in the system. The assessment continued with in-depth telephone interviews, email correspondence, and extensive in-person interviews and focus groups conducted during a site visit to the CNMI in June 2013. After the site visit, the data gathering continued with further document review, analysis and synthesis through November 2013, with a wide range of stakeholders throughout the CNMI coral reef management system. The key components of how we gathered and analyzed data and conducted the capacity assessment are summarized below.

Jurisdictional Capacity Assessment Team: As part of the process of inquiry into capacity needs, we convened a small standing committee of people with in-depth knowledge and deep personal involvement in coral reef management system in the CNMI that we dubbed the “J-CAT.” We held six meetings with this group, either by conference call or in person, between April 2013 and August 2013 including one during our June 2013 site visit. We collaborated with J-CAT members during scheduled meetings, as well as on an ad hoc basis, to:

- Share available information at key points in the capacity assessment process;

- Create a shared communications strategy about the capacity assessment process;
- Customize the methods based on local context;
- Coordinate an efficient process of data collection;
- Provide input to assist in prioritizing capacity building needs;
- Analyze and summarize results and recommendations; and,
- Make the overall process as useful as possible within the current context of coral reef management in the CNMI.

Our goal was to build high quality collaboration among the consultant team and the J-CAT with a clear beginning, middle and end to our process that provided extensive opportunity for input along the way. J-CAT members summarized the experience with largely positive comments particularly noting the huge amount of material gathered for analysis and learning that occurred during the process. It is important to note that while consensus was a common outcome from the J-CAT collaborative process, the consultant team made it clear that the role of the J-CAT was as a supportive and guiding function across all aspects of the process, not with the specific goal to arrive at consensus. Therefore, the consultant team remains responsible for the overall product and process. This document was developed, carefully reviewed, prioritized and edited in consultation with the CNMI J-CAT.

Goals and Objectives for Coral Reef Management in the CNMI: The PSD identifies four primary management goals:

- **GOAL 1:** Improve the condition of the CNMI's coral reef ecosystems by reducing the amount of sediment, nutrients and other land-based sources of pollution (LBSP) in the CNMI's watersheds;
- **GOAL 2:** Increase the abundance and average size of the CNMI's key coral reef fishery species to protect trophic structure and biodiversity and improve coral reef ecosystem condition (within and outside of existing MPAs);
- **GOAL 3:** Develop the legal and administrative authority and capacity to monitor and assess impacts of military build-up activities on coral reefs by 2012; and,
- **GOAL 4:** Monitor the short- and long-term impacts of global climate change as part of a longer-term adaptation strategy.

Under those four goals there were nineteen total objectives developed. Of those nineteen objectives, ten were deemed priority objectives:

- **Objective 1.1:** Implement Laolao CAP as a model approach to site-based planning and management by 2013 (coinciding with the end of the ARRA funded road improvement project in Laolao Bay);
- **Objective 1.2:** Develop and begin implementing a CAP or comprehensive watershed management plan in Garapan (defined as American Memorial Park to Garapan Fishing Base) by 2015 to improve water quality and condition of adjacent coral reefs;
- **Objective 1.3:** Develop and begin to implement a CAP or comprehensive watershed management plan for a key watershed in Rota to improve water quality and condition of adjacent coral reefs;

- **Objective 2.1:** Increase compliance with fishing laws and regulations that affect key coral reef fishery species by 2015. Focus these efforts in priority watersheds (those with completed CAPs);
- **Objective 2.2:** Strengthen the information base for fisheries management by 2012. Collect, analyze and manage fishery-dependent and -independent data about the status of stocks, including relevant life history information for targeted coral reef fishes. (Refer to Summary Recommendations [Urgent/Critical] in “Coral Reef Stock Assessment Workshop” [Western Pacific Regional Fishery Management Council (WESPAC), Feb. 2008]);
- **Objective 2.3:** Enact the Fishery Management Act and accompanying regulations by 2010;
- **Objective 3.1:** Establish protocols for joint CNMI and federal agency involvement in the environmental assessment and monitoring of military activities (e.g., landing boats, sonar exercises) in proximity to coral reefs by 2012;
- **Objective 3.2:** Rapidly assess and collect baseline information on coral reef conditions in existing or proposed military training areas. Work with military to establish these baselines and long-term monitoring of these sites;
- **Objective 3.3:** Establish protocols to avoid and minimize impacts of military vessel anchors on the CNMI’s coral reef systems by 2011; and,
- **Objective 4.1:** Create and build capacity to implement a response plan by 2012 to quantify and characterize bleaching events, building on recommendations from NOAA climate change workshop held in Guam, September 2009.

An early step in the capacity assessment was to review previous LAS as well as site-based management plans, as appropriate, for the three priority sites. Plans and reports on coral reef management across the CNMI were used to better understand the wide array of coral reef related projects in the system, with the goal of investigating the capacity present in the system to execute these projects and achieve the goals and objectives stated in the PSD.

After building background knowledge of coral reef management in the CNMI we developed a list of key questions associated with the various initiatives and projects across the CNMI and developed a plan to interview J-CAT members. Interviews with J-CAT members built our understanding of projects, context and how specific projects fit into the larger coral reef management system in the CNMI and how its “performance story” could illuminate capacity gaps and persistent barriers as well as successes in building capacity and managing coral resources. The current coral reef management initiatives became a primary, but not the only line of inquiry for the interviews conducted during the site visit.

Timeline for Coral Reef Management in the CNMI: We assembled a timeline of key events affecting coral reefs in the CNMI, and their management, beginning in a general sense with early traditional history to the present with attention to the events that signaled increase in capacity for coral reef management. A brief analysis is presented in the next Section 2.2 and 2.3. The timeline also includes events that affect capacity to manage coral reefs such as large cyclones and bleaching events, as well as key governance milestones, from political events like the establishment of the CNMI as a U.S. Commonwealth, to laws and rulings that directly affect coral reef management. The timeline was based upon interviews and anecdotes as well as published information from social science, humanities and natural science.

We printed out, on a long sheet of paper (about 10 feet), a physical timeline and brought it with us to meetings during the site visit for review and input. The timeline proved to be of interest to interviewees, who often expressed gratitude in the level of detailed information about coral reef management over time pulled together in one place. All were encouraged to “grab a Sharpie” and add new events. With strong input, the timeline became far more detailed and complete during the course of our visit and afterwards via email (see Appendix C: Recent Timeline of Coral Reef

Management in CNMI for a tabular representation of the timeline, including these additions). The timeline not only presents highly useful, contextually relevant information, but it serves as a visual reminder of the wide range of antecedents, actions, and plans that have built the platform for contemporary coral reef management and that current and future managers need to consider these historical antecedents. The timeline also became an “icebreaker” that created an engaging environment within which to conduct our interviews. The final timeline is presented in Appendix C: Recent Timeline of Coral Reef Management in CNMI of this report.

While never complete, the timeline reveals that there has been a positive trend of increasing capacity built to manage coral reefs as well as major policy initiatives and a blossoming role of civil society and market forces that depend upon the health of the coral reefs. However, as implementation progressed, there has neither been clear agreement on how best to implement among the diverse stakeholders nor certainty and predictability about how to best solve the problem. These forces of fragmentation, challenges posed by dynamic natural and social systems, and conflicting priorities have increased. These are forces that can constrain institutional capacity building and adaptive implementation of coral reef management.



Frank Rabauliman, Director of the Department of Environmental Quality, reviews and continues to the development of the recent Timeline of Coral Reef Management in CNMI during the site visit. (Photo credit: Glenn Page, SustainaMetric.)

Adaptive Approach to Capacity Needs Assessment: Over the course of conducting the assessment and applying the tools discussed above, we adapted our approach due to realities encountered during the site visit and during interviews. In some instances, neither the PSD nor other relevant management plans were seen as the universally shared source for defining the jurisdiction’s coral reef management priorities and activities. Furthermore, in some instances, when we investigated a given current activity with staff who were thought to be involved in the activity, they were not familiar with it, or recent changes in staffing meant they were not acquainted with it, and others dismissed it as something in a document in which they had little investment. Nonetheless, our semi-structured interview approach and comprehensive approach to seeking input from across the coral reef management system worked well. We often began inquiring about a specific activity and expanded the scope to include more open-ended dialogue that illuminated gaps and barriers, successes, and more broadly, the current status and context of the coral reef management system in the CNMI. Finally, we conducted an internal analysis of the enabling conditions (1st Order), which includes reflections

on what may be needed regarding changes in behavior and social norms (2nd Order) required to effectively build capacity to improve coral reef management in the CNMI.

Our investigation of current activities yielded specific and often detailed information about gaps and barriers to successful implementation of the projects. These findings are not presented here in a project-by-project review, as that would be beyond the scope of this effort. The findings on capacity building needs, as presented here, are therefore informed by:

- A review of over 80 documents relevant to the system (please see Literature Cited and Appendix A: For More Information);
- Over 50 in-depth interviews with key actors in the system (please see Appendix D: Interview List);
- Development of the timeline (with over 140 entries) and review of current activities as defined above;
- Our discussions with, and feedback from, the J-CAT, which spanned over 6 meetings held on (according to EST): April 18, May 8, May 29, June 24 (in-person), July 17, and August 28, 2013;
- Our immersion in and contributions to the professional literature of adaptive capacity, Ecosystem-based Management, ecosystem governance, capacity assessment, organizational behavior and other related disciplines; and,
- Our professional judgment, informed by similar assessments in other U.S. Flag coral jurisdictions and locations around the world.

Generation and Prioritization of Recommendations: The recommendations in Section Four are intended to serve as the core of a comprehensive capacity building strategy. Section Five presents a capacity building “road map” of how to move from this report to an action agenda with an overview of elements that would serve as main ingredients for a long-term capacity building strategy. Together, they represent a range of tasks that should not be viewed as another long list of things to do. Rather, they are presented as core elements needed to transition towards an ecosystem approach that recognizes that context is dynamic and ever changing, and investment in adaptive capacity is needed to build resilience and response to ecosystem change. Therefore sequencing and prioritizing what is done to build momentum for capacity building is crucial. The recommendations presented in this report were generated after careful consideration of the need to sequence and prioritize, and in close coordination with the CNMI J-CAT, based on the current context of what is possible within the current coral reef management system.

Section Two: The Context for Coral Reef Management in the CNMI: Trends and Current Conditions

2.1 Introduction to Context in the CNMI

Situational awareness and contextual understanding is important for all natural resource managers but particularly important for coral reef management in the CNMI. The context is dynamic and rapidly changing. As noted in the previous section, assessment of capacity to manage coral reefs in the CNMI is highly dependent on the socio-ecological context within which such management is taking place. This calls for an understanding of the pressures on coral reef systems, the current state (condition) and likely emerging trends in the coral reef condition and comprehension of the larger governance dimensions that are responding to the drivers and pressures influencing the state of the coral reef resource. We use the term drivers to include natural or human induced factors that cause changes to the state of the coral reefs of the CNMI. Direct drivers unequivocally influence ecosystem processes while indirect drivers cause ecosystem change by influencing one or more direct drivers ([Millennium Ecosystem Assessment, 2005](#)). This analysis helps to ensure that recommendations in Section 4 of this report are grounded in the awareness that specific attributes and determinants of adaptive capacity may be scale-dependent ([Adger and Vincent, 2005](#)), culture and place specific ([Adger, 2003](#)), and may involve tradeoffs ([Folke et al., 2002](#); [Allison and Hobbs, 2004](#); [Pelling and High, 2005](#)). For a more detailed summary of coral reef health please consult [The State of Coral Reef Ecosystems of the Commonwealth of the Northern Mariana Islands](#) (Starmer et al., 2008) and [Status of the Coral Reefs of the Pacific and Outlook](#) (Chin et al., 2011).

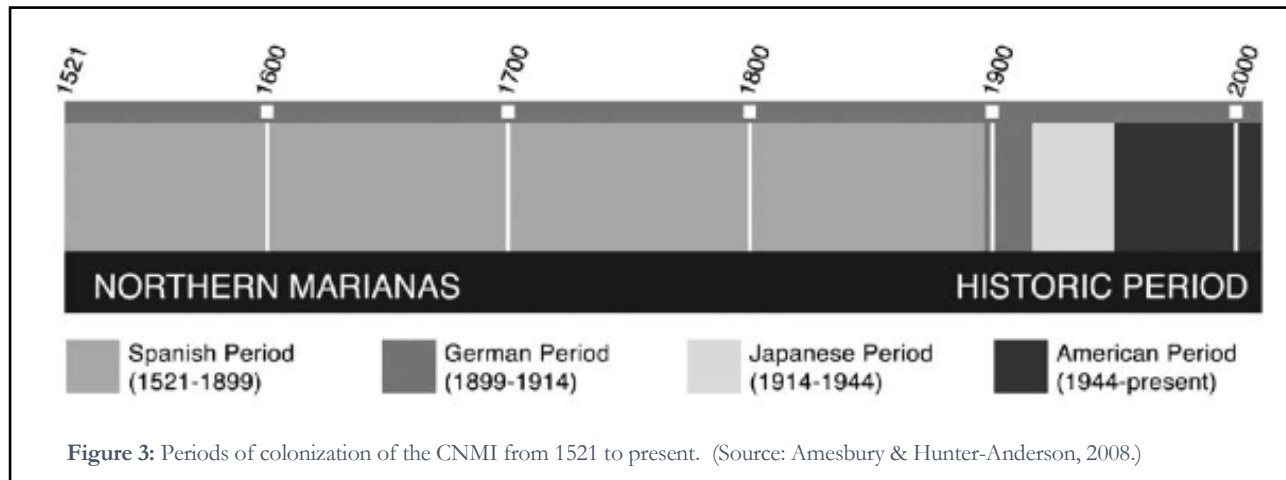
2.2 Importance of Social and Historical Context

For over four thousand years the Chamorro people have inhabited the CNMI. The Carolinians, another distinct cultural group that settled the area in the 19th century, are also recognized as indigenous to the CNMI. Portuguese circumnavigator Ferdinand Magellan was the first Westerner to reach the Mariana Islands. The Spaniards were the first to colonize the CNMI, followed by the Germans, the Japanese, and finally the U.S. The Northern Mariana Islands were awarded to the U.S. at the conclusion of the Second World War and the people of the Northern Mariana Islands voted for Commonwealth status under the U.S. in 1976.

The CNMI has been through numerous regime shifts and as such the traditional culture has been subjected to a variety of pressures that have presented challenges to traditional practices and ecological knowledge. Coral reef protection has also not been a priority through recent modern history, with issues such as military readiness and economic development taking precedence. Following American colonization in the 1940s, the CNMI went through a period of industrialization. The area experienced a cultural shift away from subsistence fishing and towards a reliance on imported goods from the U.S.

In the 1980s the CNMI welcomed foreign capital and labor and began transforming into a regional tourist destination and a hub for garment manufacturing. This changed the demographic profile of the CNMI as the population in 1980 of 16,780 rose to 63,000 in 1997, representing an increase of 275% in less than 20 years. The local utility company, Commonwealth Utilities Corporation, could not develop basic utilities infrastructure to keep pace with the population

boom. The growth of the temporary labor quickly outnumbered that of the indigenous population as well as U.S. citizens. In 1997, foreign workers comprised 69% of the workforce.



The economic upturn in the CNMI in the 1980s is reflected in the 247% increase of the gross business revenues taxes from 1986-96, rising from \$19.3 million to \$67 million, representing an annual gain of 13% a year. Revenues generated from wages, import and export taxes, and hotel tax gains also increased substantially. Heavy hotel construction and development followed, resulting in over 505,000 tourists coming to the CNMI in 1992 ([Economic Impact of Federal Laws on the Commonwealth of the Northern Mariana Islands, 2008](#)).

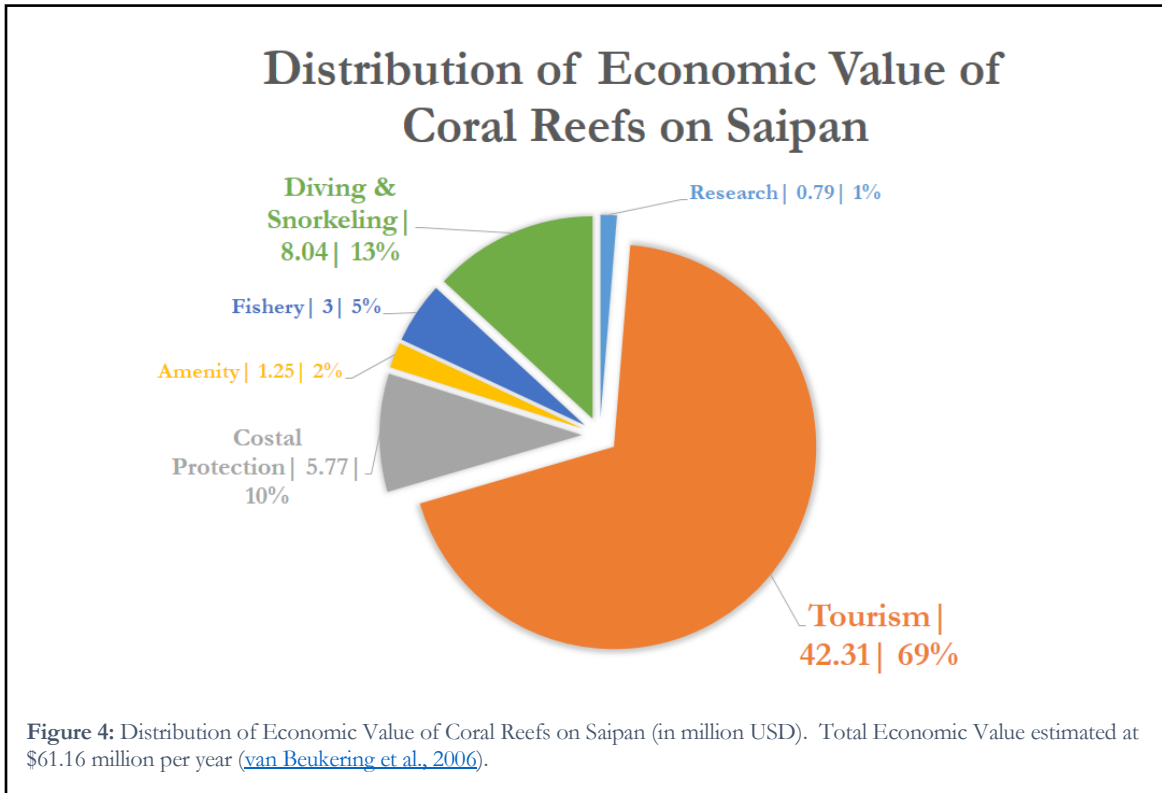
Table 1: Summary of results from van Beukering et al (2006) for the CNMI. Original results are converted from U.S. dollars in 2004 prices into international dollars in 2009 prices using purchasing power parity and Gross Domestic Product deflator factors from the World Bank World Development Indicators.

	Commercial Fishery	Recreational Fishery	Underwater and Nautical Tourism	Associated Tourism	Costal Protection	Research and Education	Total
Int. Dollar Per Hectare	106	72	1595	13,045	2782	273	17,873
Int. Dollar Per Capita	15	23	9	1,931	408	40	2,409

The downturn in the Asian economy in 1998 negatively impacted the tourism and business sectors of the CNMI. The number of visitors dropped dramatically (by 25-40%), which affected the hotels and visitor-associated industries. The economy was further impacted in 2005 when a series of lawsuits were filed against several garment manufacturing companies in the CNMI. There was mass closure of the factories between 2005 and 2009. The government and economy in the CNMI saw a sharp downturn following the closures. Many of the workers moved back to their native countries as well, the majority to China. The unemployment rate rose from 8% in 2005 to 11.2% in 2010.

The CNMI economy is still feeling the impacts of the recent economic downturn. The tourism industry now employs between 25-50% of the workforce and accounts for roughly one fourth of the Gross Domestic Product (GDP). Annual tourist arrivals have remained below 400,000 since 2007, dominated largely by Japanese and Korean visitors. An economic valuation conducted in 2006 valued coral reefs in the CNMI at \$61.16 million annually, with tourism

comprising the majority of that value (70%). Subsistence services such as fisheries and amenities for coral reefs represent 7% of that value (van Beukering et al., 2006).



Traditional cultural connections to the natural environment and subsistence fishing practices, largely stemming from Chamorro and Carolinian influences, have diminished in the CNMI through periods of colonization, but are still present and relevant (Allen and Amesbury, 2012). Local inhabitants use the coral reef and marine resources for recreation and fishing. Traditional stories and values have evolved and changed over the course of the CNMI's history. The majority of the population is Roman Catholic and, despite the wide range of ethnic groups and religious affiliations across the population, churches often have a strong influence in communities. The family unit, or clan structure, remains an important social structure in the CNMI, particularly among the Chamorro and Carolinian populations. The local government plays a strong role in the socioeconomics of the CNMI.

For more information, please see: Commonwealth of the Northern Mariana Islands (McPhetres, 2012), Commonwealth of the Northern Mariana Islands As a Fishing Community (Allen and Amesbury, 2012), An Analysis of Archaeological and Historical Data on Fisheries for Pelagic Species in Guam and the Northern Mariana Islands (Amesbury and Hunter-Anderson, 2008), The Economic Value of the Coral Reefs of Saipan, Commonwealth of the Northern Mariana Islands (van Beukering et al., 2006).

2.3 Brief Summary of the Current State of the Coral Reefs in the CNMI

The CNMI is a chain of 14 islands to the east of the Philippines and west of the Marianas Trench. The 600 kilometers (km) island chain is divided into two sections, with large variations in the coral reef resources between the south and the north (Chin et al., 2011). Most of the 417 km shoreline is potential coral habitat, although active coral reef

development does not occur in all areas. The southern islands (Saipan [the capital], Tinian, Agijuan, Rota, and Farallon de Medinilla) are mostly raised limestone blocks with sloping coastlines protected by barrier reefs and well-developed fringing reefs on the western coasts. The largely uninhabited northern islands (Anatahan, Sarigan, Guguan, Alamagan, Pagan, Agrihan, Asuncion, Maug, and Uracas [also known as Farallon de Pajaros]) are primarily volcanic, including some active volcanoes, and have much less potential coral reef area. However, there are several areas around the northern areas that have well-developed coral reefs with high mean coral cover (Brainard et al., 2012).

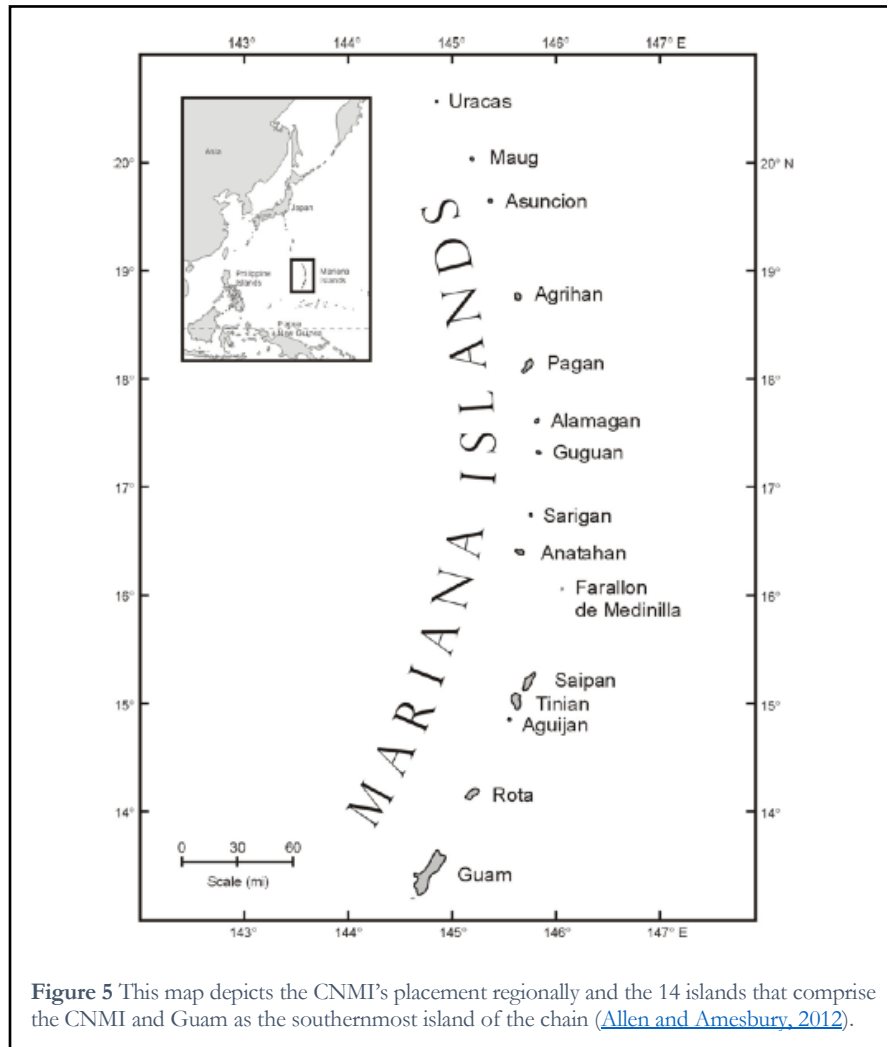


Figure 5 This map depicts the CNMI's placement regionally and the 14 islands that comprise the CNMI and Guam as the southernmost island of the chain (Allen and Amesbury, 2012).

During an investigation into the coral reef areas of the U.S. Flag Pacific islands in 1995, it was found that the 14 islands comprising the CNMI have more than 45 km² of coral reef areas between 0-3 nautical miles (nm) from shore, with 20 km² protected in MPAs, and 534 km² of coral reef areas between 3-200 nm. To date, there have been 256 species of corals comprising 56 genera and 41 octocorals of 20 genera identified from the CNMI's waters. The geologically older southern islands of Rota, Tinian, Saipan, Aguijan and Farallon de Medinilla have relatively greater coral reef development and species diversity when compared to the younger volcanic islands that lie north of Farallon de Medinilla. There are several instances where volcanic eruptions have negatively affected the adjacent nearshore coral reefs in the northern islands (e.g. Pagan Island in 1981 and Anatahan Island in 2004). Saipan has the most developed barrier reef system in the CNMI, as well as the largest human population and development pressure.

Tinian has a small barrier coral reef system that partially protects Tinian Harbor at the village of San Jose. The remaining coral reef systems found in the CNMI are fringing reefs with the most developed coral reefs on Tinian and Rota Islands (Haws, 2006).

Coral reef ecosystems in the CNMI are, on the whole, reasonably healthy. However, environmental stressors acting synergistically with anthropogenic stressors, such as NPS pollution and fishing pressure, have clearly affected areas in proximity to the populated southern islands. From a fisheries perspective, the northern islands and more distant banks and coral reefs appear to be in better condition than those closer to population centers (NOAA CoRIS). Marianas Archipelago Reef Assessment and Monitoring Program surveys in 2005 showed the highest overall average hard coral cover was at Pathfinder Bank (25%) and Maug Islands (22%) and showed highest levels of overall coral stress in Agrihan and Pagan. Since 2000, the CNMI MMT data demonstrates a steady declining trend in resiliency at sites with “impaired” water quality and NPS pollution. Specifically, decreases in species richness and recruit abundance, coupled with an increased dominance by one or a few corals, is becoming apparent at sites influenced by watershed pollution such as Laolao Bay (Starmer et al., 2008).

For more information, please see: State of the Reefs (2008), Status of Reefs in the Pacific (2011), Natural Resource Management Needs in the Pacific (2006), Downs 2012/2013, Houk (2010), and Paulay (2003).

2.4 Major Biophysical Pressures and Drivers of Coral Reef Condition

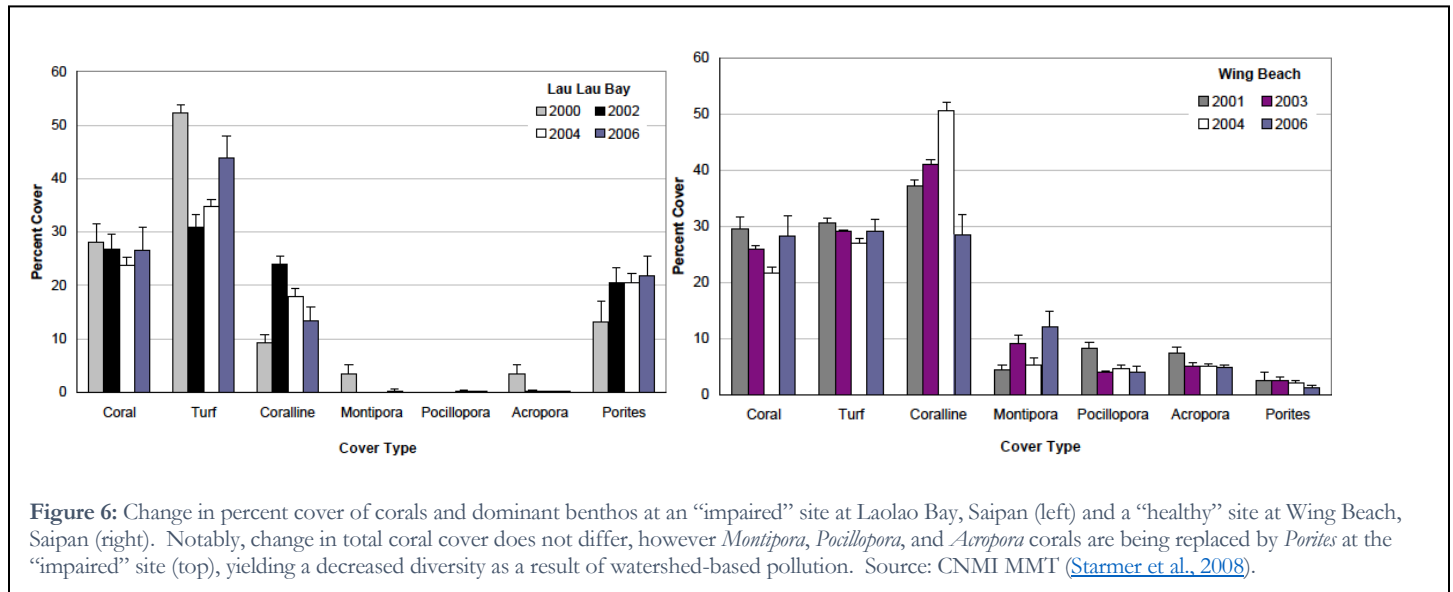
The four priority goals stated in the PSD that link with the major pressures and drivers on coral reef resources are: 1) LBSP, 2) fishing pressure, 3) military readiness and 4) climate change. Each of these pressures and drivers has further explanation in this section. Table 2 (below) is from the U.S. CZMA Section 309 Assessment and Strategy Report 2011-2015, describing resource and use threats and potential conflicts and the anticipated degree of the threat.

Table 2: Table taken from the [Coastal Zone Management Act Section 309 Assessment and Strategy Report 2011-2015](#) describes resource and use threats and potential conflicts with the anticipated degree of the threat.

Resource or Use	Threat or Use Conflict	Degree of Threat (H,M,L)	Anticipated Threat or Use Conflict
Coral Reefs	NPS, physical damage, probable sea temperature rise	High	Identified areas of localized propeller scarring from boat transfer activities, increased number of bleaching warning
Marine Resources	Invasive species	High	Aquaculture development initiatives, increase in shipping due to military buildup
Off-shore Fisheries	Overfishing by foreign fleets	Medium	Possible undocumented take of endangered species, increase pressure on fisheries
Near-shore Fisheries	Overfishing, habitat degradation, heavily polluted lagoon water	High	Lack of comprehensive management plan, no size or catch restriction on most fishery- targeted species, indication of accumulation of heavy metals in some taxa
Commercial Shipping	Dredging impacts	Medium	Continued need to dredge Sugar Dock, possible need to dredge Lighthouse Channel, lack of invasive species management plan
Recreation	High-intensity use	Medium (primarily on Saipan)	Damage to habitat from snorkelers, propeller scarring from boat transfer activities
Construction and Agriculture	Sedimentation, NPS, chemical outputs to the sea	High	Homestead development projects under-regulated, possible installation of major septic field on Tinian, secondary road maintenance
Aquaculture	Invasive species, chemical contaminants, nutrient pollution, disease	Medium	USDA funded extension program is actively promoting non-indigenous taxa for the purpose of aquaculture

Land-based Sources of Pollution

Even though the depressed economy and decline in tourism of the CNMI has contributed to the delay of major development projects, many of the developments existing today were created during a period of weaker protective measures, resulting in many of the current focal problems the CNMI faces. These developments threaten nearshore waters and act as an obstruction to improving the water quality of the CNMI, a major issue when considering that the well-being of the citizens and the coral reefs are inextricably tied to quality of the water. NPS pollution remains the greatest threat to the CNMI coral reef ecosystem (Table 2). Specific risks include failing sewage collection systems, urban runoff, and lack of proper erosion control.



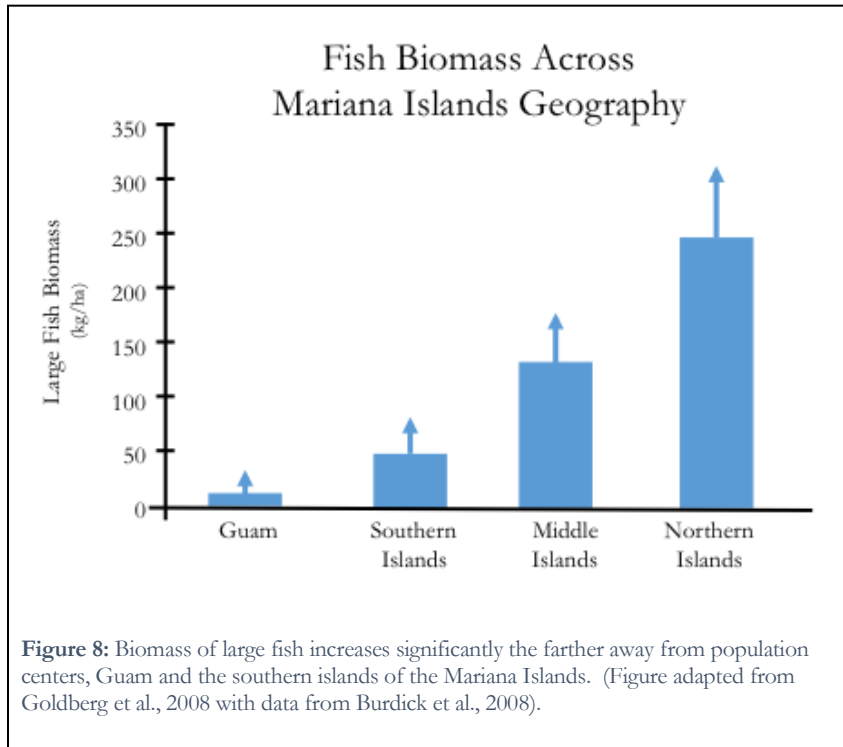
In a survey conducted in 2006 by the [DEQ](#), it was found that out of 83 water quality monitoring locations in the CNMI, 37.3% were classified as “impaired” due to excess nutrient and bacteria levels (Figure 8). Several sewage treatment plants have also been found to outfall fairly close to shore. The Commonwealth Utilities Corporation is in the process of upgrading and repairing sewage transfer and treatment infrastructure. With help from the U.S. EPA, many of the major hotels in the CNMI now discharge their hypersaline and nutrient enriched wastewater in deep injection wells instead of directly into the Saipan Lagoon, which was the previous practice, although it is unclear what the long-term effects will bring (Starmer et al., 2008).

The continuity of effectively managing LBSP issues has been maintained in CNMI, despite the inconsistency of the CRM NPS pollution program, which was eliminated in fiscal year 2007. Despite the closing of the official program, CRM maintained an NPS pollution coordinator through June 2012, and DEQ has an NPS pollution program that has been in existence since 1997 to address LBSP issues. Capacity is therefore present in the system in different forms.

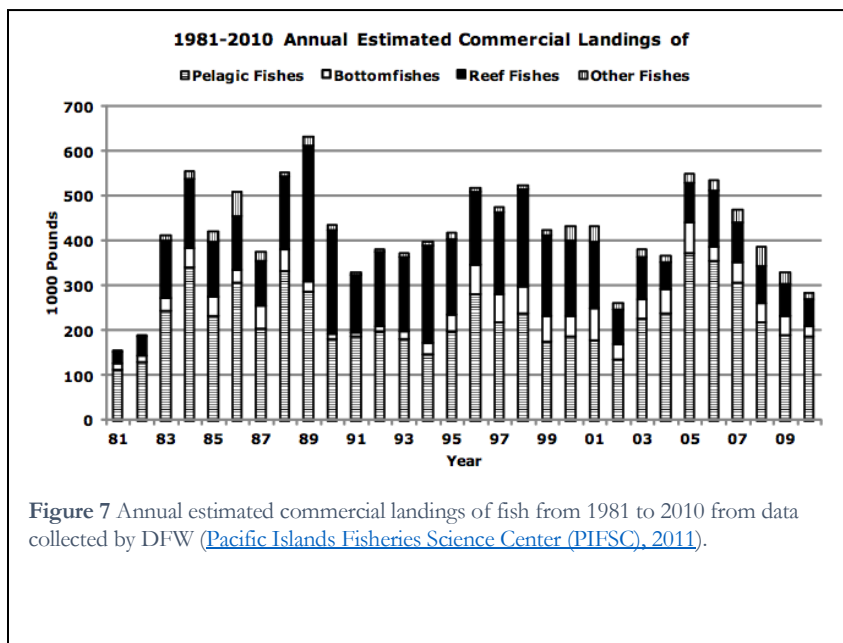
For more information, please see *The Use of Cellular Diagnostics for Identifying Sub-lethal Stress in Reef Corals* (Downs, 2013), *Coral Assemblages and Reef Growth in the Commonwealth of the Northern Mariana Islands (Western Pacific Ocean)* (Houk, 2010), and *The State of Coral Reef Ecosystems of the Commonwealth of the Northern Mariana Islands* (Starmer et al., 2008).

Fishing Pressure

Small-scale nearshore fisheries in the CNMI are fundamental for subsistence, trade, and resources, in addition to having important social and cultural purposes. Popular fishing techniques include cast netting, spearfishing, hook-and-line, gleaning, trolling, and bottom fishing. As of today, there are five MPAs in the waters around Saipan. Three are no-take marine conservation areas, and two are species-based reserves.



In 2009, the majority of the coral reef Management Unit Species catch was caught using bottomfishing method/gear and the dominant fishing method for shore-based fishing was hook-and-line. Fisheries landings data from the [DFW](#) suggest a general decline in coral reef fish landings and catch per unit effort since 1990, although actual trends in fish populations are hard to define. Recent enforcement of bans on gill, drag, and surround nets, including Saipan Lagoon. However, Rota and Tinian amended the gillnet ban in 2010 and 2011 respectively. Gillnets are now legal again on Rota and Tinian with a specific permit, and cast nets are still legal with permits and certain exemption criteria. DFW monitors total pounds taken from these exemptions. Larger nets are allowable with a permit from DFW for non-commercial use and are typically associated with special occasions and fiestas.



For more information, please see Mariana Archipelago 2009 Annual Report (WESPAC, 2011), Archipelagic Fishery Ecosystem Annual Report (WESPAC, 2012), Status of Coral Reefs of the Pacific 2011 (Chin et al., 2011), The State of Coral Reef Ecosystems of the Commonwealth of the Northern Mariana Islands (Starmer et al., 2008), and Comparative Assessment of Commercial Coral Reef Fisheries across Micronesia: the

Need for Improved Management (Houk et al., 2012).

Military Readiness

Much of the proposed military pressure in the CNMI consists of the development on the islands of Tinian and Pagan. Marine Corps training activities are also planned for the CNMI involving marine and terrestrial construction that would affect the natural marine environment. “Military readiness” in this report refers to the specific upcoming DoD initiatives proposed for the CNMI, which include MITT, MIRC, CJMT, and Airport Expansion Activities. The MITT includes military training and testing activities that are proposed in the CNMI between 2011 and 2015. The MIRC would re-designate air traffic control assigned airspace in order to create safe training areas throughout the Mariana Islands, with the starting date yet to be determined. The CJMT plans to improve existing and develop new live-fire military ranges and training areas on Tinian and Pagan. Airport Expansion Activities will improve and expand an existing airport in the CNMI, with potential additional candidates being the airports on Tinian, Rota and Saipan. The National Environmental Policy Act (NEPA) has completed an EIS and/or OEIS for the MITT, MIRC, and Airport Expansion Activities, and there will be an ongoing EIS process for the CJMT between 2013 and 2016. The Lieutenant Governor under the Office of the Governor has been tasked with addressing the potential increased military pressures in the CNMI.

Military readiness is a key topic of discussion in the CNMI government at the moment. Mounting concern for military presence in the CNMI is demonstrated through examples such as the local petition that is currently being circulated in the CNMI regarding increased military development. Although construction jobs could be created due to the need to build facilities for training and operations on Tinian and Pagan, ranchers and other livelihoods could be impacted due to their termination of grazing leases located within the range footprints and “surface danger zones”. It will be important to monitor the status of these federal laws and actions, in addition to the response of the CNMI community. Development locations will largely be focused on central Tinian and Pagan, but can have significant environmental and social effects across the whole archipelago. Specifically, the increase of impervious surfaces will have an effect on stormwater runoff and groundwater recharge.

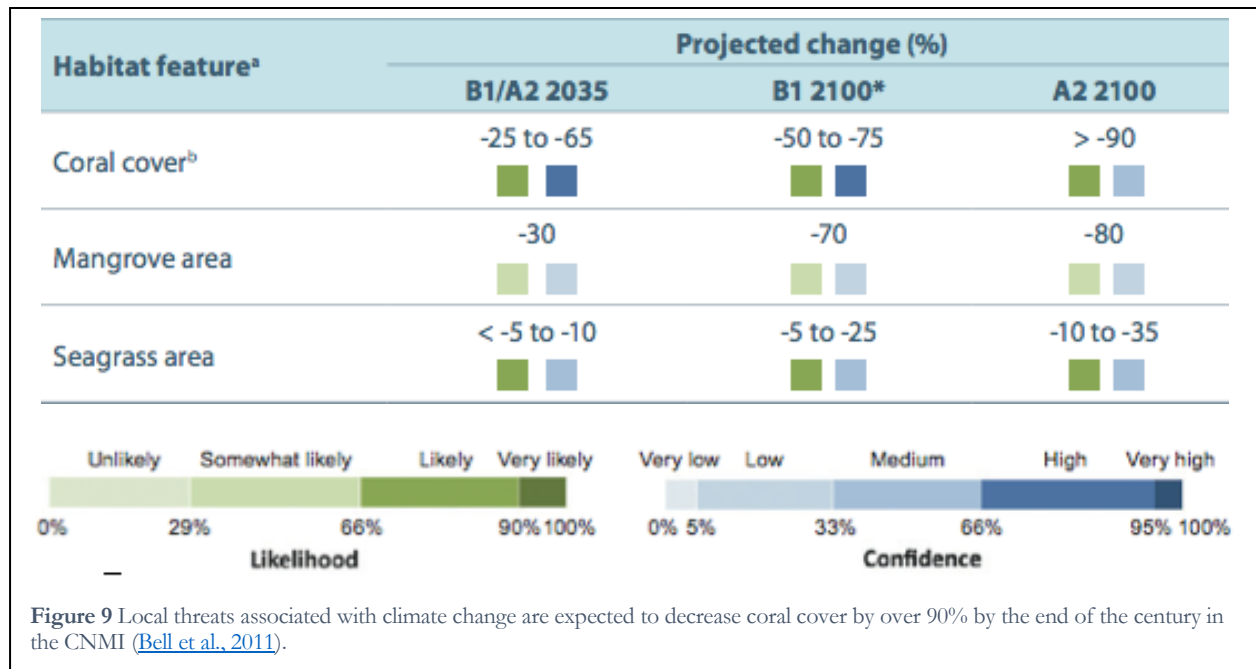
For more information, please see NOAA Tech Memo PIFSC 36 (Allen and Amesbury, 2012), U.S. CZMA Section 309 Assessment and Strategy (CRM, 2011), [Factsheet of Ongoing NEPA Actions in the Mariana Islands](#) (2011), and the [CNMI Joint Military Training EIS/OEIS Website](#).

Climate Change

After a 2001 bleaching event caused by warmer than average temperatures affected shallow-water coral assemblages in the southern Mariana Islands, climate change concerns heightened in the CNMI. The 2012 Saipan Reef Resilience Study used the following metrics to determine resilience of reefs around Saipan: coral diversity, bleaching resistance, recruitment, herbivore biomass, macroalgae cover, temperature variability, nutrient input, sedimentation, fishing access, coral disease, and anthropogenic physical impacts. The study found that out of thirty-five sites monitored, twenty-three had high relative resilience, nine sites had medium, and three sites had low. Four of the sites with the highest resilience scores did not exist within MPAs. High and medium resilience sites were found throughout all of Saipan’s reef habitats, while the low resilience sites were all found in the Saipan Lagoon. Further research is planned in Saipan for the Reef Resilience Study in the future. A NOAA Coastal Fellow at CRM is also currently conducting a CNMI Climate Change Vulnerability Assessment, and once completed that will be a valuable resource for addressing climate change issues and adaptability in the CNMI. Researching the effects of global warming has become a top

priority, with the CNMI’s resource management agencies putting emphasis on monitoring water quality, sea surface temperatures, oceanographic conditions, and shoreline change. Although the NOAA Coral Reef Early Warning System buoy was removed due to reduced program funding at NOAA PIFSC CRED, the CNMI successfully pursued a replacement through NOAA’s Atlantic Oceanographic and Meteorological Laboratory’s Coral Health and Monitoring Program with a fixed station (Integrated Coral Observing Network) in Laolao Bay. Manifestations of El Niño Southern Oscillation events have been linked to large-scale mortality of reef-building corals due to increased water temperatures and ultraviolet exposure. The CNMI is also vulnerable to La Niña periods, which cause sea level sharply rises above average, particularly when El Niño and La Niña conditions transition rapidly. When comparing satellite-derived sea surface temperature from the CNMI with the multivariate El Niño Southern Oscillation index, it appears that during a strong El Niño, maximum annual temperatures at Maug, Pagan, and Saipan are cooler than average compared to non El Niño years (Starmer et al., 2008). Ocean acidification, another climate change related phenomenon, is being added to the list of conditions requiring attention of the CNMI’s monitoring programs. The CNMI has also experienced recent outbreaks of Crown of Thorns Starfish (*Acanthaster planci*), in 2003 and 2004, which may be linked to changes in water quality and temperature (Chin et al., 2011). Climate change is projected to increase the threats to coral reefs, mangroves, seagrasses and intertidal flats in the CNMI, reducing the quality and area of these habitats (Figure 9).

For more information, please see Vulnerability of Tropical Pacific Fisheries and Aquaculture to Climate Change (Bell et al., 2011), Coral Reef Resilience to Climate Change in Saipan, CNMI; Field-based Assessments and Implications for Vulnerability and Future Management (Maynard et al., 2012), and The State of Coral Reef Ecosystems of the Commonwealth of the Northern Mariana Islands (Starmer et al., 2008).



2.5 Governance Context and Institutions Involved in Coral Reef Management and their Recent Development Over Time²

The CNMI is home to a wide range of decision-making groups, particularly with respect to coral reef management. Understanding the power dynamics within communities and the CNMI at large has been a necessary yet informal capacity that has been developed to identify what is truly important to the people of the place. As many of the interviewees recognize, this capacity is critical for coral reef management in the CNMI.

The three major expressions of governance in the system are government, market forces and civil society. These are expressed at different scales. For the government, it is expressed in the CNMI through the federal government, the government of the CNMI, and local municipalities. Government expresses its power through laws and regulations, taxation and spending policies, and educational outreach. Market forces are expressed through differently sized corporations and businesses. Their power is expressed through profit seeking activities, ecosystem service valuation, and cost-benefit analyses. Civil society includes organizations and institutions whose geographic and programmatic scope varies. Examples include large international NGOs, mid-sized civic organizations and local marine resource councils. Their power within a governance system is expressed through advocacy and lobbying activity, vote casting, co-management and stewardship activities.

Context of Government Institutions

The federal agencies of government that are most directly related to coral reef management include: NOAA OCRM, NOAA CRCP, NOAA PIFSC, NOAA PIRO, WESPAC, National Park Service, EPA, NRCS under the U.S. Department of Agriculture, USFWS, and USACE.

At the local government scale, the agencies most directly related to coral reef management include: DEQ, DFW, CRM, DPW, OPM, DFA, MVA, and several others.

Context of the CNMI's Coral Reef Initiative

Executive Directive 235 issued from the Office of the Governor created the CNMI CRI in 2003. The initiative mandates a joint effort for coral reef conservation between three managing agencies: DEQ, DFW and CRM. The Executive Directive also calls for the appointment of a Point of Contact (POC) and three working committees to be established: a Policy Committee (consisting of the Directors of DEQ, DFW and CRM), a Science Committee (consisting of one biologist from each of the three agencies), and a Coordinating Committee (consisting of one representative from each of the three agencies).

The CRI monitors nearshore and reef flat areas on all three main islands (Saipan, Tinian, and Rota) and issues a number of reports. The initiative produces a variety of educational and outreach materials and activities, and sponsors a summer internship program that allows college students or recent high school graduates the opportunity to work in coral reef conservation. Since 2003, CRI has used LAS to identify management priorities based on a suite of NOAA-

² In this section, select agencies are spelled out and include an acronym for greater clarity for the reader.

designated priority threat categories. To date, the CNMI has addressed NPS pollution, Fisheries and Coral Reef Management, Recreational Use and Public Awareness with LAS activities. The CRI is now reviewing and revising LAS to align with revised NOAA priorities. The CRI also ensures that LAS actions complement local priorities for achieving the goals of the MC (Allen and Amesbury, 2012). The CRI has also recently been working in partnership with TNC and NOAA to help develop and implement CAPs at the three priority sites in the CNMI: Laolao Bay, Garapan, and Talakaya.

DEQ was created through Public Law 3-23 in 1983 with the purpose to protect the public health and environment of the CNMI. Under the Commonwealth, DEQ has the jurisdiction and authorization to issue regulations and implement programs to protect the air, land, and water of the CNMI. DEQ is made up of a series of branches and programs, including the Clean Air Branch, the Safe Drinking Water Branch, the Site Assessment and Remediation Branch, the Toxic Waste Management Branch, the NPS Pollution Branch, the Pesticide and Storage Tank Branch, and the Wastewater, Earthmoving and Erosion Control Branch. DEQ programs and operations are largely funded by the CNMI Government, U.S. EPA, the DOI Office of Insular Affairs, and the NOAA CRCP cooperative agreement.

CRM, that implements the U.S. CZMA of 1972, was established by the CNMI government in 1980 through Public Law 3-47 with the purpose to promote the conservation and wise development of coastal resources. The coastal zone includes all nonfederal lands on the island, as well as offshore islands and nonfederal submerged lands within 3 nautical miles from shore. CRM provides technical assistance for the planning, management, and monitoring of coastal resources and ensuring their sustainable use and development. CRM is made up of many branches that address issues relating to the CNMI's coastal resources, including Permitting, Enforcement, Outreach and Education, NPS Pollution, The Coral Reef Program, Natural Resource Planning, and GIS. NOAA OCRM's Coastal Program Division largely funds the CRM programs and operations.

DFW was created in 1981 by Public Law Number 2-51 entitled the "Fish, Game and Endangered Species Act" with the purpose to conserve fish, game and wildlife, and to protect endangered and threatened species. Through research, monitoring, regulation, enforcement, planning and management, DFW works to ensure the long-term survival and sustainability of the CNMI's natural resources. DFW includes a Wildlife Section, Fisheries Section, Planning and Education Section, Enforcement Section and Administrative Section. DFW also reviews all development proposals submitted to CRM and/or DEQ to ensure that negative impacts to endangered and threatened species are minimized, mitigated and/or avoided. Funding for DFW comes largely from federal sources such as the USFWS, NOAA Office of Law Enforcement (OLE), and NOAA CRCP.

Context of Major Market Forces

The local economy of the CNMI relies heavily on federal financial assistance. Historically the garment industry was the largest driver of the local economy of the CNMI. However, the economy has recently gone through a major transformation with the closing of the garment factories in the CNMI between 2005 and 2009. The tourism industry is now one of the largest market forces in the CNMI, accounting for one quarter of the CNMI's GDP and employing 25-50% of the workforce. There is a small agriculture sector that consists of cattle ranches and small farms that produce coconuts, breadfruit, tomatoes, and melons. The labor force in 2012 was 38,450, nearly 29,000 of which were foreign workers ([CIA Factbook](#)).

Context of Civil Society and NGO partners

Local civil society organizations are in their nascent stage of organizing and building capacity in the CNMI. There is a limited presence of NGOs working in the CNMI and they include Rare, TNC, the Pacific Marine Resources Institute ([PMRI](#)), the Mariana Islands Nature Alliance ([MINA](#)), the Asia Pacific Academy of Science, Education and Environmental Management ([APASEEM](#)), Saipan Fisherman's Association, and the Northern Mariana Dive Operators Association ([NMDOA](#)). The CNMI is a signatory to the MC initiative that has the goal to effectively conserve at least 30% of the nearshore marine resources and 20% of the terrestrial resources across Micronesia by 2020, thus the MC Regional Office provides some support as well. The CNMI government's efforts to implement the MC are supported by a variety of local and regional partners such as MINA, PMRI, NOAA CRCP, DOI, and TNC. Increasing the capacity of civil society in the CNMI will be important to supplement some of the local capacity for coral reef management and to act as a bridge between the government and the public.

Section Three: Findings Related to Coral Reef Management Capacity in the CNMI

3.1 Jurisdictional Coral Reef Initiative Management Process

In this section, we outline the findings related to recent progress that has been made in coral reef management in the CNMI and briefly present what we believe are some of the major gaps and barriers. Coral reef management is a complex challenge that involves a wide range of system interrelationships such as political, social, economic, and biophysical. Each of these systems involves a large number and diverse groups of stakeholders. The greater the diversity involved in a collaborative process the greater the potential for lack of agreement on what to do which is a form of social complexity. Add to this the challenges of uncertainty and lack of predictability of potential solution strategies based upon the complex inter-relationships and a new class of problems emerge, often called wicked problems, that can create dynamic forces of fragmentation. The Management Cycle and Orders of Outcomes frameworks (Section 1) will be used as heuristics in an attempt to present the findings appreciating the dynamic, unpredictable, and complex challenges of coral reef management.

Coral reef management occurs at multiple scales. For the purposes of this capacity assessment the primary focus of coral reef management is at the scale of the CNMI CRI. Since management is about implementation, we place a strong emphasis on the degree to which there is a transition from issue analysis and planning (Steps 1 and 2) to securing formal commitment (Step 3) and the degree to which implementation of a plan of action has occurred (Step 4). Ideally, there is reflective practice that aims to learn about the management effectiveness through periodic evaluation and assessment (Step 5) that informs a more adaptive approach in the current and next generation of management. When management actions are linked together in such a cycle, we believe the process provides evidence of adaptive coral reef management capacity. For this analysis, we remain faithful to the issues described in the PSD and include current issues that arose as topics during the interviews that have relevance to the challenges, gaps and barriers to building adaptive capacity.

The CNMI Coral Reef Initiative

The CRI was created in 2003 by Executive Directive 235 under the Office of the Governor. The initiative mandates a joint effort for coral reef conservation between three managing agencies: DEQ, DFW and CRM that conduct routine monitoring and assessment of different systems interactions and identify pressing issues that require attention (Step 1 - Issue Identification). The interagency group is also tasked with protecting coral reefs, the analysis of options and the formulation of plans (Step 2 - Assessment of Options/Program Planning) and have prepared a set of LAS. The CRI adopted the first LAS in 2002 (Step 3 - Formal Funding and Adoption), and began implementation (Step 4 - Implementation) in 2003 with a strong focus on Laolao Bay. As part of a reflective process, the CRI recognized that further strategic planning and actions would need to occur to support ongoing efforts to improve the health of the site's resources (Step 5 - Reflection and Evaluation). Since the CRI partners include a wide range of agencies and organizations to support a variety of management tools in the CNMI, engagement with TNC was a logical step to explore the site-based approach of CAPs to support analysis and action to remove site-specific threats to coral reefs.

Creation and Implementation of MPAs

There are currently nine MPAs throughout the CNMI managed under DFW. These nine MPAs are: Bird Island Sanctuary, Bird Island Sea Cucumber Sanctuary, Forbidden Island Sanctuary, Laolao Bay Sea Cucumber Sanctuary, Lighthouse Reef Trochus Sanctuary, Mañagaha Marine Conservation Area, Sasanhaya Bay Fish Reserve, Tank Beach Trochus Sanctuary, and an unnamed marine reserve recently created on Tinian. However, the law that originally created the new MPA on Tinian sunsetted in August 2013, and DFW has left the pending decision of renewal to the mayor of Tinian. It is important to note that the Lighthouse Reef Trochus Sanctuary and the Laolao Bay Sea Cucumber Sanctuary are redundant to moratoriums that currently prevent all take of those species anywhere in the CNMI through 2017. Three of these MPAs are year-round no-take reserves located in Saipan, each of which has its own management plan: [Mañagaha Marine Conservation Area Management Plan](#) (2005), [Bird Island Wildlife Conservation Area and Bird Island Marine Sanctuary Management Plan](#) (2007), [Kagman Wildlife Conservation Area and Forbidden Island Marine Sanctuary Management Plan](#) (2007). Mañagaha Marine Conservation Area is the most popular and well recognized of the MPAs in the CNMI as it is a famous tourist attraction. In the 1980s, the area had up to 800 visitors per day, and concerns started growing over the sustainable recreational use of the area (Step 1 - Issue Identification). Investigations were made and in 2000 the CNMI Legislature published the finding that “Mañagaha Island and its surrounding waters contain historical, cultural, and natural resources that must be protected” (Section 2 of Public Law 12-12). The Mañagaha Marine Conservation Area was first created in 2000 under Public Law 12-12 (Step 2 - Assessment of Options/Program Planning) with the stated purpose “to protect and preserve, by strict regulatory enforcement, the land and water resources, flora, fauna, and marine life that are found in the conservation area for the enjoyment of future generations of Commonwealth residents and visitors” (Section 4(b) of Public Law 12-12). In 2002, NOAA CRCP provided funds to support staff and resources for effective enforcement of the area, and the first citations for violations within the MPA were handed out in 2003 (Step 3 - Formal Funding and Adoption). The management plan for Mañagaha was created in 2005 (Step 4 - Implementation), along with two other MPA management plans in the CNMI. DFW recognizes in each of these management plans, in Section 6.0: Implementation, that they intend to, “periodically assess the status of the conservation area, update [the] management plan, and implement unplanned management actions as needed to meet the mandate for these conservation areas.” If conducted in the future, these reassessments would represent Step 5 (Reflection and Evaluation) for these three MPAs (Coral Reef Habitat Assessment for U.S. Marine Protected Areas: Commonwealth of the Northern Mariana Islands, 2009).

Based on responses during interviews, there appears to be a widening gap as to the degree of agreement regarding the efficacy and commitment for MPAs. The enforcement is uneven and compliance by resource users remains a capacity challenge. While there is growing anecdotal evidence of the benefits of MPAs such as refugium for fish and other marine life and potential spillover effects that could benefit adjacent fishing grounds, stakeholders appear far from certain that such an approach is working and far from agreement on how to manage the MPAs.

Compliance requires a broad understanding and acceptance of the rationale for regulations to prevent the degradation of the coral reefs of the CNMI. Compliance also requires effective and fair enforcement to maintain support for regulations that restrict certain activities. As noted in the 2008 report by the National Research Council on Building Capacity for Stewardship for Oceans and Coasts, “because of lack of adequate resources and political will,

enforcement of rules and policies adopted by coastal and fisheries management programs tends to have low priority on the political agenda. Enforcement does not attract donors to the extent that other more appealing capacity building initiatives do.” Since certain federal funds such as the USFWS Sport Fish Restoration Program grants cannot be allocated for enforcement, this issue of funding and capacity building for enforcement remains a challenge in the CNMI. However, other federal agencies such as NOAA CRCP, CZM and OLE have been contributing funds to enforcement in the CNMI for several years.

Monitoring compliance, performing surveillance and enforcing regulations are undertaken through a variety of arrangements between resource agencies, enforcement agencies and with key stakeholders such as resource users, NGOs and academia. Ideally, enforcement is culturally appropriate, fits with the sociopolitical history, is transparent with its use of funds and absent of corruption. There are models of both top-down enforcement (Asinara Marine Park in Italy and Galapagos Marine Reserve in Ecuador) and more participatory co-management relationships with resource users and stakeholders (Banco Chinchorro Biosphere Reserve in Mexico and in several Marine National Parks in Indonesia).

Table 3: Range of Management Strategies of MPAs in CNMI from Coral Reef Habitat Assessment for U.S. MPAs: Commonwealth of the Northern Mariana Islands (2009); Appendix B: CNMI MPA Classification.

Site Name	Conservation Goal	Level of Protection	Permanence of Protection	Constancy of Protection	Scale of Protection	Management Plan
Bird Island Sanctuary	Natural Heritage	No Take	Permanent	Year Round	Ecosystem	Yes
Bird Island Sea Cucumber Sanctuary	Sustainable Production	Uniform Multiple Use	Permanent	Year Round	Focal Resource	N/A
Forbidden Island Sanctuary	Natural Heritage	No Take	Permanent	Year Round	Ecosystem	Yes
Laulau Bay Sea Cucumber Sanctuary	Sustainable Production	Uniform Multiple Use	Permanent	Year Round	Focal Resource	No
Lighthouse Reef Trough Sanctuary	Sustainable Production	Uniform Multiple Use	Permanent	Year Round	Focal Resource	No
Managaha Marine Conservation Area	Natural Heritage & Cultural Heritage	No Take	Permanent	Year Round	Ecosystem	Yes
Sasanhaya Bay Fish Reserve	Natural Heritage & Cultural Heritage	No Take	Permanent	Year Round	Ecosystem	No
Tank Beach Trochus Sanctuary	Sustainable Production	Uniform Multiple Use	Permanent	Year Round	Focal Resource	N/A

The Micronesia Challenge

The following is an example that describes the generations of the MC program development.

- *Step 1 - Issue Identification:* The CNMI's involvement with the MC is often cited as an important shift for natural resource management in the jurisdiction, and one of the major drivers of their recent progress. In 2006, in response to the need for comprehensive and collaborative dedication to natural resource protection in Micronesia, the President of Palau launched the MC at the Eighth Conference of Parties to the Convention on Biological Diversity. The stated goal of the challenge is to, "effectively conserve at least 30% of nearshore marine resources and 20% of terrestrial resources by 2020." The Governor of the CNMI signed the MC Declaration of Commitment in 2006, along with 4 other political leaders from the Federated States of Micronesia, the Republic of the Marshall Islands, the Republic of Palau, and Guam (Micronesia Challenge Declaration of Commitment, 2006).
- *Step 2 - Assessment of Options/Program Planning:* This was followed by the 1st Regional Action Planning Meeting, which clearly outlined components of the MC commitment, metrics of success, outreach strategies, and purpose of the Measures Working group.
- *Step 3 - Formal Funding and Adoption:* The MC Measures Working Group met for the first time together in 2008, along with over 60 participants from all 5 MC jurisdictions, and they meet on a regular basis in order to constantly discuss and refine indicators of conservation effectiveness and adapt methods as needed (The Micronesia Challenge, 2012).
- *Step 4 - Implementation:* The Challenge has guided implementation of a variety of management and collaborative initiatives in the CNMI. The CNMI has also developed a CNMI MC Communications Working Group, which had its inaugural meeting in 2013, to help design a CNMI MC communication campaign. Efforts are also being made in the CNMI to implement the MC Sustainable Finance Plan and explore methods of supporting the MC endowment through local financing mechanisms, to be developed in consultation with local business owners and the CNMI legislature.

Recent Management Cycle for Coral Reef Management in the CNMI

In summary, the following are a set of findings related to the capacity to move through the Management Cycle at the scale of the CNMI.

Findings for Step 1: Issue Identification

While there are considerable challenges, biophysical monitoring of the coral reefs and the issues that this work identifies is a capacity strength in the CNMI. The CRI's long-term MMT is an outstanding example of how a small and well-trained team of scientists and technicians, many of whom are local, have generated a long-term and robust set of scientific research regarding the status of marine resources in the CNMI. These trends are documented in [The State of Coral Reef Ecosystems of the Commonwealth of the Northern Mariana Islands](#), part of a NOAA Technical Memorandum on the state of the coral reefs that was published regularly up to 2008, and are valuable for providing a comprehensive, detailed description of the state of the marine resources review of major threats and drivers of ecosystem change. CRED also performs regular biophysical monitoring of coral reefs in the CNMI, such as the [Coral Reef Ecosystem Monitoring Report of the Mariana Archipelago: 2003-2007](#). NOAA PIFSC CRED has undertaken

several comprehensive Marianas Archipelago Reef Assessment and Monitoring Program cruises to build an understanding of the state of coral reef ecosystems in the CNMI and across the Mariana Archipelago.

Another monitoring effort has been conducted by DFW with a goal to obtain long-term fisheries trends in the region. Unfortunately, the two monitoring programs do not share a comprehensive research methodology and the degree of collaboration between these two programs was described by both parties as relatively low. Communication and effective coordination across the programs such as data sharing remains a challenge and affects the degree of integrated analysis and translation of information into improved and more adaptive management actions. The point was raised that it is not uncommon for scientific researchers to come to the CNMI to work on a data collection effort for two to three years for a specific academic goal (i.e. Masters or PhD research), and the products of their research are not widely shared and do not go towards improving management, although there are exceptions to this phenomenon (i.e. Talakaya watershed). With such forces of fragmentation at work, the integrated connections between the findings of coral reef and fisheries studies and then the application through adaptive management practices tends to be very difficult even though impressively strong monitoring exists.

Investment in understanding the human dimensions and the relationships to coral reef health is only just starting with a basic socio-economic analysis, yet signals an important and much needed direction in issue analysis. Currently, the PMRI in collaboration with the MC and numerous regional partners are working together to develop core socioeconomic indicators that could be applied to coral reef conservation and management. They are still in the planning phase for the initiative. Another example of science to inform management in the CNMI is the [Saipan Reef Resilience Report](#), which included in its scientific analysis of 35 monitoring sites around Saipan the implications of the biophysical findings for future management. An example of a recommendation from this report is the identification of four sites that are ideal candidates for increased protection due to their high resilience scores and could benefit from place based management. These examples underscore a relatively strong capacity of the CNMI's progress in issue identification (Step 1 - Issue Identification) yet multiple challenges related to the number and diversity of players involved and the relatively low degree of collaboration affects the potential for science to inform management.

The context in the CNMI includes a lack of shared agreement amongst the resource agencies as to the appropriate methods for biophysical data collection. A central challenge for building adaptive capacity is to pool existing data and build off of what has already been gathered but more importantly to create a more collaborative and collegial environment across the agencies and organizations that are collecting the data. This type of work requires expert facilitation with competencies in conflict resolution, expertise in subject matter, understanding of the social and political climate and understanding of how to build the quality of collaboration.

Findings for Step 2: Assessment of Options/Program Preparation

While some sites have moved through cycles of implementation, such as the creation of MPAs being a major accomplishment, when taken as a whole the CRI could be described as being in Step 2 of a current Management Cycle as methodologies, as well as several of the associated management plans and action plans, are still in the process of being developed.

The CAP process is a prime example of the CNMI's natural resource management community collaborating to assess options for program preparation. The CAP processes, occurring at several sites around the CNMI, have undergone

their own generations of the management cycle. In 2007, in support of the MC, TNC facilitated a new round of CAPs in several locations in Micronesia at the same time including the CNMI, Chuuk, Guam and the Marshall Islands. The first CAP completed in the CNMI was for Laolao Bay as a strategic next step following the LAS process. Engaging diverse stakeholders and perspectives was considered a priority and a team was assembled, composed of government agencies, NGOs and community members. The first step was to conduct a series of workshops aimed at using the CAP tool for developing site-based issue identification (Step 1 - Issue Identification) and use that to inform the development of management plans (Step 2 - Assessment of Options/Program Planning) and arrive at a shared understanding and commitment of what needed to be done (Step 3 - Formal Funding/Adoption). The product of the three-fold workshop series was the first [Laolao Bay Conservation Action Plan](#) in 2009. The CAP proved to be the guiding document for implementing coral reef management projects at the priority site (Step 4 - Implementation). Three years later, a reflection process was conducted to review which initiatives from the original CAP had already been completed, which had yet to be done, and which required revision and editing. This resulted in an addendum to the Laolao Bay CAP (Step 5 - Reflection and Evaluation). The revised Laolao Bay CAP was completed in 2012 (which marks the successful completion of a cycle of adaptive management). With some new issues identified, and adjustments made to the plan, the Laolao Bay CAP process is now in Step 3 of its next management cycle.

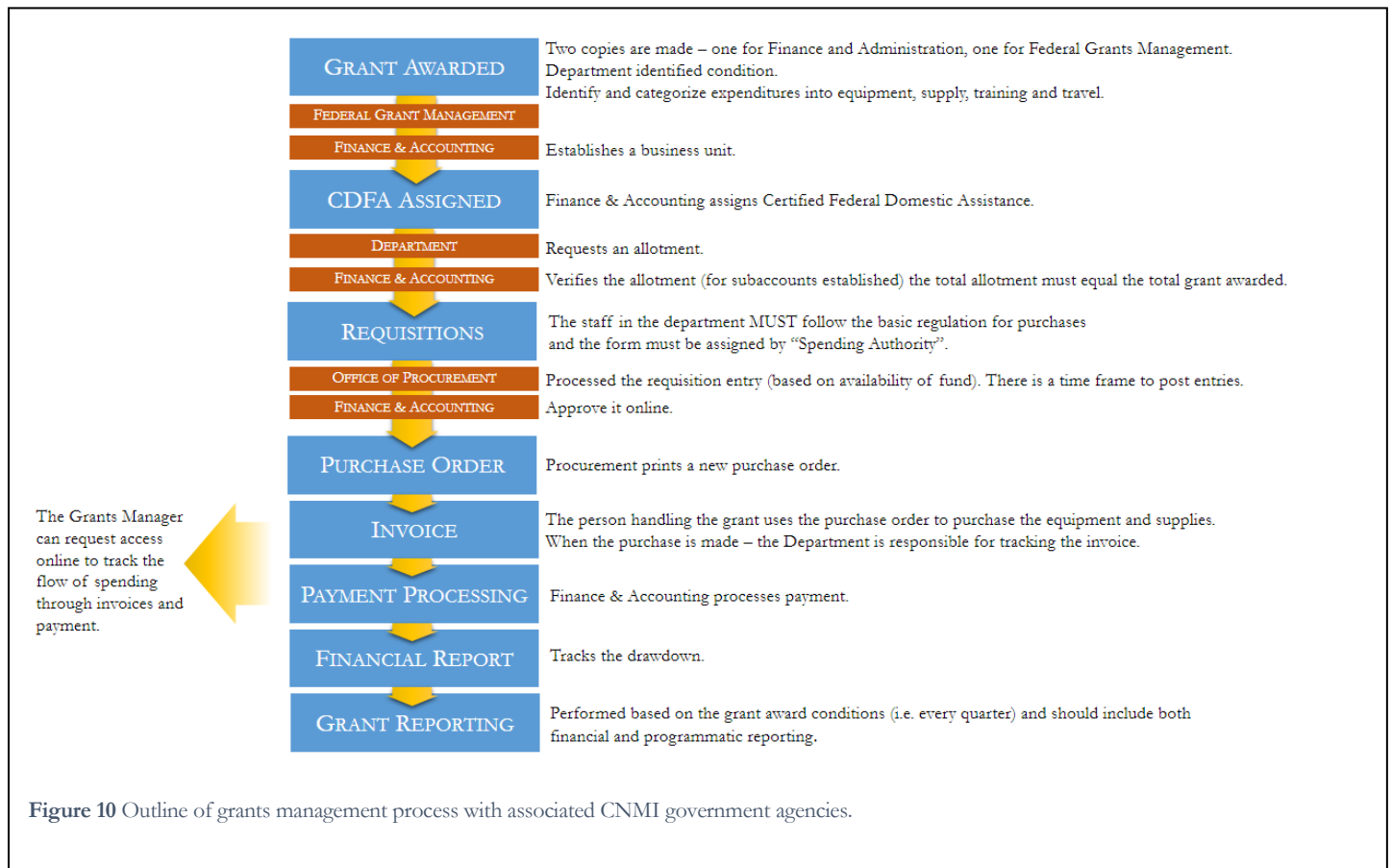
In Talakaya, another priority site, there has been a first generation of management initiated using the CAP process in 2012. Issue assessments and a formal plan have been completed with commitment and funding and this generation of management is currently in Step 4 (Implementation). There is an initial draft CAP that was recently completed for Garapan in 2013, and is currently in its first management cycle, specifically in Step 2 (Assessment of Options/Program Planning).

Several of the MPAs in the CNMI also have management plans, including the [Mañagaha Marine Conservation Area Management Plan](#), the [Bird Island Marine Sanctuary Management Plan](#), and the [Kagman Wildlife Conservation Area and Forbidden Island Marine Sanctuary Management Plan](#). The hope is for the CAPs and management plans to inform the next steps in the management cycle and secure funding for implementation of the projects suggested therein. Many of the Priority Objectives listed in the PSD call for action in Step 2 of the Management Cycle, such as establishing protocols for environmental assessment within the planning documents and developing plans for monitoring of military activities (Objective 3.1) and creating a response plan to quantify and characterize bleaching events (Objective 4.1).

Findings for Step 3: Formal Funding and Adoption

As is true in just about all aspects of natural resource management around the world, the issues of funding and formal commitment were consistently listed among the top barriers and capacity gaps to coral reef management in the CNMI by those interviewed. Many reported that the economy in the CNMI is currently weak, and the agencies' dependence on federal funds has come up repeatedly as an issue related to lack of sustainability of funds and support. The quality of investors in the CNMI has been variable, with some illegitimate investors causing issues and not following rules and regulations. Local NGOs have also reported difficulty with fundraising, and many stated that environmental groups are often overlooked when funders are focused on supporting organizations that address issues such as public health and education.

Fiscal management and oversight of funding repeatedly came up as barriers to capacity for coral reef management in the CNMI. The challenges noted ranged from inconsistencies identified between the financial reports, charges billed to the incorrect federal award, the purchase, repair and maintenance of items that were not approved under the award, unallowable personnel practices, challenges related to hiring of federally-funded staff positions, imposition of furloughs, to name a few issues that have been identified in the past. While many of these administrative issues are being addressed, they have added a level of administrative challenge that affects morale, basic procurement, hiring and efficient and transparent use of funds which can affect the CNMI’s “performance” in the use of federally awarded funds.



If reform of the grants management and fiscal oversight process is conducted, then building local forms of sustainable financing for natural resource management through initiatives such as the MC Sustainable Finance Plan and legislation to support dedicating portions of local taxes to resource agencies may be more practical. The CNMI has also been exploring other potential partnerships for funding through independent foundations and non-profits, such as the Margaret A. Cargill Foundation.

Formal commitment for more effective enforcement is often listed as another major barrier to adoption of management plans and actions. This is largely attributed to a lack of manpower and adequate resources for on-the-ground enforcement. In an island where “everyone knows each other”, effective enforcement is difficult. Further complicating factors involve the proper match of the infractions to the fines that are levied have also been mentioned as common hindrances to effective enforcement. It was reported that funding to support conservation enforcement officers is limited and entirely from federal funds, several of which are being cut in the coming years. Many also noted

that enforcement actions rarely follow through the steps of prosecution and that natural resource cases routinely do not make it past the DFW office and to the courts. There is a lack of accountability for enforcement actions from upper-level management, which further reinforces a lack of compliance at the community level. Programs such as [MINA's Tasi Watch](#) community rangers program help to support enforcement at the local scale, and may be useful tools to scale up to help build capacity for enforcement and compliance in the future.

Findings for Step 4: Program Implementation.

The implementation of projects and programs for coral reef management is rather piecemeal and there is a perceived gap between planning and implementation of the plans. Laolao Bay is a good example of a large-scale, watershed-wide, comprehensive management program that has been successfully implemented. Issues related to low quality collaboration and weak partnerships may create barriers for implementing similar initiatives in the future. Other issues include distance for projects on Rota and effective coordination with federal and local partners. As noted above, it is important to note that many of the recent management initiatives, such as the CAPs, MPA management plans, and the PSD, are still in the planning phases and by tracking steps to move through to formal commitment and on to implementation may be necessary. The PSD calls for the implementation of several of these plans, such as the CAP for [Laolao Bay](#). Building off of the CNMI's impressive science base of issue identification, it will be critical moving forward to increase the quality and frequency of science to communicate effectively with management to inform on-the-ground project planning and implementation.

Findings for Step 5: Reflection and Evaluation.

Many long-term programs and initiatives have not yet reached Step 5 in the Management Cycle. Tools such as performance standards, metrics of success, and scorecards should be built into programs that are currently in their nascent stage or beginning a new management cycle. The process to develop CAPs requires regular re-evaluations every 3-5 years, though many of the CAPs are in the early stages of implementation [Step 4]. Ensuring that Step 5 occurs for these initiatives will be crucial to their adaptability and will aid in planning for their next generation in the management cycle. Several other key initiatives for building capacity for adaptive management in the CNMI, such as the first generation of the Tasi Watch program and the Laolao Bay Watershed Restoration efforts, could ensure that Step 5 is conducted and that lessons learned are shared between partners in order to make adjustments for the next generation of the management cycle. The management plans for the three no-take MPAs in Saipan also have a regular assessment component built into their implementation plan, which will be a critical step for producing revised management plans in the future that adapt to the needs of the environment as well as the people of the CNMI. The MC Measures Working Group has also adopted a MPA Management Effectiveness evaluation tool for use in assessing "effective conservation" for the MC. The tool is also being used by Rare for their Pride Campaigns, in collaboration with PMRI.

3.2 Brief Review of Management Enabling Conditions (1st Order Outcomes)

In an operational sense, and given global ecosystem change, an important feature of coral reef management is a "north arrow" that points in the direction of desired change and most importantly receives a high degree of agreement among key stakeholders. While this may be the ideal, it is often very difficult to achieve with the high numbers of people,

communities, organizations and sectors engaged in some aspect of coral reef management. Experience has repeatedly confirmed that the most successful initiatives focus their efforts on one or two issues where basic agreement can be secured and then expand the scope of the program as experience, capacity, and constituencies are built. It is usually a mistake to launch a fully integrated program directed at multiple issues before capacity, clear goals, supportive and informed constituencies, and formal commitment for improved management are effectively in place and shared by many stakeholders.

Clear and unambiguous goals that define desired reef conditions and intensities of use

While there are goals defined in the PSD, there was not a great deal of evidence of a widely agreed upon set of clear, aligned goals across all partners in coral reef management in the CNMI. While not unusual, there were fundamentally different viewpoints expressed by different stakeholders, citing different core values and operating from different paradigms about what is most important to do. Even among professional groups dedicated to coral reef management, there were different forms of methods applied, different approaches to training and conflicting perspectives about what management actions are needed. There are models of high quality partnerships between resource agencies and other partners but the forces of fragmentation are apparent. During our interview process, multiple interviewees stated that in recent years collaborative approaches to research have been difficult to achieve amongst CNMI's natural resource agencies, including disagreements over potential shared assessment methodologies. Attempts to convene spaces to improve this persistent barrier have been unsuccessful to date. Forces of fragmentation and lack of aligned goals and management efforts makes it more difficult to build formal commitment from upper-level management on a consistent course and direction.

There are examples where collaboration is expressed. One set of issues that seems to create common ground is the natural resource issues related to DoD military pressure. The [CNMI Climate Change Working Group](#) was also referenced as a platform for high quality interagency collaboration, as well as a venue for sharing information and working towards a common goal, across partners in the future. In both cases, the potential causal forces or drivers of ecosystem change are accepted as being from outside of the CNMI.

Informed and supportive constituencies for coral reef conservation

There seems to be a mixed level of support from constituents and the general population in the CNMI for coral reef management. Due to the CNMI's history of settlement, colonization, occupation and geographic location, there is a varied demographic population that does not share a common natural resource stewardship ethic. This leads to a wide variety of responses and reactions to management and conservation. In other words, there does not seem to be a unified front or general shared opinion among constituents regarding stewardship actions, and some actions are often polarizing in communities such as limiting access or charging user fees. It was reported to us that most people in the general public in the CNMI are not aware of the natural resource rules and regulations, particularly within protected areas. Although many may be aware of the very basic status of the natural and marine resources, it seems as though many are not aware of the connection of certain behaviors and their resulting impacts to coral reef resources, particularly with relation to ecosystem/human health and LBSP. One factor that was brought up repeatedly was lack of formal education in natural resources and natural resource management in the CNMI. Marine science and natural resource education do not currently factor into standard grade-level curriculums. Although the CNMI's local community college (Northern Marianas College, or "NMC") has a Natural Resources Program that is making great

strides to address this gap, it is reportedly lacking adequate capacity and does not offer programs that exclusively focus on the marine environment. There is opportunity for the college to be a critical partner in coral reef conservation and management in the CNMI, particularly to build capacity by educating local students in marine biology, ecology and conservation, and in turn prepare local students to work for the natural resource agencies in the CNMI. Many also expressed that, although many agencies and organizations are involved in community outreach in the CNMI, on-the-ground efforts have been described as piecemeal and not coherent across the multiple partners involved. The CAP process is an important step working to achieve greater cohesion during planning and implementation for the pertinent partners.

Sufficient capacity to practice effective coral reef management

The consensus among those that we spoke with is that the challenges of administrative oversight, procurement, hiring and issues related to staff retention were reported to be the most significant capacity gaps. The majority of agency funding in the CNMI is from federal granting agencies and there are few mechanisms for local sustainable natural resource financing. Many discussed the long amount of time required for purchase orders to be paid and disconnects in the procurement process. It was reported that many project managers are not familiar with the procurement process, including what is required to route each type of request, the number of signatures and endorsements required, the order of submission and the expected time for each to process. Much of the process is also done via hard paper copies and is not electronic. This leads to a difference in time required to process between the agencies. Several critical technical and professional leadership positions, such as Senior Biologists, Lead Planners, and Conservation Officers, have historically remained unfilled in the CRI Agencies due largely to issues associated with hiring, funding and management. This leaves a gap where important leadership should exist for certain departments and teams. However, most of the vacant positions within CRM have been filled this year under new leadership, and capacity is being built to fill professional and technical gaps in the CRI.

It was reported that the hiring process (Figure 11 below) is overly time consuming, confusing and unnecessarily convoluted, and that retention of agency staff is difficult due to factors such as salary comparisons between local and federal agencies. The Northern Mariana Islands Retirement Fund, a public pension fund established for the CNMI, also filed for bankruptcy in 2012 and is projected to collapse in 2014, due to chronic under commitment of funds by the CNMI government in recent years. In 2012, the fund held \$268.4 million in assets with \$911 million in liabilities (38.8% funded), and is currently undergoing court-ordered restructuring. The uncertainty of the retirement fund has provided a massive disincentive to prospective new CNMI government employees.

Many noted the continued “brain drain” of qualified students and professionals who move on to other opportunities outside of the CNMI and do not return after schooling or receiving other jobs after they have worked within local resource agencies. From our interviews, we heard of a pattern where professionals hired from off-island often do not remain in the CNMI past two or three years, and these interviewees noted that there are no mechanisms in place to develop institutional knowledge or to share information so that the projects and initiatives that they build can be continued despite high staff turnover. However, there are notable exceptions where staff who came to CNMI from off-island have stayed, and although they have transitioned to different capacities have continued to work with the natural resource agencies. The Talakhaya project, is an example of a program that has continued to develop and grow despite staff turnover. To address the challenge of turnover and loss of qualified staff, [The Saipan Higher Education](#)

Financial Assistance program is working to create incentives to attract educated professionals back to Saipan and the CNMI. The CRI Internship has also been successful in building capacity of local students to work in natural resource agencies in the CNMI after their education.

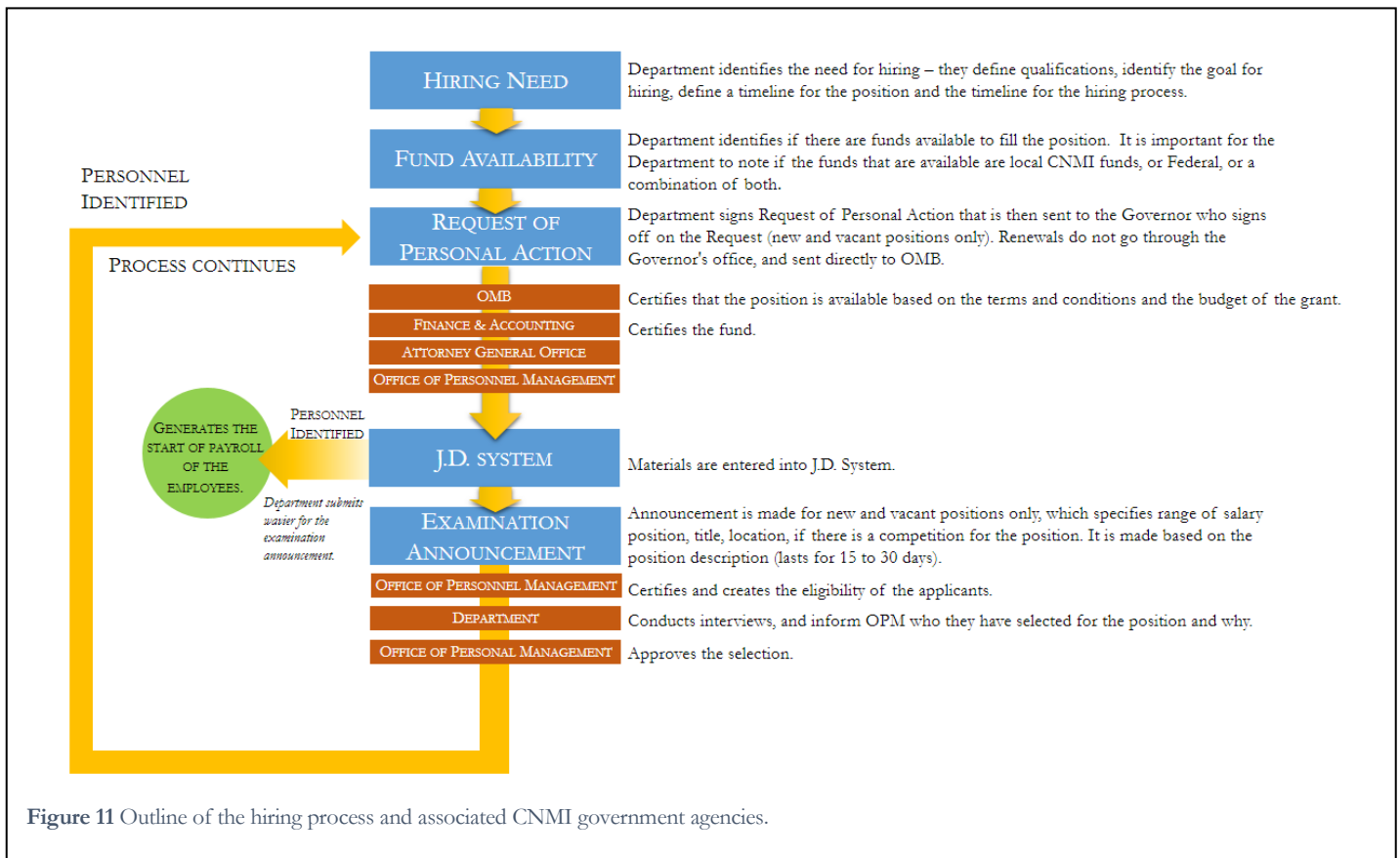


Figure 11 Outline of the hiring process and associated CNMI government agencies.

Natural resource education is not woven deeply into the curriculum of schools in the CNMI and students are not regularly exposed to environmental education, particularly the marine component. There is a presence in higher education, such as the NRM program at NMC, however students are rarely exposed to the concept of natural resource protection before high school or college. There is not a large pool of local residents who are trained in basic coral reef education, therefore many agencies and organizations hire staff from outside of the CNMI.

Although CRI Agencies have a mechanism to evaluate minimum qualifications of federally funded hires, other governmental agencies and organizations are subject to political hires that in some cases are under qualified for their position. Every year, the Governor must also sign a new contract for every government employee in the CNMI, which is a stumbling block for staff retention and creates a disincentive for agency staff to get involved with political affairs or legislation related to natural resources. Capacity further diminishes when agencies are working at remote priority sites such as Rota and Tinian, where travel costs and lack of on-the-ground staff and resources must be taken into consideration.

Formal commitment to coral reef conservation, protection and management

Formal commitment and political will for natural resource management requires building a base of support for coral reef stewardship through a combination of actions including promoting awareness of the socioeconomic value of the

CNMI's coral reefs, the long-term societal benefits and the importance to preserving the culture and livelihoods. It was often stated that other priorities such as economic development take precedence over natural resources, and that political agendas are largely focused on topics such as development and attracting visitors and investors to the CNMI. However it was also mentioned that there is a small group of politicians and elected officials on-island that do engage with natural resource managers and help build support for conservation and management.

Public discussions of costs and benefits of coral reef protection that are documented and interpreted by the mass media, further promoted through information campaigns and education programs are essential to building the necessary political will for changes in the process of planning, decision-making, implementation and enforcement. Filling vacancies with competent staff using available funds is a clear step in this direction. Reform of the process of hiring is a longer-term challenge but one that requires the necessary political will. Several director and senior staff level positions that have remained unfilled for several years were just recently filled in the CRI Agencies, though some technical and professional gaps still remain. Directors for local government agencies are often politically appointed, and supervisory and senior level positions are hired based on annual contracts that can be terminated at any time by the Governor. This situation generates uncertainty and can contribute to turnover in upper-level management, and a lack of consistency in the long-term process of natural resource management. Unqualified appointees present additional challenges and face steep learning curves and are often unprepared for the challenges of the position and can further complicate natural resource management if they resort to their own agenda, be it political or otherwise, rather than that of the agency or the natural resource management system at large.

One of the most important success factors for developing capacity for stewardship of coral reefs is strong and effective leadership. With Governor Eloy Inos's recent appointment in 2013, there may be a window of opportunity in the CNMI to build strong formal commitment and political will for natural resource management, potentially coupling it with other pressing issues such as economic development, public health, and supporting direct foreign investment in tourism. One way to strengthen capacity is to grow leadership and identify, develop, mentor and reward people who are emerging leaders in projects and programs. Effective leadership training programs help to build competencies such as developing a shared vision that motivates and empowers people, focuses activities, rewards teamwork and supports high quality collaboration and provides an overall confidence in a team's ability to reflect on progress and learn from mistakes and adapt. These are neither easy nor simple traits to develop yet they seem to be present within several leaders in the CNMI's natural resource management structure. Equally important, political appointees who are asked to take on leadership within natural resource agencies should be expected to play a central role in navigating the process of working with an existing team, understand their roles and responsibilities, engage effectively in a collaborative process and assemble support for a specific course of action that builds upon the learning that has already been in place. While political appointees may have formal training in the biological sciences ideally, they are effective leaders of teams who can collaborate across agencies, across sectors and build high quality collaboration.

Section Four: Priority Capacity Building Strategies

4.0 Scope of Available Financial Resources

Access to sustained and adequate sources of funding is often cited as a major capacity gap for any ecosystem management initiative. While coral reef management in the CNMI would benefit from a more diverse portfolio of sustained sources of funding, a principle capacity concern is to increase more effective overall management of existing funds. In the CNMI the financial support for coral reef management can be divided into external resources, principally from the federal government and financing provided by the CNMI. These investments include programs and activities that concern the management of fisheries and a diverse array of programs and activities associated with coastal management, NPS pollution, education and outreach, biophysical monitoring, land use, implementation of management plans, enforcement, watershed management and other measures to control impacts to coral reefs.

Funding directed at the CNMI from the NOAA CRCP Cooperative Agreement was roughly \$550,000 in FY2012. Activities funded through the NOAA CRCP Cooperative Agreement are the primary focus on which this capacity assessment is directed. However, there are additional federal funds through NOAA and other federal partners that likely have some relationship with activities that support the broad spectrum of coral reef management.

Examples of funds dedicated to the CNMI include various grants and agreements funding scientific monitoring, public education, staff as well as regional programs that contribute to the CNMI's coral reef management. The NOAA CRCP Cooperative Agreement supports the CRI and is co-managed between DEQ, CRM and DFW. DEQ has an annual budget of roughly \$2.5 million and receives funding largely from U.S. EPA, DOI (~\$125,000-\$150,000/year) and NOAA CRCP. DFW largely receives funding from USFWS (approximately \$800,000-\$900,000 from the USFWS Dingell Johnson fund annually), NOAA OLE (~\$150,000/year), NOAA CRCP, and the WESPAC Fisheries Information Network (~\$125,000/year). The NOAA CRCP Cooperative Agreement with CRI also contributes to funding Conservation Officers within DFW, as there are currently no local funding mechanisms to support enforcement. However, several of the staff salaries for enforcement from NOAA funding have been cut in recent years. CRM has an annual budget of roughly \$900,000, which is nearly 100% funded by NOAA CRCP and CZM. Issues associated with award management has been a concern over the past few years, and NOAA's Grants Management Division recently began requiring that CRM operate on a reimbursable basis while the agency considers whether they should be treated as High Risk recipients. Though the NOAA CRCP Cooperative Agreement was designed for equal distribution across three CNMI government agencies, it is a competitive process that can result in uneven distribution of funds in the CNMI. A key concern by both the CNMI and NOAA CRCP has been the loss of funds from federal cooperative agreement awards (i.e. NOAA CRCP Cooperative Agreement and CZM Cooperative Agreement). Federal funds that are provided to the CNMI government and remain unspent when the award expires are diverted back to the General Fund at the U.S. Treasury instead of supporting on the ground needs. As noted in

Section 3.1, this appears to be a systemic issue, and the overall challenges of efficient grants management has been identified by many who were interviewed as a significant capacity gap in the CNMI.

Several federal agencies, such as NOAA NMFS and National Park Service, receive funding specifically for their own staff salaries for offices located in Guam and the CNMI. NOAA staff must compete for all other project-level funding, which varies greatly annually and is typically approximately \$100,000. Few local NGOs or local organizations in the CNMI related to natural resource management receive consistent core funding and therefore rely on short-term funding cycles with a range of reporting, monitoring and evaluation requirements. While many are entrepreneurial and have some fundraising capacity, it is small scale and they face uncertain long-term futures, as they are largely dependent on current availability of grants and contracts from federal agencies that support work in the CNMI. Large NGOs (predominantly TNC, Rare and the MCT), are present and contribute significantly to building capacity and rely on a global and diverse funding base to support local programs. Few foundations have invested deeply in coral reef management in the CNMI and potential partnerships are being explored with organizations such as Margaret A. Cargill Foundation. Local NGOs in the CNMI are often competing for funding with large international organizations that are involved in issues such as public health, which typically take priority.

Increasing the quality, transparency and effectiveness of grants management and ensuring adequate degree of controls associated with spending is a fundamental recommendation that crosses across all recommendations below. Without fundamental reform of these core aspects, issues surrounding fiscal management will continue to create barriers to both public and private investment in coral reef management in the CNMI. Formal commitment for both reform and building a diverse portfolio of sustainable finance mechanisms for natural resource management is the principle recommendation that links to all others below.

Note on recommendations: The recommendations in this section have been divided into three groups based upon their complexity, scale, practicality and the degree of control over their implementation. The Group 1 Recommendations are highly political in nature, will require high-level governmental action, and in many respects lies beyond the direct reach of the CNMI coral reef management network. The Group 2 Recommendations will require a collaborative and coordinated approach to management at select priority sites and involve interconnected systems and engagement with multiple resource users, government entities, NGOs and funders. The Group 3 Recommendations are designed to build capacity at an organizational scale where leadership and control over implementation is relatively high. Each recommendation includes insight on the degree of complexity, cost, and the time required to implement. Section Five presents broader contextual guidance on how to develop a long-term strategy to build adaptive capacity to improve coral reef management in the CNMI.

TIME SCALE	COMPLEXITY SCALE	MONETARY SCALE
Short = <1 year	Simple = Somewhat context independent recommendations such as “best practices” and “standard operating procedures” that have fairly high certainty of building capacity.	\$ - Less than \$5,000
Medium = 1 to 2 years	Complicated = Context is more important and the recommendation may require either coordination of technical expertise that may or may not be present in the system, or may require a degree of social engagement and relationship building that creates a common ground; i.e., either socially or technically complicated.	\$\$ - Between \$5,000 and \$20,000
Long = >2 years	Complex = Context is highly dependent and the recommendation may require strategies that are adaptively implemented and address dynamic, emergent, non-linear and complex conditions.	\$\$\$ - Between \$20,000 and \$100,000 \$\$\$\$ - Greater than \$100,000

4.1 Group 1 Recommendations: Politically Challenging Goals to Improve Formal Commitment to Coral Reef Conservation

This group of recommendations involves a level of decision-making that must fit within a larger political agenda, will require high-level formal commitment, and in many respects lies beyond the direct control of the CNMI coral reef management network.

4.1A Clarify the Legal Roles, Mandates, Responsibilities, and Jurisdictions of Local and Federal Partners and Identify Obvious Areas of Overlap

There is a need for clarification on roles of local and federal partners so as to further develop inter-agency collaboration to foster improved federal-local relationships amongst agencies. This should be identified at both the local and the federal scale, and areas of overlap should also be investigated. It would be valuable to develop a sort of orientation binder on “who is doing what” in coral reef management in the CNMI at the scale of the CRI. This could serve as a concise guide to Executive Directive 235 and the different agencies and organizations in the coral reef management system in the CNMI for new employees and contractors. This would be a useful tool to identify the legal mandates, roles and responsibilities of each of the different agencies. It would also be a valuable resource to streamline the permitting process, clearly outline how the agencies interact, and help to identify partners for different types of programs and projects. This resource could be linked to orientation to improve transparency within the interconnected network of coral reef management and across the multiple scales of governance.

When the U.S. Coral Reef Task Force was created, federal agencies had to go through this similar process at the scale of the U.S. In addition to that existing knowledge, a similar process should be done at the scale of the CNMI. This effort should begin with the CRI Agencies, and the next step would be to develop a similar tool for all natural resource agencies and organizations that do work in the CNMI. The CRI Attorney could be a critical partner for interpreting local mandates and clarifying the enabling legislation from the CRI Executive Directive 235.

Related PSD Priority Goals: Builds capacity for all PSD priority goals

Recommended Leads: CRI Attorney, DEQ Attorney

Potential Partners: NOAA CRCP, USFWS, EPA, National Park Service, DoD, DOI, NRCS, DLNR Attorney

Time: Short

Cost: \$

Complexity: Simple

4.1B Clarify the Administrative and Criminal Pathways of Enforcement and Identify Where Appropriate Law Enforcement Training is Needed

A critical first step to this recommendation is making the case for both increased compliance and enforcement and why one needs to be viewed in direct relationship to the other. Political will and formal commitment needs to be built to support enforcement in order to increase compliance. This requires commitment for the enforcement program from upper-level management and administration, as well as dedication from enforcement officers themselves. Once the case is made, steps should be taken to explore where clarification and training may be required in law enforcement to ensure that rules and regulations are enforced effectively. A professional evaluation by an organization with expertise in enforcement review, such as MPA Enforcement International in partnership with NOAA OLE, may be a thoughtful step to review specific ways to reform enforcement to increase compliance. In the meantime a set of capacity building trainings may include the following:

- Clarification on parameters of natural resource rules, regulations and laws;
- Protocols for improving case preparation;
- Trainings for hearing officers on the importance of natural resource rules; and,
- Trainings in avoiding and resolving conflicts of interest.

PIMPAC is a collaborative group of stakeholders engaged in coral reef use and management across the U.S. Pacific Islands and Freely Associated States that work to build partnerships in order to increase the effectiveness of MPAs in the region, could be a partner in building cross-trainings for those engaged. Administrative and criminal pathways should be made clear to enforcement officers as well to other stakeholders, including the general public through education outreach campaigns to increase compliance. CRM does have funding in FY2013 to convene a group to conduct enforcement trainings similar to those previously done in Palau and Guam.

Related PSD Priority Goals: 1, 2

Recommended Lead: Office of the AG

Potential Partners: PIMPAC, representatives from each of the CRI Agencies and their enforcement sections, NOAA Department of Justice

Time: Long

Cost: \$\$\$

Complexity: Complex

4.1C Reinvigorate the CRI Science Committee to Work in Coordination Across all Three CRI Agencies

Across the three CRI Agencies, each has a different mandate to assess different aspects of coral reef and environmental health. No one single agency or entity is mandated to comprehensively assess overall coral reef health in the CNMI. Furthermore, knowledge that is relevant to good stewardship comes from many sources including local resources users, communities, elders, cultural practices, NGOs government agencies as well as academia. The goal of this recommendation is to foster a more collaborative process to meet the Executive Directive of the CRI to answer

the question, “How are the coral reefs doing?” This has direct economic impact as it is related to the business case for coral reef management (see Recommendation 4.2C - Collaborate Across Natural Resource Agencies To Define Agenda for Response to Department of Defense Readiness), as well as social and cultural aspects of ensuring the traditions and practices associated with healthy coral reefs. If partners within the jurisdiction including natural resource agencies, businesses and the general public, move closer to agreement on the importance health of the coral reefs as a driver of the economy as well as importance to socio-cultural traditions, then the CRI Science Committee should be reinvigorated to further document and communicate the dominant trends of the health of the coral reefs. Moving closer to the degree of agreement among partners as to scientific approaches, both biophysical and social, would be required to increase coordination across the CRI Agencies and other stakeholders and may require expert conflict resolution.

A serious challenge that is increasing across the world is the degree of connectedness between researchers generating knowledge with those who are in a position to translate the knowledge into action. Ideally, these connections operate in both directions where resource users pose questions for researchers to investigate and researchers develop more effective methods to share new knowledge with resource users. Clarifying the role of science in decision-making is essential yet remains a source of potential conflict.

Implementing this recommendation to build capacity for increasing the role of science to inform coral reef management through the CRI Science Committee would require a multi-step process and likely require long-term attention:

- Step 1) Re-invigorate the Science Committee. There are many ways to implement, and one that is suggested below is designed to strengthen the local ownership of the process. The process would begin with a team of scientists who represent all local agencies doing work in coral reef management in the CNMI to come together and agreed upon basic parameters such as data collection methods, distribution of results, communication effectiveness and overall collaboration. A nominee for the committee has already been selected from CRM, and if other agencies follow suit then this portion of the recommendation could occur relatively quickly. Since these topics could generate strong disagreement, defining steps to resolve conflict is essential early on in this process. Once local partners meet and come to a consensus on methods and general perspective on the health of the coral reef as well as approaches for conflict resolution, then federal partners should be welcomed to engage in dialogue with the committee. It is critical to foster high quality collaboration among local partners as a first step in the process.
- Step 2) In the event that it is needed, the CRI may consider contracting a professional outside mediator for CRI Science Committee meetings to maximize collaboration and reduce the potential for conflict. The facilitator could help to establish clarity over key issues and foster a set of principles for how to resolve conflict in the committee meetings and would likely only be required in the initial stages of committee development. Implementing this step could feature a retreat for the CRI Science Committee, at a suitable location potentially in the northern islands of the CNMI, in order to team-build and hold productive dialogues and possibly simulate and share research methods.
- Step 3) Develop meetings agendas based on the principles of high quality collaboration. Formalize meeting procedures and best practices for engagement to better clarify the ideal role of science in decision-

making and how best to inform individuals, institutions and society who are engaged in the decision-making process. Science should not dictate decisions, but inform them in ways that document changes, explore interrelationships in coupled social and natural systems, anticipate likely outcomes and develop and evaluate options for alternative trajectories.

Building upon Step 2 and supporting the long-term viability of the Science Committee, a neutral trusted third party (ideally local) in partnership with a trusted interdisciplinary academic scholar should work to broker a dialogue on reconciliation of biophysical coral reef and fisheries information. Those engaged should build off of existing data and work towards a common goal of analyzing scientific data to effectively inform management and policy actions. The dialogue should include topics such as developing a common database, ideal process for data management, and methods for presenting data. This process would work towards ensuring consistency in the capacity to analyze biophysical coral reef data across all CRI Agencies. This should be coupled with an effort to create a unified front on biophysical coral reef information across the CRI Agencies, as well developing a process by which that information can inform upper-level management and political leaders. The CRI Agencies should work to ensure that accurate and efficient data is reaching decision-makers in the CNMI government.

Once these steps have been taken, the CRI Science Committee should engage directly with the CRI Policy Committee as a platform for the agencies to come together and agree on agendas, methods, expectations, etc., with the ultimate goal of ensuring that scientific data informs management and policy. Once both local committees are organized and on track, then more effective policies for collaborative research can be defined. For example, when someone external from one of the federal research agencies wants to do scientific research in the CNMI, they would work directly with the Science Committee as the group that represents the collective interests of current CRI research activities.

If this process of reinvigorating the Science Committee proves successful for biophysical research questions, a next step would be to build capacity for the further integration of social science to further weave in the human dimensions and build off of socio-economic information that has already been gathered. A Social Science Committee or subcommittee could be developed that can be grown on a parallel track and could work to inform each other to develop a more holistic perspective of biophysical as well as human dimensions with respect to coral reefs.

Related PSD Priority Goals: Builds capacity for all PSD priority goals

Recommended Leads: POC, CRI, CRI Policy Committee, CRI Scientists, supervisors of the scientists, and some external well-recognized voice to help facilitate the process

Potential Partners: NOAA, PMRI, MINA, MES, APASEEM, MMP, UoG, Sea Grant, NMC, Saipan's Fishermen's Association, and WESPAC

Time: Medium

Cost: \$\$\$\$

Complexity: Complex

4.1D Work with MVA and Other Partners to Explore Local Options and Strategies for Sustainable Finance for Natural Resource Management

The MC Sustainable Finance Plan Recommendations should be explored and implemented where appropriate in the CNMI. For example, funds from local taxes, such as the Hotel Occupancy Tax, could be tied and bound with stipulations to be directed to enforcement at DFW, as well as other coral reef management needs. Initial meetings have taken place between CRI, MCT and the Office of the Governor to explore methods of sustainable financing for natural resource management. Possibilities to build local sustainable financing include dedicating funds from local

taxes, creating drop boxes for spare change at points of entry and exit to the CNMI, providing the option on hotel bills to give some money to natural resource protection, etc. Certain funds could go into a common pool to fulfill specific needs (such as enforcement) between DFW, DEQ and CRM. Natural resource agencies also plan on meeting with the legislature in the future to discuss opportunities to help build the CNMI's endowment for the MC, interest income of which could be used to fill funding gaps. There may also be a possibility in the future to tie natural resource funding to the local corporate taxes, such as the Business Gross Revenue Tax, and provide corporations with the option of matching and dedicating funds. Engaging key community members such as mayors to explore sustainable financing through local funds and local taxes will be a critical step for implementing and sustaining this recommendation long-term.

Related PSD Priority Goals: 1, 2

Recommended Lead: POC

Potential Partners: TNC, MC Regional Office, MCT, DEQ, CRM, DFW, Micronesia Chief Executives Summit
Time: Medium

Cost: \$

Complexity: Complicated

4.1E Fill Critical Vacancies and Identify Critical Hires in Near Future for Natural Resource Management Positions at CRM, DFW, DEQ

As noted in this report, filling vacancies is needed to build effective human resource capacity. As a key first step, identify most urgently critical vacancies and work directly with Department or Division leadership to expedite the process for critical hires within each of the three agencies. Following clarification, the agencies should connect with key personnel at OMB, OPM, Office of the Governor and Office of the AG to help expedite the process of hiring that would dovetail with reform of the hiring process defined above. Key vacancies include lead biologist and planner positions, grants managers, enforcement officers, and education and outreach coordinators. Under recent new leadership, CRM is in the process of hiring biologists, lead planners, GIS staff, and several other key positions. DFW is also working to hire an education and outreach coordinator. The CRI has therefore seen recent efforts to fill staff capacity gaps, and momentum should be continued in that direction. Since hiring of local staff is important, developing a stronger feeder network with Natural Resource Management graduates and [Saipan Higher Education Financial Assistance](#) alumni as part of a recruitment strategy is encouraged.

Revival of the CRI Coordinating Committee is needed to better link the three natural resource agencies (DEQ, CRM, DFW) and would be an ideal body to track the progress of filling vacancies, and the status of CRI funding and report directly to senior level administrators within the Office of the Governor to track progress of overall reform. The CRI Policy Committee should also be involved with the implementation of this recommendation. This could ensure that through the committee meetings all members and directors are informed of the continued status of this recommendation. The three agencies' designated representatives to OPM may be logical liaisons to the committees on this issue. Those liaisons would be responsible for knowing which positions were open in their agency, funding available for those positions, qualifications, ideal time frames for hiring, etc.

Related PSD Priority Goals: Builds capacity for all PSD priority goals

Recommended Leads: DEQ, CRM, DFW, CRI Coordinating Committee

Potential Partners: NOAA PIRO in the CNMI, EPA, USFWS, NOAA CRCP, DOI

Time: Long

Cost: \$
Complexity: Complicated

4.1F Clarify Hiring Processes and Consider Options for Reform

The first step for improving issues related to hiring in the CNMI would be to map the current process that is in place. It would then be important to assess what would be ideal given the current context and realities of hiring for the various agencies involved. Ultimately, high-level meetings with key staff from Department of Finance, OMB, OPM, Office of the Governor, and Office of the AG would be necessary to get the formal commitment for a revised system.

As part of mapping the current process, there could be an assessment of the grant and award funding currently being underutilized (returned, lost, etc.). This assessment of grant funding could inform future hiring practices as well as other aspects of financial administration reform. MOUs would be useful to improve government-wide cooperation related to hiring protocol combined with training workshops to educate new staff and refresh existing staff on the standard operating procedures regarding the hiring process. Liaisons in each agency to track hiring could prove worthwhile for increasing communication and efficiency, increase cross-training and identify ways to address recurrent issues with staff hiring, retention and turnover.

The following steps should be taken to implement this recommendation:

- Step 1) Define the steps that would improve the efficiency of the hiring processes using examples in a specific program such as coral reef management. Present information that summarizes analysis of job hires and position vacancies in all CRI Agencies. See Recommendation 4.1E - Fill Critical Vacancies and Identify Critical Hires in the Near Future for Natural Resource Management Positions at CRM, DFW, DEQ for more information.
- Step 2) Build political will and formal commitment through the development of a case that features clearer understanding of the return of investment for reform of hiring practices. The case for reform should be brought to the Office of the Governor, and high-level meetings should then be held to decide on revision or total overhaul.
- Step 3) If needed, secure services of experts in this field and implement the necessary steps to transform the system. Make this a priority with stakeholders at different scales throughout the CNMI.

Related PSD Priority Goals: Builds capacity for all PSD priority goals

Recommended Lead: OPM

Potential Partners: DEQ, CRM, DFW, DFA, OMB, Office of the AG, Office of the Governor

Time: Long

Cost: \$

Complexity: Complex

4.1G Clarify Procurement Processes and Consider Options for Streamlining

The first step for improving issues related to procurement in the CNMI would be to simply map the current process that is in place and identify specific methods for increasing efficiency. It would then be important to assess what specific reforms would be ideal to improve the process for all the various agencies involved. Ultimately, high-level meetings with key staff from Department of Finance, OMB, OPM, Office of the Governor and Office of the AG would be necessary to get the formal commitment for a revised system.

With formal commitment for reform of the procurement process, MOUs could be executed that specifically states shared expectations for steps to improve government-wide procurement with signatures of key leaders from relevant agencies. Standard operating procedures may need to be revised, distributed and shared. Workshops could help educate new staff and refresh existing staff on the revised standard operating procedures and their direct linkage to administrative code (such as 70-30.0-220 administration code A through E related to Small Purchases and ensuring that biologists work directly with agency procurement staff on providing appropriate quotes). Such training could be done on a regular basis in conjunction with dedicated staff who act as liaisons in each agency to track procurement and increase communication and efficiency. Reform of procurement would benefit natural resource management across the CNMI. If there are efforts to increase overall quality of contracting for specific services such as LID, innovative techniques for sediment and erosion control practices, and there are certification practices in place for such competencies, a reformed procurement process becomes an ideal platform that provides incentives for securing the services of certified contractors.

With limited staff, cross training on administrative process is needed. The DFW currently conducts cross training to ensure redundancy and continuity of the skill set among its personnel given issues with staff turnover, timing of personal leave, etc. This is a sound practice that should continue with all aspects of financial administration such as procurement, as a fundamental principle of reform.

The following steps should be taken to implement this recommendation:

- Step 1) Define the case for why and the steps for how the procurement processes in coral reef management should be improved. An analysis of the persistent barriers to efficient procurement should be completed.
- Step 2) Build political will and formal commitment by articulating the likely return on investment for procurement reform. The case for improvement should be brought to the Office of the Governor, and high-level meetings should then be held to decide on revision or total overhaul.
- Step 3) If needed, secure services of experts in this field and implement the necessary steps to transform the system. Make this a priority with stakeholders at different scales throughout the CNMI. Recurrent trainings for staff dedicated to procurement (specifically trainings on terms, conditions and protocol on how to go through procurement process).
- Step 4) Procurement and Supply of the Department of Finance has only 25% of the staff positions that were present in 1994. At least two more trained FTEs within the accountability section of Procurement and Supply could aid with bottlenecking issues. If ensuring improved procurement is a priority for natural resource agencies, then consider creating procurement and finance clerks for each agency to act as the liaison.

Related PSD Priority Goals: Builds capacity for all PSD priority goals

Recommended Lead: Department of Finance, Procurement and Supply

Potential Partners: DFW, DEQ, CRM, OMB, OPM, Office of the AG, Office of the Governor

Time: Long

Cost: \$

Complexity: Complex

4.1H Work with MVA to Make the Business Case for Improved Coral Reef Management

To answer the question “Why should we manage coral reefs?” a succinct and clear case for coral reef management could be developed to engage other potential partners in the tourism sector. Such a case statement, when completed, should be a shared document that all natural resource staff, including the CRI system, partner organizations and foundations, as well as the tourism sector, can understand. The case statement should clearly present strategic implementation plans, types and amounts of expenditures, signs of success and ultimately provide language regarding return on investment and the clear link between natural resources management and improved economic, social and environmental conditions within the state as a whole.

Components of such a business case could include:

- Economic valuation of coral reefs (examples may range from dollar value of coral reef protection to maintaining or growing jobs and job opportunities associated with the tourism and recreation sector);
- Valuation of ecosystem services of coral reefs;
- Long-term and short-term return on investment for coral reef management and protection;
- The importance of coral reef management in building resilient communities in the CNMI;
- Balancing responsible extractive activities while maintaining cultural and social integrity of coral reefs;
- The promise of sustainable development; and,
- A list of literature that references the source of this information.

Another aspect of this recommendation could be to co-develop briefing presentations with MVA to present to the tourism industry stakeholders. An opportunity exists to promote the importance of coral reef health to leadership in the tourism sector through briefing presentations. Saipan Chamber of Commerce Environmental Committee monthly meetings and MVA’s meetings could be used as a venue for natural resource managers trained in communication to make presentations communicating the importance of the coral reefs. An example presentation might be on the State of Coral Reef Ecosystems of the Commonwealth of the Northern Mariana Islands (2008), or the updated Economic Valuation Study for Coral Reefs. These presentations should include compelling narratives about how the coral reefs are doing and their importance for the CNMI’s “brand” and the long-term sustainability of the tourism industry in the CNMI. Such collaborations should occur on a rotating and regular basis so that this partnership between natural resource agencies and the tourism industry is sustained. It may be valuable to employ metrics to ensure formal commitment from both CRI and MVA. For example, DEQ is working on a campaign to highlight businesses that are using “coral reef-friendly” or “coral reef conscious” practices, and it may be beneficial to partner with MVA to ensure that MVA is promoting and sanctioning businesses that meet those DEQ campaign criteria.

This business case could also be connected to the Guide for Investors booklet (see Recommendation 4.1N - Update Guide for Investors in the CNMI) to encourage best practices for those involved in business and development in the CNMI. The goal of the business case should be to demonstrate the importance of coral reefs and to clearly show how the coral reefs are responsible for sustaining businesses in the CNMI. The next step would be to tie the business case to the Economic Valuation and Guide for Investors in order to change the behavior of stakeholders to improve stewardship. These studies should be widely disseminated and presented to critical partners in industries such as tourism, business and development.

Related PSD Priority Goals: 1, 2, 3, 4

Recommended Leads: MVA, CRI Policy Committee, Saipan Chamber of Commerce Environmental Committee

Potential Partners: Tourism operators (for a wide range of demographics of tourists)

Time: Medium

Cost: \$\$\$

Complexity: Complicated

4.II Create Consistency for Public Federal Funds that Support Positions to Define Minimum Qualifications Using CRI as a Model

With the necessary formal commitment for reform of the hiring process, the CRI could serve as a model to foster consistency in hiring practices and adopt new practices in collaboration with both the CNMI's administrative agencies and federal partners. Currently, recruitment for positions includes the requirement that applicants demonstrate how their competencies and skills match the intended scopes of work. If those positions are federally funded, then the federal agency could require minimum qualifications. For example, NOAA CRCP, through the cooperative agreement, has the mandate to review the qualifications of those candidates to confirm that they meet the hiring requirements under the federal award. Once NOAA confirms the minimum requirements of the top three candidates, then the local agency has the final decision on hiring. This process would not be required if the position is not federally funded. The CRI hiring process has served as a successful model for enforcement and for ensuring that hires meet minimum requirements for their position. It is important to have this added consistency for hires meeting minimum requirements due to persistent issues of nepotism in hiring within the local government

While the degree of control over funding and hiring may vary across federal agencies, identifying a specific program such as the CRI to serve as the lead for this could establish a more consistent approach across multiple funding programs. Improving consistency of oversight of federally-funded positions by all federal granting agencies participating in the CRI should feature an agreed upon set of control mechanisms to be put in place in partnership with agencies in the CNMI to ensure that hired staff meets minimum requirements of the position and award requirements. Implementing this recommendation and building consistency would require a high degree of agreement within CRI to define basic minimum requirements and why these competencies are essential at the specific level of authority and responsibility. Implementation would therefore be complex, and the method by which partners come together and come to a consensus on this topic is critical which is why a piloted effort at the scale of federal and agency partners within the CNMI initially could be a path forward. If this is successful, other initiatives within the CNMI could adapt this model and it could potentially serve as a model for other U.S. coral jurisdictions to be scaled up to create greater consistency in hiring. This would require formal commitment from NOAA CRCP and upper-level management in the federal agencies involved.

Related PSD Priority Goals: Builds capacity for all PSD priority goals

Recommended Leads: CRI Agencies, Office of the AG, POC

Potential Partners: OPM, NOAA CRCP, NOAA PIRO in the CNMI, EPA, USFWS, DOI

Time: Long

Cost: \$

Complexity: Complex

4.1J Review, Clarify and Update the CRI Executive Directive

Clarify the roles and responsibilities of the three agencies involved in CRI. Use this as a process to reconfirm and redefine the mandate and share with senior officials the overall scope and quality of collaboration that is essential for effective coral reef management. The Governor's Legal Counsel has already been studying the mandate, and the CRI Policy Committee is planning to review it as well. There may be a window of opportunity for this recommendation to occur in the near future given the degree of attention and potential commitment by the Office of the Governor. This may be an opportune time for the CRI to recognize that initiative has completed one full generation of the Management Cycle (see Section 1) and are now at a critical time in their evolution to look back and assess what the CRI has accomplished, how they arrived at where they are, and to forge a revised path forward toward shared goals and outcomes. This could be a useful tool to validate the CRI in its current generation and to shape the narrative of how the CNMI can emerge as a leader.

This would be a two-tiered recommendation. First, the mandate would have to be reviewed and clarified. Following that review, if indeed it were found that the mandate needed to be updated, a process would be put in place to thoroughly go through the mandate and update it. There may also be a need for brokering the mandate if it is found that there is a lack of consensus. There would be an outreach component to this part of the recommendation as well. When the mandate is finalized, whether or not it is updated, the terms of the mandate for all CRI Agencies should be widely distributed and clarified to stakeholders. If update is justified, a process should be put in place to secure the mandate, which may require resolution of specific issues and coming together of CRI Agencies and stakeholders. There may be an opportunity to use the mandate as a tool to increase high quality collaboration between the CRI Agencies. Clarifying which agencies have jurisdiction and responsibilities in which areas of coral reef management may help to address forces of fragmentation, overlap, and missed opportunities for partnership on initiatives. The mandate may also include specific guidelines and requirements for collaboration and interaction between the three agencies to ensure that they are continuously working in partnership towards common goals.

Related PSD Priority Goals: Builds capacity for all PSD priority goals

Recommended Leads: CRI Policy Committee, POC

Potential Partners: Office of the Governor, Office of the AG, NOAA CRCP

Time: Short

Cost: \$

Complexity: Complicated

4.1K Addressing Staff Retention within CRI

Retention of staff within CRI Agencies will likely continue to pose capacity challenges as a range of factors remain such as pay scale, cost of living in the CNMI, benefit packages, more lucrative alternative offers. One approach to better understand the degree that compensation is an issue would be to conduct a desk audit and potentially adjust pay scales based on roles and responsibilities of employees. A similar desk audit was initiated by OPM in the late 1990s, but the resources were not available for full implementation. If this were to be a priority among CRI Agencies, then an external contractor would be hired to conduct the desk audit.

Based on the results of the audit, one potential method of increasing retention would be to increase the pay scale for government employees. This may serve to improve efficiency if institutional knowledge were retained at critical

natural resource management offices. Increasing the pay scale could also have the effect of enticing locals back to the island after going off-island for higher education opportunities. If the pay scale were to be adjusted, the attorney for the Civil Service Commission would likely be a key partner. However, it would be critical to ensure that, if indeed pay scales were to be increased for federal employees, it would not create an imbalance and a shifting scale between federal and Commonwealth employees. The topic of pay scale is an inherently systemic and complex issue, and is one that should be dealt with at the federal scale for employees across multiple sectors, not solely coral reef managers.

There are legislatively defined caps for salaries within all the CNMI's government agencies (Personnel Rules and Regulations). Review and potential reform of the salary caps and pay scales at the scale of the CNMI would require formal commitment and would need to be part of a comprehensive case for why and how it could be done. This could be incorporated into the business case for coral reef management (Recommendation 4.1H - Work with MVA to Make the Business Case for Improved Coral Reef Management). An assessment should also be done on the benefits of CRI employment in order to increase hiring and retention. Such an assessment/case should include aspects such as salaries and cost of living in the CNMI, benefits to employment in CRI (such as travel, additional training, and professional development), being a contractor versus an employee, and incentives. Benefits should be made consistent across agencies. This case should help build a unified voice among CRI Agencies as to whether they support the endeavor of reassessing the pay scale, as well as justification and validation of benefits for CRI positions and hires. Finally, a brief review of the comparable job opportunities for staff involved in coral reef management at other agencies and organization, federal and private, could be conducted so as to make more transparent the number type and compensation packages that are available. Following this review, CRI Agencies may consider increasing and standardizing benefits where appropriate and possible to help support retention in the long-term, such as increasing the hours of annual leave per pay period and develop other appropriate incentives.

Related PSD Priority Goals: Builds capacity for all PSD priority goals

Recommended Leads: OPM, Attorney for Civil Service Commission

Potential Partners: OMB, DFW, DEQ, CRM

Time: Long

Cost: \$\$\$\$

Complexity: Complex

4.1L Revive the Joint Enforcement Task Force

Revive the already established Joint Enforcement Task Force as described in CRM's CZMA Section 309 Evaluation Metrics. CRM is currently beginning a 5-year evaluation process to identify a series of success metrics. One of the metrics they will be evaluated on is establishing a task force through joint enforcement for the three CRI resource agencies. This will begin in October 2013 and will continue for 5 years. This creates a process to expand and grow the program, and to clarify roles and responsibilities therein. Through the Joint Enforcement Task Force, a combined skill set should be developed across all CRI agency enforcement officers. The Task Force could be a platform for cross-training and standardization so that all CRI enforcement officers could become deputized to enforce all natural resource rules and regulations. Officers could then be shared across agencies and rotations, which would foster a more unified natural resource enforcement team. This would help to create wider availability and rotation of officers on the ground. Based on current transitions in the CRI, this process could happen relatively soon and would help build momentum for implementation of other recommendations to build capacity for effective management.

Through interviews, several noted that general public perceives a lack of coordinated enforcement in the CNMI and thus further undermines compliance. One strategy to address this issue is an external, comprehensive audit to assess where existing legislation specifically defines areas of enforcement and what efforts are currently in place. This could help to clarify the Joint Enforcement Program roles, responsibilities and needs for the CNMI and validate it to the enforcement officers involved, community members, and political leadership. Another responsibility of the Task Force could be to foster transparency between enforcement officers and communities regarding the warning and citation process in order to build compliance and accountability for enforcement. One strategy would be to develop a public website where people can send in information on violations and track how they are handled by enforcement officials. This could be an important tool to allow community members to see and track enforcement efforts in their communities and increase the level of accountability. Increasing community involvement in and support for enforcement could be tied with Recommendation 4.2D - Conduct Lessons Learned Process for First Generation of Tasi Watch for Continued Program Development.

The Joint Enforcement Task Force, once developed, should consider appointing a CRI Enforcement Coordinator in charge of the Task Force as well as the CRI Agencies' enforcement programs. This staff member doesn't necessarily need to be enforcement personnel, but it is important to have someone with strong leadership and organizational skills who can coordinate, manage and represent the enforcement program and who can make sure there is support for enforcement from upper-level management and the political leadership. This position would have two key roles: program manager for enforcement officers, and grant manager for the enforcement program. Responsibilities would include managing the program and officers themselves, as well as managing federal funding and allocating those funds within the program. This position could also be responsible for managing the community enforcement website mentioned above, if it is developed.

Related PSD Priority Goals: 1, 2

Recommended Lead: DFW, CRM, DEQ

Potential Partners: OMB, OPM, and Attorney for Civil Service Commission

Time: Medium

Cost: \$\$\$

Complexity: Complex

4.1M Clarify Grants Management Processes and Consider Options for Streamlining

Reform of the award and grants management process should greatly contribute to addressing persistent capacity gaps related to the more effective use of federal funds. The first step for improving issues related to grants management in the CNMI would be to lay out the current management process. This would most feasibly be accomplished by the Office of Grants Management under the Office of the Governor that was established by Public Law No. 16-48 in 2009. It would be important to assess what would be ideal for the various agencies involved. Ultimately, high-level meetings with Department of Finance, OMB, OPM, Office of the AG, and Office of the Governor would be necessary to get the formal commitment for a revised system.

As part of a more detailed understanding of systems, steps and oversight involved with the current process, there could be an assessment of the grant funding currently being underutilized (returned, lost, etc.). While this issue is likely germane for other federal source, starting with the case example of NOAA CRCP Cooperative Agreement funds could provide a case example to examine ways to increase efficiency and define specific reform for grants management

protocol (including ensuring that hiring protocol complies with grant terms). Include measures to “train the trainers” to ensure continuity of skills, especially considering the imminent staff turnover as a large number of government employees are expected to retire in the near future.

The following steps should be taken to implement this recommendation:

- Step 1) Define the current and ideal grants management processes using coral reef management and the oversight of federal funds as a case example. A systems analysis should be conducted to understand the specific issues that increase the transparency and effectiveness of administering grant funds that features a brief section on funds that have been returned to the grantor/not being spent in the last 5-10 years.
- Step 2) Build political will and formal commitment by making the business case for increasing the effectiveness of grants management. The case for reform should be brought to the Office of the Governor, and high-level meetings should then be held to decide on revision or total overhaul.
- Step 3) Work with federal partners in grants management to reform the system.

Related PSD Priority Goals: Builds capacity for all PSD priority goals

Recommended Lead: Office of Grants Management under the Office of the Governor

Potential Partners: DEQ, DFW, CRM, DFA, OMB, OPM, Office of the AG, Office of the Governor

Time: Long

Cost: \$

Complexity: Complex

4.1N Update Guide for Investors in the CNMI

Update the Investment Opportunities in the United States Commonwealth of the Northern Marianas document that was done in late 90’s specifically designed to promote the CNMI as a site for organizations who are considering investment, such as tourism infrastructure, in the CNMI. The guide can be a basic update of the current version and also include clear guidelines on the process of natural resource agency requirements, such as site development procedures, time to permit, certified site development contractors, engineers, architects as well as all other categories from the previous draft. The site development process should be made clear to investors who seek a “level playing field” so that everyone has to follow the same rules for the site development process. The updated guide would provide an opportunity to attract new investors and maintain existing investors, as well as to reinforce the importance of environmental consideration in development in the CNMI. Formal commitment and review by the Governor should be sought as a central feature of this recommendation. The Saipan Economic Development Authority, Saipan Chamber of Commerce, the Office of the Governor, and the DOI Office of Insular Affairs should be key partners with natural resource agencies in implementation. In the future, similar guides could be developed for other investors, such as for investments at the homeowner and small business scale.

Related PSD Priority Goal: 1

Recommended Lead: CRM, Saipan Chamber of Commerce, Saipan Economic Development Council

Potential Partners: DFW, DEQ

Time: Medium

Cost: \$\$\$\$

Complexity: Complex

4.2 Group 2 Recommendations: Using a Common Management Framework to Pursue Ecosystem-based Management at Priority Sites

This group of recommendations will require a collaborative and coordinated approach to management at select priority sites, and involve interconnected systems and engagement with multiple resource users, government entities, NGOs and funders.

4.2A Science to Inform Management: Social Science to Better Define Human Dimensions and Relationships to the Coral Reef

Conduct an inventory of all social science work that has been done related to natural resource management in the CNMI. Identify knowledge gaps and key indicators in balance with biophysical attention. Develop a literature review of related work on public health issues in the CNMI and identify possible linkages to the environment.

The MC Socioeconomic Working Group, together with the assistance of Micronesia Conservation Trust, TNC, NOAA, PMRI, Palau International Coral Reef Center, and many other partners has developed socioeconomic indicators that can be monitored throughout the MC jurisdictions. Success metrics could then be determined and coupled with biophysical indicators to create clear links between people and the coral reefs. This could be tied to Recommendation 4.2B - Science to Inform Management: Update Economic Value of Coral Reefs Study. Having a clear case that outlines the value of coral reefs both socially and economically would help support implementation of this recommendation. Understanding the sources of those values may contribute to developing and tracking socio-economic indicators related to coral reef health.

A local team (the Social Science Task Force/Working Group/Committee proposed in Recommendation 4.1C - Reinvigorate the CRI Science Committee to Work in Coordination Across all Three CRI Agencies) should be assembled to develop a capacity building program for social science to specifically address the human dimension in relation to coral reefs. The DEQ Coral Reef Project Coordinator and the CRI Education and Outreach Coordinator should be key leads for coordinating existing efforts and helping to build capacity to further those efforts and develop new ones. Trainings could be included for those involved to spread awareness on what the human dimension is and how it relates to coral reef management. NOAA CRCP could support training in the use of the [SOCMON/Sem-Pasifika](#) socio-economic monitoring method, which includes recently developed indicators for assessing community-level social vulnerability to climate change. Other partners that could be engaged in building capacity for social science in the CNMI include NMC, NSF, Rare, PMRI, TNC, the NOAA PIFSC, etc.

Related PSD Priority Goals: 1, 2

Recommended Lead: Social Science Task Force/Working Group/Committee proposed in Recommendation 4.1C

Potential Partners: DEQ Coral Reef Project Coordinator, PMRI, NMC, PIMPAC, MC, Rare, TNC, NOAA Science Center, NOAA CRCP, NOAA NCRMP, CRI Education and Outreach Coordinator

Time: Long

Cost: \$

Complexity: Simple

4.2B Science to Inform Management: Update Economic Value of Coral Reefs Study

Update the 2006 van Beukering et al. coral reef valuation study, [Economic Value of the Coral Reefs of Saipan Commonwealth of the Northern Mariana Islands](#), to include topics such as food security, socio-economic indicators of coral reef health, issues of retirement funding from the CNMI, etc. Build upon the existing study and simply update it to reflect the current coral reef economic value and socio-economic situation in the CNMI. This report could also be developed into an upper-level briefing that could be presented to help build political will and formal commitment for coral reef management in the CNMI. There may be an opportunity to do a valuation study that encompasses both the CNMI and Guam and leverage funds from both jurisdictions for its development. Academic partners from both jurisdictions may also be engaged in the valuation process. A potential next step to updating the valuation study would be to develop plans for community adaptation and community resilience in order to maintain that economic value and associated ecosystem services of coral reefs. [The MCT](#) and PIMPAC, with some support from [TNC](#), have developed a community adaptation toolkit, including a vulnerability assessment and early action plans for communities, which will be the topic of a Train the Trainers session later this year. This is one potential model that could be used for this recommendation in the long-term. Modules should be developed that are adapted for the threats and vulnerability level of the CNMI specifically.

Related PSD Priority Goal: 2

Recommended Lead: External Consultant, potential future Social Science Task Force/Working Group/Committee proposed in Recommendation 4.2A, CRM

Potential Partners: NMC, UoG, MC Measures Working Group, Micronesia Conservation Trust, PIMPAC

Time: Medium

Cost: \$\$\$\$

Complexity: Simple

4.2C Collaborate Across Natural Resource Agencies To Define Agenda for Response to Department of Defense Readiness

An opportunity exists for a common goal across agencies to contribute to a common strategy for DoD readiness including a shared monitoring protocol, shared database, etc. Although each of the DoD initiatives in the CNMI (MITT, MIRC, CJMT, Airport Expansion, etc.) have distinct associated environmental impacts and should be managed in different manners, the topic of military pressure as a whole is an issue for which the CRI could develop a unified front. The CRI Agencies share a common ground in their willingness to respond to DoD activity, and that consensus could provide a platform on which to model collaborative behavior that enables the three agencies to work together. There have been some examples of informal coordination between the agencies on the DoD readiness, and the agencies have been providing comments individually on certain proposed military actions. Coordination, commitment, and will among CRI Agencies on the topic of handling the DoD readiness should be formalized. A forum where all of the agencies come together and sit down to discuss the military pressure as a unified group would be one strategy. The Civil Military Task Force under the Office of the Governor in Guam may be a model for bringing stakeholders together. Engage the Military Integration Coordinator in the Office of the Governor as the lead responsible for providing information to and updating the natural resources agencies. There may also be an opportunity for the agencies to work together to develop a strategic plan for the military readiness, similar to the [Natural Resources Strategy](#) in Guam. This would provide CRI Agencies the opportunity to develop a common front

and common goals with respect to military pressure, as well as an agenda that clearly outlines how the agencies are going to interact and be involved in military development activities and mitigation strategies. Developing a complementary strategy that provides detail on mitigation standards/in-lieu fees and practices for the CNMI could also be worthwhile.

Related PSD Priority Goal: 3

Recommended Leads: Office of the Governor, CRM, Directors from all CRI Agencies

Potential Partners: NOAA, USFW, EPA, DoD

Time: Short (and then ongoing)

Cost: \$\$\$\$

Complexity: Complicated

4.2D Conduct Lessons Learned Process for First Generation of Tasi Watch for Continued Program Development

The Tasi Watch program has been a model for building social capacity and awareness in communities, as well as for transforming those involved to become stewards and to view natural resources from different perspectives. The program is still in its early stages and going through its first generation. Once it has been implemented for a longer period of time (likely around 5 years), conduct a lessons learned process for understanding the successes of the first generation of the Tasi Watch program at the three pilot sites (Garapan, Laolao Bay and Mañagaha) since 2011. A draft revised action plan for Tasi Watch for the coming years based on lessons learned from the pilot first generation should accompany that lessons learned process. A critical first step for this recommendation is to identify the time frame for initiating this process that allows the Tasi Watch program adequate time to fully engage with communities and community members and raise awareness on environmental issues in order to build compliance. This effort should be linked with the Education and Outreach Working Group as well as the Enforcement Task Force. Those entities should be brought together around the concept of Tasi Watch and should consider partnering to scale up the program to other geographies. Sustainable funding options should also be explored by partners involved in Tasi Watch, particularly to support vehicle access and stipends for rangers, fuel, and other maintenance needs as deemed necessary. Incentives should be developed in the future to encourage participation in the program. Tasi Watch is a clear link with building capacity for social science in coral reef management in the CNMI, and potential partnerships could be formed to support funding options and trainings and financial support for rangers.

Related PSD Priority Goals: 1, 2

Recommended Lead: MINA

Potential Partners: TNC, Education and Outreach Working Group, Enforcement Task Force

Time: Long

Cost: \$\$\$

Complexity: Simple

4.2E Create a Coordinated Education and Outreach Program between DEQ, CRM, DFW and potentially other NGO partners for the Priority Sites

At the scale of CRI, outreach coordinators exist for DEQ, CRI as a whole (which is housed within CRM), and DFW is planning on hiring one in the future. CRM may consider hiring an outreach coordinator in the future as well. These coordinators could work together on a unified education and outreach program between the three natural resource management agencies related to coral reefs. The Education and Outreach Working Group could be a platform to

begin these discussions. This effort could also be tied to the MC Communications Working Group, which is looking to engage with each of the CRI Agencies to reinvigorate their involvement with the MC and to encourage them incorporate the MC Communication Plan into their own education and outreach initiatives. If an overarching education and outreach program were created for the CRI, the MC Communication Plan and Communication Working Group could help with the program's direction and strategy. Potentially there could be a partnership with [National Marine Educational Association](#) for support related to materials development. These coordinators could co-sponsor monthly meetings with public and private school educators and NRM professors and administrators to brainstorm effective educational programming in the CNMI.

At the scale of the jurisdiction, reinvigoration of the Education and Outreach Working Group (see Recommendation 4.2F - Develop a System of Communication to Improve Engagement with Local Communities at Priority Sites) should also be prioritized by the CRI. CRI could be the coordinating body and the Working Group could engage other stakeholders beyond CRI such as local NGOs. Specific teams therein could also focus on coordinating education and outreach programs at the priority sites. The Tano/Tasi Working Group in Guam could be used as a model to engage both agencies as well as NGOs and other organizations involved in education and outreach for natural resources in the CNMI. The [CNMI Organization for Conservation Outreach](#) provides a blog that is a platform for engagement between outreach partners in the CNMI, and the CRI website will have a shared calendar for the agencies to post events. Those tools should be heavily encouraged in the CRI and within other education and outreach working groups in the CNMI. Additional tools and techniques may be needed to ensure that those involved in outreach in education in the CNMI are constantly sharing their projects with one another and that intrapersonal communication is regularly occurring. Partners in the CNMI may want to consider conducting a lessons learned workshop with La Tausangi in American Samoa.

Related PSD Priority Goals: 1, 2

Recommended Lead: CRI Education and Outreach Coordinator

Potential Partners: DEQ Education and Outreach Coordinator, (future) CRM and DFW Education and Outreach Coordinators, National Marine Educational Association, MINA, Tano/Tasi Working Group in Guam, La Tausangi in American Samoa

Time: Short

Cost: \$

Complexity: Complicated

4.2F Develop a System of Communication to Increase Quality of Engagement with Local Communities at Priority Sites

Most interaction between natural resource agencies/organizations and communities in the CNMI is through outreach and education campaigns or enforcement. There are several expressions of community outreach currently in the CNMI, such as [Tasi Watch](#), the [Our Laolao Campaign](#), and Rare's Laolao Bay Pride Campaign, and engagement with communities regarding natural resource protection is building. Developing a guidance framework on how best to engage with different communities when embarking on long-term outreach, including elements such as principles of respect, rules for communication, preferred languages, how to honor people's time, how to document engagement, and how to share lessons learned, would be a valuable tool to make community engagement more cohesive and coordinated. Create a platform for sharing lessons learned with the various partners ([Rare](#), [TNC](#), [MINA](#), [SeaWeb](#),

etc.) who have been involved in public outreach and awareness campaigns. Share successes and discuss strategies for aligning in the future.

Another aspect of this recommendation would be to increase the communication and systematic coordination across the different agencies and organizations that engage in community outreach. To avoid issues such as “survey fatigue,” there should be regular communication between the agencies and organizations that are engaged in community outreach. The CRI Outreach Coordinator may be a useful partner to create a platform, such as regular meetings or a shared calendar, for agencies and organizations to share their agendas, roles, responsibilities, campaign expectations, and current and upcoming outreach projects at different locations. Re-engaging the Education and Outreach Working Group may be another key aspect to reinforcing regular, systematic coordination of agencies involved in community outreach. This may require a revision of the group’s charter to clarify roles, responsibilities, meeting agendas, etc. The Education and Outreach Working Group could also provide annual updates to communities so the public is aware of all of the natural resource management actions and campaigns that are taking place in their community. This could include newspaper articles, public meetings, social media, and engagement with outreach coordinators in each of the priority sites.

Related PSD Priority Goals: 1, 2

Recommended Lead: Education and Outreach Working Group

Potential Partners: Rare, TNC, MINA, SeaWeb

Time: Long (and then ongoing)

Cost: \$\$\$

Complexity: Complicated

4.2G Reach Out to Support Local High School Students to Increase Engagement at Priority Sites

As part of its focus, the Education and Outreach Working Group could increase its existing outreach efforts specifically among local public and private high school environmental groups to help provide material or logistical support and provide professional advice as needed. Through this process, advertise NRM and cultivate interest in natural resource management careers. Students should be made aware of opportunities to get involved in natural resource protection in higher-level education, internships, and careers. Students involved in crafting CAPs through their Schools for Environmental Change group at local high schools could be a good place to start. CAPs are a good example of methods that have real world application to coral reef management in the CNMI, and giving students the chance to apply their work to actual data and research would be valuable to their education. If funding became available, it would also be useful to develop a counselor camp for high school volunteers engaged in the CRI Eco-Camps each summer. This would provide an opportunity for high school student counselors to receive ecology training, fieldwork experience with local scientists, and potentially engage with NRM managers prior to counseling and teaching the younger students in the camp. Continue to engage students throughout the year through the annual exposition, the CRI internship, Coral Watch (at high school clubs), and MINA programs with local high schools. Build on the successes of these existing programs and seek further opportunities for engagement through high school environmental groups, particularly in high schools at priority sites. One example is that of KKMP Radio, which received an outreach grant to work with a high school environmental club to compose songs about the environment, with funds from the sale of the compact discs going back to the club. Expanding on these efforts could be low-hanging fruit to build momentum for outreach and education at the scale of the priority sites.

Related PSD Priority Goals: 1, 2

Recommended Lead: Education and Outreach Working Group, Education and Outreach Coordinator

Potential Partners: Public and private high schools, Department of Education, KKMP, NMC and NRM

Time: Short

Cost: \$

Complexity: Simple

4.2H Apply Lessons Learned from Laolao Bay Watershed Restoration Efforts

Define lessons learned from the recent Laolao Bay Watershed Restoration project. This model could be expanded to new sites, particularly priority sites in the near future. Potential partners include the Green Team at UoG, WERI, National Park Service, CRI Agencies, ARRA, NOAA Habitat Restoration, and others that were engaged in the project. There was a wide range of partners and stakeholders that participated in the project, and this is a real model of engagement and collaboration in the CNMI. The learning from this project should therefore be widely distributed in order to foster a large knowledge base on how the project was carried out, and identifying lessons learned and opportunities for the future.

Related PSD Priority Goals: 1, 2

Recommended Lead: DEQ

Potential Partners: DFW, CRM, ARRA, NRCS, DLNR, NOAA Habitat Conservation - Restoration Center

Time: Short

Cost: \$\$

Complexity: Simple

4.2I Native Plant Nursery for Restoration at Priority Sites (Possible Training Program at Juvenile Detention Center)

Develop a jobs training program related to the creation of a native plant nurseries in the CNMI. One potential location for a native nursery could be the juvenile detention center on Kagman Road side of Laolao Bay. This native plant nursery could use the material removed from the culverts for its composting operations. Water for the nursery could be provided by the DLNR Division of Forestry from their existing nursery in Kagman. Establishing a reliable water supply is a critical enabling condition for the implementation of this recommendation. If it is a priority to have the nursery at Kagman, then addressing sustainable water source issues will be an important first step. Other management techniques such as catchments and cisterns could also be explored. MINA has been working to incorporate the juvenile detention center as part of Tasi Watch as well, which may be another method to engage the center in stewardship activities. There is also a Rare campaign in the CNMI that has a strong focus on native vegetation, which could be a critical partner to invigorate native nurseries. Fostering native nurseries such as this should be coupled with efforts to reconnect children and students in the CNMI with their natural resources. Students could be a valuable asset to work with and help to maintain the nurseries.

Related PSD Priority Goal: 1

Recommended Lead: DLNR Division of Forestry

Potential Partners: CRM, DEQ, MINA, NMC CREES, Rare, Forestry Advisory Council

Time: Long

Cost: \$\$\$\$

Complexity: Complex

4.2J Develop Lessons Learned from CAP Process and Management Plans

Partners engaged in the CAP process should work to ensure the CAPs in the CNMI are meeting expectations and are revisited and updated regularly as factors and conditions change. Focus should be placed on their utility in the region to help build adaptive capacity across a wide community. Employing a lessons learned process between each CAP would reinforce the adaptive capacity of the plans so that each one builds upon the previous one. The Laolao Bay CAP is an example of this process, as it has already gone through one generation and a revised version is currently being drafted. TNC also serves as the lead for the Pacific Islands Franchise of the Conservation Coaches Network, which has been investing in techniques to develop the CAPs into effectiveness assessments that can be readily used and adapted in the future. The Pacific Islands Franchise for the Conservation Coaches Network has been training a cadre of about 11 coaches in the region. The coaches receive enhanced training and then conduct their own initiatives to disseminate the learning process across the region. MINA has been using a similar technique through Schools of Environmental Change and the Environmental Camp. They have been bringing students together and training them so that they can conduct their own CAPs, largely focused on topics such as recycling and climate change, at their schools. These are expressions of the sharing of lessons learned across multiple scales. A similar process could occur with the CAPs in the CNMI and across the region to ensure that knowledge gained from the CAP process is widely distributed to communities, managers, and other stakeholders.

Other management plans in the CNMI could be incorporated into a lessons learned process in order to further their success, using the collaborative stakeholder engagement of the CAP implementation described above as a potential model. For example, there is an unimplemented, formally committed Management Plan for Mañagaha that should be implemented with stakeholder participation. It will be important to engage the concessioners as key stakeholders at Mañagaha. A visitor center that is included in the management plan could be an important education and outreach opportunity for tourism, and multi-language materials would be critical for its effectiveness. Similar processes could occur in order to facilitate implementation of the Bird Island and Forbidden Island management plans as well, and lessons learned sessions could occur across all three.

Related PSD Priority Goals: 1, 2

Recommended Lead: CRI, POC

Potential Partners: TNC, Pacific Islands Franchise for the Conservation Coaches Network, MINA

Time: Short

Cost: \$\$\$

Complexity: Simple

4.3 Group 3 Recommendations: Tractable Projects

This group of recommendations can be implemented by a small group of people, an organization or a network of organizations. They include programs and trainings that build a range of technical, financial, social, institutional and political capacities.

4.3A Continue to Develop Opportunities for the CRI Internship as well as the Coral Fellowship / Link NRM Students with Academic and Professional Development Opportunities

The CRI internship and the NOAA Coral Fellowship are both expressions of capacity building in the coral reef management system in the CNMI. Opportunities should be explored to grow and expand on both programs where possible. A lessons learned process should be conducted for the current generation of the CRI internship in order to look back and see what has worked and plan a path for adapting in the future.

The CRI should continue to partner with NMC and the NRM Program on growing the CRI internship. CRI has been working with the NRM Program to ensure that a certain amount of students in the program apply for the CRI internship. Growing that connection would be beneficial to both parties.

Curricular elements could be developed within the NRM that directly link to the priority sites, include field experiences, use real CRI data in the classroom, include guest speakers of practitioners and government employees, and support summer internships with CRI and other natural resource agencies and organizations. The NRM program recently completed a “Developing a Curriculum” process. Recommended directions for the program that came out of that the process could potentially be linked to goals of increasing collaboration with natural resource agencies in order to raise awareness of natural resource opportunities and professions among students in the CNMI. NRM graduates should be made aware of job openings in local government. NRM students should be assisted with academic and professional development. Examples may include bringing in alumni to discuss their experiences, profiling them on the school website and local newspaper, helping them with resume building, connecting them to external internship possibilities (through the listserv), having an inventory of all the natural resource-related internships and educational opportunities, etc. A directory of opportunities to engage in natural resources-related education, internships, and careers should be built and maintained with access for all students. This could be coupled with internal training programs within NRM related to professional skills such as resume building and interviewing.

Connect curriculum builders to the active collaborative science groups in the CNMI. NMC should consider adding basic math or statistics requirements to the NRM degree requirements to make them more competitive. There may be potential for NSF’s Experimental Program to Stimulate Competitive Research linkages with Guam (and a possible lessons learned process from previous funding cycles in Guam and elsewhere) as well as future NSF opportunities in the CNMI.

Related PSD Priority Goals: 1, 2, 4

Recommended Lead: NRM

Potential Partners: UoG, NMC, PMRI

Time: Short

Cost: \$

Complexity: Simple

4.3B Support NGO/Civil Society Development

Develop a comprehensive strategy to build civil society capacity in the CNMI by building off of strong programs developed by TNC. Identify each NGO and their stages of development. Identify all Board vacancies and ensure that each has a clear job description and minimum qualifications. Build capacity at the Board scale of NGOs. Bring in external expertise to work with Board development and move beyond small-scale fundraising. Identify candidates for nonprofit management institute training, and foster partnerships with entities such as the [Stanford Center for Social Innovation](#), which has been conducting capacity building programs for NGO Board members and linking with NGOs on trainings to build capacity. TNC has done some Board trainings and Board development, and has worked with

[MINA](#) in the past. Partnerships such as this could be reinitiated in order to build the relative capacity of local NGOs on a macro scale, grow civil society, and also to ensure that NGOs have the capacity to look beyond the local scale for resources and partnerships.

Support and development for local NGOs should be cohesive and coordinated. As capacity is built in NGOs at the macro scale, it will be critical to ensure that each of the NGOs are working together to help grow mutual capacity and are not competing with each other. It may be beneficial to bring together an NGO learning group to play a coordinating role in NGO development in the CNMI. Representatives from each NGO engaged in natural resources in the CNMI should be engaged in this process (including [TNC](#), [MINA](#), [Micronesians in Island Conservation](#) [MIC], [PMRI](#), and others) to increase coordination for leveraging resources.

Related PSD Priority Goals: 1, 2

Recommended Leads: All NGOs in the CNMI (TNC, MINA, MIC, etc.)

Potential Partners: An organization with expertise in NGO development (such as the Stanford Center for Social Innovation)

Time: Long

Cost: \$\$\$

Complexity: Complex

4.3C LBSP: BMP Tour – Engage Mayors, Churches, Elders, Community Groups, and Fishermen’s Associations in “Ridge to Reef” Demonstration Projects

We recommend that agencies engage with communities and others to build off of the Municipal Council’s “Adopt a Place” concept and develop a simple tour of model BMPs such as rain gardens, pervious parking lots, swales, buffer strips, etc. Part of this initiative should also include identifying who has or will adopt these projects for long-term maintenance. This recommendation could largely be carried out by communities themselves and likely would result in best results if not implemented by a top-down approach from the natural resource agencies. Ideally, this recommendation helps to build pride in communities across the CNMI for the infrastructure that has been built to support innovative management techniques. This could link to beautification awards such as the most beautiful “Ridge to Reef” demonstration sites as a way to incentivize local pride in community management. Demonstration sites could be featured on local news stations and in newspaper series to spread awareness. The upcoming CRI website will also include a section titled “Spotlight,” which will be an ideal venue for showcasing BMPs and local demonstration sites as well as providing information on how people can get involved and do similar activities in their community.

Related PSD Priority Goal: 1

Recommended Lead: Municipal Councils

Potential Partners: CRM, DEQ, DPW, local churches, Mayor’s Council, Contractors’ Association, Community Associations, MINA

Time: Short

Cost: \$

Complexity: Simple

4.3D LBSP: Implement Comprehensive Monitoring Of Post-Construction Site Inspections

Implement comprehensive monitoring of post-construction site inspections to ensure that site construction is conducted as planned, specifically with relation to stormwater management. Site inspectors should be urged by CRI

Agencies and partners to use available resources, such as the “Erosion and Sediment Erosion Control Field Guide” (authored by Horsely Witten). Such resources should be coupled with trainings for site inspectors. These resources will help to build a supportive and informed group of constituents involved in development in the CNMI. Agencies responsible for construction site inspections, such as [CRM](#) and the [CNMI Zoning Board](#), should be engaged in implementing this recommendation. This could be a critical path forward to address issues related to LBSP and development pressure in the CNMI.

Related PSD Priority Goal: 1

Recommended Lead: CRM, DEQ

Potential Partners: DPW, DEQ, Contractors Association, DLNR, Municipal Councils, CNMI Zoning Board

Time: Short

Cost: \$\$

Complexity: Complicated

4.3E LBSP: Establish Procurement Process that Incentivizes Certified Professionals

If a Stormwater/LID certification (see Recommendation 4.3I - LBSP: Develop Inventory of Professionals Associated with Site Development and Initiate Certification Process for Low Impact Development) outlining associated best practices is developed for contractors, engineers and architects, then amend the procurement process to have a point system that increases points when certified contractors, engineers and architects are used. The winner of procurement bids would then be based on the total points the bidder has according to the points of the contractors, engineers, architects, etc., in their hired team. This would incentivize the use of BMPs, following a more intensive training regimen and meeting rigorous certification criteria. The first step to implementing this recommendation would be to develop and clearly define how the procurement incentive system would look and work. The system could then be proposed to stakeholders to build buy-in and formal commitment. Implementing the system would be the final stage, which would largely be the responsibility of CRI Agencies engaged in development processes and procurement.

Related PSD Priority Goal: 1

Recommended Lead: CRM, DEQ

Potential Partners: DPW, Municipal Councils, Contractors Association, Office of the AG

Time: Short

Cost: \$

Complexity: Simple

4.3F Connect to Existing Curriculum Standards in Public Schools that are Locally-appropriate in order to Increase Stewardship Message

Reconnect lesson plans in local schools around coral reefs, watersheds, native plants, and island ecology in order to give a sense of ridge-to-reef dynamics and support STEM educational goals. Invite local elders to be guest speakers in classrooms to share their traditional ecological knowledge. Linkages should be fostered between school curricula and work being done within the CRI, particular through raising awareness of the coral internship with CRI. Use real data from MMT in science lessons plans and create a study guide with raw data and graphs as a teaching tool for students. Create after-school programming to encourage local students to enter into the field of marine biology and other natural resource fields. If the current edition is in use, this effort could consider linking with the existing Islands Ecology textbook.

There have been several natural resource curricula that have been developed in recent years in the CNMI for different grades. Creating an inventory of existing curricula related to coral reefs and natural resources in the CNMI would help support implementation of this recommendation. An NRM degree in Education may be beneficial to ensure that each curriculum meets education standards, and for matching curricula to individual schools across the CNMI based on their needs and requirements.

Another aspect of this recommendation would be to bolster the effectiveness of MINA's Teacher Camp by connecting to the CNMI Board of Education Curriculum Standards. The Teacher Camp is a model in the CNMI for professional development and for the formal incorporation of natural resources education into public school curricula. Incentivize participation to reach teachers who might not otherwise participate in such an opportunity.

Related PSD Priority Goals: 1, 2, 4

Recommended Lead: The CNMI Board of Education, CNMI Public School System

Potential Partners: MINA, NRM Education Program, MMT

Time: Medium

Cost: \$\$

Complexity: Complex

4.3G LBSP: Define (Current and Possible Future) Site Development Process, Time to Permit, Clear Rules/Regulations, and Incentives for Contractors and Investors to Follow Rules

Clarify topics related to site development such as: major and minor site development processes (currently outlined in CRM regulations), issues related to zoning, environmental impact assessment involvement, [Areas of Particular Concern](#) program requirements, [DEQ](#) enforcement, as well as the times and steps needed to secure permits. Clarify areas of potential overlap among agencies as well as clarify enforcement jurisdiction at the organizational level. This should be used as a user-friendly resource (possibly online resource) that can be easily shared with current and potential contractors and investors to demonstrate the holistic process of site development. It should help to clarify the roles and responsibilities of all agencies and organizations involved and specifically outline the steps required and incentives or disincentives therein. It could be made available other stakeholders. When complete, partners should present findings to the Legislature and Office of the Governor, specifically those who are involved with interest in simplifying the process and attracting investors.

An example site development process:

Step 1) Zoning – Does the project pass, or does it require a variance?

Step 2) CRM – Is the project a major siting? If so, what are the steps for an Environmental Impact Assessment?

Step 3) DEQ – Review grading and sediment and erosion control plans. Where possible, require certification process.

Step 4) DPW – Issue building permits.

Related PSD Priority Goal: 1

Recommended Lead: CRM, CNMI Zoning Board

Potential Partners: DPW, DEQ, Office of the AG, Legislature

Time: Medium

Cost: \$

Complexity: Complicated

4.3H Create Attorney Positions at Each of the CRI Agencies

Ideally, there should be at least 2-3 natural resource attorneys in the CNMI that exclusively handle CRI issues and are shared between each of the CRI Agencies. Dedicated funding for these positions over the long-term would be crucial. Currently, there is one dedicated CRI attorney in the CNMI that is federally funded. Other natural resource attorneys that the CRI uses are locally funded and are housed within the Office of the AG, and they therefore attend to other general duties as needed. Additional CRI attorneys would ideally be federally funded so that even if they are housed within the Office of the AG, the AG does not dictate their workload and they can dedicate all of their time and effort exclusively to the CRI. This could help alleviate the Office of the AG workload and increase local capacity to manage legal issues related to natural resources.

Related PSD Priority Goals: Builds capacity for all PSD priority goals

Recommended Lead: Office of the AG

Potential Partners: DEQ, CRM, DFW, federal agencies/funders to pay for lawyers

Time: Medium

Cost: \$\$\$\$

Complexity: Complicated

4.3I LBSP: Develop Inventory of Professionals Associated with Site Development and Initiate Certification Process for Low Impact Development

Develop a list of all professionals who could benefit from a certification process for low impact site development including engineers, architects, contractors, building inspectors, permit reviewers, and local mayors. Identify in the site development process where certified professionals in LID is best applied. An exam should be required in order to receive the certification, and annual refresher courses should be required to maintain the certification. DEQ currently has a certification for contractors called the “[Erosion and Sediment Control Contractor Training and Certification Program](#)”. This training program should be tied to procurement so that, in the bidding process, if you are a certified contractor putting in a bid that is packaged together you get points for being certified (see Recommendation 4.3E - LBSP: Establish Procurement Process that Incentivizes Certified Professionals). Rules and regulations should also be developed so that DEQ has the mandate and capacity to enforce the requirement of these trainings. Contractors that receive and maintain the training/certification should receive certain recognition, benefits and incentives. When someone seeks a permit during site development they typically submit requests to DEQ or CRM, and therefore DEQ and CRM could be critical partners to reinforce the use of certified contractors. For example, the CRI Agencies could provide the list of contractors that are certified and give a type of alleviation in the site development process when those contractors are used. A potential model could be the pool of certified contractors listed in the Waste Water Section in DEQ that issue waste-water permits. Dissemination of such a list applied to sediment and erosion control practitioners, possibly in an easy-to-update online format, could help to ensure that stakeholders are aware of it and use it.

Related PSD Priority Goal: 1

Recommended Lead: DEQ

Potential Partners: CRM, DPW, Municipal Councils, CNMI Zoning Board

Time: Medium

Cost: \$\$\$

Complexity: Complicated

Section Five: Developing a Strategy for Building Adaptive Capacity

5.1 Three Phases of the Assessment of Coral Reef Management Capacity

There are three phases to the capacity assessment process: Phase I featured the initiation of the capacity assessment and began with the priority setting process and continued through the development of the most recent LAS and concluded with the formation of the J-CAT in 2013. Phase II featured collecting and examining information related to capacity, building an understanding of needs across stakeholders, summarizing key issues and prioritizing recommendations. This phase is concluded with the preparation of this report. Phase III is based upon the distribution of the report, a socialization process that includes soliciting and receiving comments, preparing an action plan based upon local context, implementing and monitoring the plan for a defined time period, and evaluating what was learned from the capacity assessment process and defining further action.

Given that building capacity for improved coral reef management is a journey, with no clear and precise destination, this section is intended to provide the basics for making the transition from Phase II to Phase III.

The importance of Phase III or post-capacity assessment, cannot be overstated because very little will happen if post-assessment activities do not take place. If Phase III is done well, it positions the CNMI and the coral reef management network for improvement and further development toward its intended goals. If results are not acted upon in some manner, it can serve to undermine future processes of stakeholder engagement in the CNMI and underscore the inadequacy of the status quo. Key actions in building an action plan include engaging a team to finalize the sequence and prioritization of the plan, identifying persons responsible, and creating timelines and mechanisms for assessing progress. Such a team might form organically out of the J-CAT process, and additional participants and perspectives should be encouraged to join in the Phase III process. Success will be determined by both the substance of the plan as well as the facilitation process used to broadly communicate and gain support for, adaptively implement, monitor associated activities, and revise it as needed. The following sections have been developed with insight from experiences in building capacity for the ecosystem approach in other locations around the world and in a wide range of organizational development contexts ([Stevahn & King, 2009](#)).

Building capacity requires change. Change, by its definition is acting in new ways, using resources differently, and seeing the world through fresh eyes. This is neither easy nor simple; indeed it is complex and can create discomfort, anxiety, confusion, and possible ineffectiveness when transition occurs from one way of doing something to another. Adaptive capacity is rooted in the ability to collectively work through concerns, anxiety and fears as new practices are tested, new skills developed, and new understandings are revealed (Fullan, 2007). Done well, positive momentum is built and can be leveraged for greater change. Done poorly, it reinforces fear, anxiety and mistrust. A range of literature exists that can guide organizations through the developmental steps of change and selected references are presented in the organizational development section of Appendix A: For More Information.

The development of a customized plan is recommended which identifies an institutional “home” and most accountable person for overseeing implementation of capacity building efforts. Such a strategy should feature a detailed budget, timeline, milestones, and contextually relevant principles for capacity building within the CNMI and across all other coral reef management agencies. The strategy document should be distributed widely and feature clear

opportunities and specific budget justifications that could become part of external funding requests to federal implementing partners and foundations. Such a strategy should include a detailed directory of capacity building training modules that currently exist and those that need to be developed (Appendix E: Portfolio of Training Modules).

5.2 Building a Long-Term Action Plan

While there are no panaceas or “silver bullets” for building capacity for coral reef management, an action plan is needed to guide involvement of multiple implementing partners. Capacity building for improved coral reef management is a long-term process and no one group alone will have the power, resources or skills to respond to the increasing issues, challenges and degree of complexity. Likewise, there is no single group that is expected to provide the wide portfolio of tools, methods, trainings etc., to support adaptive capacity and more effective coral reef management. Therefore, a distributed approach to capacity building is needed that features both short- and long-term investments. It takes a village.

Less expensive tactical capacity building is needed to build momentum, adding building blocks that address some aspects of the current challenges of coral reef management. Long-term sustained strategies are also needed to address operational issues of staff turnover and retirement, changing political administrations, as well as dynamic trends in social and biophysical health and well-being. Blending strategies that address both short- and long-term capacity building issues can guide an action plan.

To develop this action plan, the recommendations within this document have been divided into three groups based upon their complexity, scale, practicality and control of implementation. The first group is a set of essential recommendations that are complex largely because they are highly political in nature and therefore decisions regarding the timing and strategy must be made at upper-level administrators and officials who will factor in a wider range of issues. The second group involves implementing a more collaborative and coordinated approach to management at select priority sites and involves interconnected systems and engagement with resource users, other managers and funders of coral reef management. Implementing these recommendations will require a significant degree of coordination, formal commitment and adaptive implementation. To assist in this process, a common management framework is featured to underscore the importance of tracking both process and outcomes to help map the development of this action plan. The third and final group is a prioritized range of recommendations that are designed to build capacity at an organizational scale where leadership and control over implementation is relatively high. This final group of capacity building recommendations is important, but likely will not be as effective without progress made in the first two groups.

The process of building and maintaining adaptive capacity, as a key function of the ecosystem approach, takes far longer than one might expect and is a long-term commitment. It requires the development of an action plan, adaptively implementing and experimenting, and seeking out leaders across the implementing partners who can carry forward its importance. The action plan requires an honest assessment of what can actually be done in a given timeframe and at what scale, constantly assessing and reassessing where the power is in the system and how power may be shifting, where the threats are and how they are shifting, where the windows of opportunities are and how they

are opening and closing. Building a shared understanding of these dynamics and acting upon them is a process that develops over time, ideally across organizations. This section of the report provides a preliminary strategy or the beginnings of a “road map” for the development of an action plan that ultimately can only be developed by the implementing partners based on the shared commitment to build adaptive capacity.

5.3 Lessons Learned in Building Adaptive Capacity

Elements that have proven useful for building adaptive capacity collaboratively include the following:

- Building values and attitudes among the managers that lead toward a desire to solve problems collaboratively, across a nested system, to clarify how to approach and solve persistent problems and more clearly define the appropriate institutional responses;
- Working with the media to share positive stories as case examples of successful management, describing the challenges and most importantly the benefits of what happens when collaboration across agencies and organizations works well;
- Building a knowledge base that is easily accessible and provides sound, honest and diverse information that can be easily communicated, exchanged, widely shared and debated;
- Recognizing the importance of informal and formal social networks and partnerships that are specifically intended to cross up and down scales of the nested system and horizontally across specific agencies;
- Encouraging the use of market-based instruments to promote the adoption of BMPs as well as increasing the diversity of economic activities at scales of stakeholders and at the scale of the whole watershed; and,
- Encouraging the use of predictive tools and scenario thinking to better understand potential impacts of ecosystem change at the global scale - specifically climate change and its impacts on the coral reefs as well as potential changes in weather patterns that influence many economic activities.

Building capacity is a long-term commitment and measuring progress is a complex challenge. The following actions could be used to assess progress and allow for both qualitative and quantitative description:

- Document changes in capacity through routine assessment that use a consistent set of criteria that allow for comparisons across time and across programs;
- Fund capacity building through diverse sources and coordinated investments;
- Support dynamic and committed leaders identify and track their progress; and,
- Establish and support networks, increase communication and support for capacity building efforts.

Rather than specific numbers, the challenge is to recognize bundles of attributes, processes and practices that support and link adaptive capacity and the effective implementation of an ecosystem approach. Paying attention to patterns in the system such as the DoD readiness, Endangered Species Act listing of coral species, the nature and timing of climate change impacts and response, scenario planning into the future. Economically, it is important to stay abreast of developments related to the Northern Mariana Islands Retirement Fund and its projected collapse in 2014.

Specifically, it could prove useful to develop scenario plans that could mitigate for the potentially negative impacts this could have on the hiring and retention of the CNMI government employees.

One thing is certain, the CNMI's coral reefs will be different in 25 years and likely quite different in 50. There is a range of local actions. While crisis waiting for catastrophe to strike for real commitment to building adaptive capacity is unsettling and reversing this trend is a pressing and complex challenge (Bohnet et al., 2008).

5.4 Key Considerations For Developing A Post-Assessment Action Plan

The following are a set of key considerations in the capacity building action plan/implementation process that can help define the necessary logistics, whom to include, networks and norms for communication, and proper methods for information management (Stevahn & King, 2010):

Involvement in a Capacity Building Action Plan

Involvement in the process of defining the capacity building action plan and overseeing its implementation should be carefully considered. Major tasks may include the development of an action plan, making final decisions about when to implement which specific actions, monitoring progress and evaluating the effectiveness of the plan as it relates to goals for building capacity. The first major step is circulating the document and seeking input. The J-CAT members are ideal distribution channels but distribution should not end with this. A distribution strategy and possibly convening a listening session to review responses may elicit useful feedback. Ideally, a small representative group that is invested in seeing resources directed to address persistent capacity issues, barriers etc. should oversee implementation. While it does not need to be precisely the same members as the J-CAT, it serves as a logical starting point from which to build and make recommendations for a longer-standing structure. A capacity building advisory committee could be established and nest within the existing CRI committee structure and could report to the policy committee that could routinely report out to the All Islands Committee of the U.S. Coral Reef Task Force. However, capacity building should be a shared responsibility and needs to have appropriate authority from upper-level administrators to assign activities and delegate tasks so that implementation is a distributed and shared process. A specific individual should be designated as the coordinator for arranging the efforts to craft the capacity building action plan, with additional technical assistance likely needed.

Logistical Concerns

A series of logistical concerns should be attended to that includes maintaining calendars, scheduling committee meetings, preparing agendas, and documenting completion of capacity building activities. A major step is defining who is responsible for managing logistics. One additional FTE would likely be sufficient to oversee this work and could be blended with other related tasks and responsibilities of coordinating capacity building for resource management in the CNMI.

High Quality Communication

The culture and quality of communication around the importance of building capacity defines the spirit and intent. Ideally, communication around capacity building is appreciative, open, honest, responsive, and culturally appropriate. Unfortunately, breakdowns and other issues associated with communications are at the heart of organizational conflicts, interpersonal challenges and program difficulties. Establishing agreed upon communication protocols and adhering to them can improve the communications process.

- **Communication within committees:** Good committee behavior is the responsibility of all involved and will only become a norm if it is established from the start and reinforced through periodic reflection. A brief list of best meeting practices should be identified and customized to fit the cultural context, agreed upon and distributed and could include the following: engage all voices, listen respectfully, explore alternatives, raise issues constructively, appreciate each person's skills, unique histories, perspectives, and talents. Assume confidentiality unless otherwise defined and mutually agree on what information is to be shared with others outside the meeting.
- **Communication among committees:** Since there are a growing range of committees that are associated with coral reef management, defining the general guidelines for how to track their progress and ways to best communicate among them is an essential element of capacity building. Once established, a short and simple protocol may be needed to ensure that this level of communications sharing is maintained.
- **Communication beyond committees:** It is often not made clear what information can be shared outside of coral reef management committee structures such as other administrative hierarchies, governing or advisory boards, private sector operations, program funders, etc. The leadership team should define policies, guidelines and procedures for communication beyond the coral reef management committees.
- **Electronic communication:** Sharing information electronically is rapid, efficient and inexpensive with quick turnaround potential. Given that e-mail and technology overload is a possible downside, set guidelines for electronic communications such as a file naming convention, use shared directories or a shared project website to host information in one location, and describe the situations where e-mail is preferred or face-to-face communication is preferred.
- **Confidentiality:** Transparency fosters trust but can work against confidentiality. It is helpful to appreciate the tension between confidentiality and transparency and by agreeing within the group what information and documents can be shared and what should remain confidential. Be clear and direct on matters regarding confidentiality.

Information Management

Document and keep records of significant capacity building actions that have been taken so there is an easy to follow trail that documents the degree to which resources have been allocated to this end. Such a document trail is useful for reflecting on actions taken and the level of investment allocated. Examples include chronological timetables of various steps in the capacity assessment and capacity building program, records of training, assessment reports and findings, and evaluations of coral reef management and capacity building efforts. Such information is the basis for high quality lessons learned and ensuring that a knowledge base is maintained in the face of unexpected events such as staff turnover, new leadership, new budget priorities, and program audits.

5.5 Acting on the Grouping of Recommendations

As presented in Section 4, the recommendations that serve as the basis for an action plan are divided into three groups. The first group involves recommendations that require decisions that are political in nature and requires decision-making from senior administrators. The ultimate timing, control and direction needs to be decided from the

highest levels within the CNMI government. These actions are the most critical for long-term adaptive capacity to be built into the system of coral reef and other Ecosystem-based Management. The second group requires the collaborative force of implementing partners working closely with funding partners to model a customized form of Ecosystem-based Management that is based on a shared language and process of management at both priority sites. The outcomes of these actions are in the hands of the implementing partners and can be accomplished largely within a relatively small segment of the coral reef management network. This set of actions is largely independent of progress associated with the first group, although they would be greatly enhanced by accomplishing recommendations within Group 1. Together, the recommendations in Group 2 promote the collaborative use of a common management framework to sequence and prioritize implementation in select priority sites.

To be effective, this would require linking with funding partners such as USFWS, National Park Service and NOAA in the short run to tie funding to the strategy for implementation and adaptive learning at locations such as Laolao Bay. Ideally there are additional federal partners in the future, but in the near-term, this would be applied at a demonstration scale, with select partners that are tied to specific funding opportunities such as the NOAA CRCP Cooperative Agreement and USFWS and National Park Service support for priority watershed investments. As a condition of the award, the recipients would track progress of implementation through a simplified monitoring and evaluation process. Since this strategy pertains to the preparation of proposals, including how they are written, the setting of priorities and how they are administered, this action requires strong commitment, partnership and a shared agenda among funders and the recipients. In the short run, it is our advice to keep it as simple of a process as possible, provide clear guidance and training for those who are preparing proposals so they are clearly identifying what part of the management cycle they are contributing to, and how they will track progress along the way.

The third group of recommendations includes a range of actions that can be done at the scale of committees, task forces, within organizations, and by groups of individuals. These are important, but their overall impact will only be realized if there is significant progress with capacity building in the other two groups. Actions within this group can be controlled by one or a few organizations and generally don't require significant resources. We believe these are good places to build capacity momentum as long as attention is paid to implementing the first two groups described above.

5.6 Building Adaptive Capacity

As has been shown in this analysis, increasing adaptive capacity for coral reef management requires competencies in at least four key decision environments: the ecological system, the political system, the organizational system and the community system. As a manager, the work requires winning support among a diversity of stakeholders, engaging effectively within one's own organization, securing formal commitment from the political process, and then implementing a plan of action over the long-term. Given this level of complexity, team-based management competencies are required to address a growing range of cross-scale issues outlined in this report. Competencies include, but are not limited to the following:

- How to engage local communities in the analysis of long-term changes in condition and use of coral reef ecosystems;

- How to analyze the governance structures and processes that encompass values, policies, laws and institutions that determine how coral reef ecosystems are conserved and used;
- How to build leadership required to build “political will” to design, adopt and implement plans of action that address complex challenges posed by coral reef ecosystem change;
- How to build strength in facilitation, mediation, stakeholder engagement and public education;
- How to strategically design a transformative program or plan of action that fits within the existing governance dimensions; and,
- How to design and implement a monitoring and evaluation program in support of adaptive management.

In practical terms, this means moving beyond BMPs and focusing on building high quality collaboration, building bridges between scientists and policy makers, between the CRI natural resources agencies, and using a common language to build common ground across diverse perspectives. The modern-day adaptive manager must display competency as a scientist, collaborator, politician, humorist, evaluator, and strategist.

Building adaptive capacity to manage effectively requires paying attention to both the theoretical and operational implications of the holistic “ecosystem approach” when responding to the challenges brought by accelerating societal and environmental change. Management requires looking ahead, watching for and nurturing the conditions that enable change and can lead to tipping points. Building this capacity will require scenario thinking, sharing information on how to build momentum, how to see opportunities, how to select a strategic and politically viable management agenda. The work requires sharing lessons learned on how best to excite the “political will” and maintain it for addressing complex ecosystem management challenges, connecting with others, building more effective collaborations, paying attention to enabling conditions, committing to a common language across a wide network to sequence and prioritize collective action.



*Educational sign on the road to Laolao Bay, a popular recreation site.
(Photo credit: Glenn Page, SustainaMetricx.)*

Literature Cited

- Allen, S. and Amesbury, J. (2012). Commonwealth of the Northern Mariana Islands as a Fishing Community. NOAA Technical Memorandum NMFS-PIFSC-36.
- Amesbury, J., & Hunter-Anderson, R. (2008). An analysis of archaeological and historical data on fisheries for pelagic species in guam and the northern mariana islands. Pelagic Fisheries Research Program Joint Institute for Marine and Atmospheric Research, School of Ocean and Earth Science and Technology, University of Hawai'i at Manoa, Manoa. Retrieved from <http://www.soest.hawaii.edu/PFRP/pdf/MARSreport.pdf>.
- Bell, J. D., et al. (2011). Vulnerability of tropical pacific fisheries and aquaculture to climate change. SPC FAME Digital Library.
- Brainard, R.E. et al. (2012) Coral reef ecosystem monitoring report of the Mariana Archipelago: 2003–2007. NOAA Fisheries, Pacific Islands Fisheries Science Center, PIFSC Special Publication.
- Buniag, J. (2012). Pride Pre-Campaign Research Plan. Laolao Bay Watershed Pride Campaign, Division of Environmental Quality.
- Burke, L. et al. (2011). Reefs At Risk Revisited. World Resources Institute, Washington DC.
- Chin, A. et al. (2011). Status of Coral Reefs of the Pacific and Outlook: 2011. Publishers Global Coral Reef Monitoring Network. 260 P.
- Climate Change Working Group. (2010). Progress Report on Resolution 18:1: Coral Reefs and Climate Change. Presented to the US Coral Reef Task Force. Saipan, CNMI.
- Coastal Resources Management Office. (2011). CNMI section 309 assessment and strategy report 2011-2015. Coastal Resources Management Program.
- Department of the Army, U.S. EPA, USFWS, NOAA. (2000). Federal Guidance on the Use of In-Lieu-Fee Arrangements for Compensatory Mitigation under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act.
- Division of Fish and Wildlife (in collaboration with PIRO). (2006). Marine Protected Areas (MPAs) of the CNMI. Saipan, MP.
- Division of Fish and Wildlife and the Western Pacific Fishery Information Network. (2007). Commonwealth of the Northern Mariana Islands 2005 Fishery Statistics.
- Downs, C. A. et al. (2012). The use of cellular diagnostics for identifying sub-lethal stress in reef corals. *Ecotoxicology*, 21(3), 768-782. doi: Eighteen Northern Marianas Commonwealth Legislature in the House of Representatives. Session, 2013. H.B 18-53.
- Eighteen Northern Marianas Commonwealth Legislature in the House of Representatives. Session, 2013. H.B 18-72.
- Eighteen Northern Marianas Commonwealth Legislature in the House of Representatives. Session, 2013. H.B 18-10.
- Global Coral Reef Monitoring Network (GCRMN). (2004). State of Coral Reefs of the World: 2004, Volume 2. Australia.
- Haws, Maria. (2006). Natural Resources Management Needs for Coastal and Littoral Marine Ecosystems of the U.S. Affiliated Pacific Islands. University of Hawaii: Hawaii Cooperative Studies Unit.
- Hezel, F. X., & McGrath, T. B. (1989). The great flight northward: FSM migration to Guam and the Northern Mariana Islands. *Pacific Studies*, 13(1), 47-64.
- Houk, P., & van Woesik, R. (2010). Coral assemblages and reef growth in the Commonwealth of the Northern Mariana Islands (Western Pacific Ocean). *Marine Ecology*, 31, 318-329.
- Houk, P. et al. (2012). Commercial coral-reef fisheries across micronesia: A need for improving management. *Coral Reefs*, 31(1), 13-26. doi:
- Johnson, S. (2013). Reef Resilience in the Commonwealth of the Northern Mariana Islands. CNMI Division of Environmental Quality Marina Monitoring Program.

- Laurans, Y., Pascal, N., Binet, T., Brander, L., Clua, E., David, G., Seidl, A. (2013). Economic valuation of ecosystem services from coral reefs in the south pacific: Taking stock of recent experience. *Journal of Environmental Management*, 116(0), 135-144. doi: 10.1016/j.jenvman.2012.11.031
- Manyard, J. et al. (2012). Coral reef resilience to climate change in Saipan, CNMI; field-based assessments and implications for vulnerability and future management. Prepared for CNMI DEQ and NOAA as part of the Northern Mariana Islands Coral Reef Initiative with The Natural Conservancy, Pacific Marine Resources Institute and the CNMI Division of Fish and Wildlife as collaborating agencies.
- Marianas Visitor Authority. (2012). The Northern Mariana Islands Tourism Master Plan for 2012-2016. Saipan, MP.
- McPhetres, S. (2012). *The Contemporary Pacific: Commonwealth of the Northern Mariana Islands*. University of Hawaii Press.
- The Micronesia Challenge. (2013). *Micronesia Challenge Communications Plan for the Commonwealth of the Northern Mariana Islands*.
- Misulich, R. J. (2011). A lesser-known immigration crisis: Federal immigration law in the Commonwealth of the Northern Mariana Islands. *Pacific Rim Law & Policy Journal*, 20(1), 211-235.
- NOAA. (2006). *Evaluation Findings for the Commonwealth of the Northern Mariana Islands Coastal Resources Management Program from April 2001 to March 2006*.
- NOAA CRCP. (2007). *Coral Reef Ecosystem Research Plan for Fiscal Years 2007 to 2011*. NOAA Technical Memorandum CRCP 1.
- NOAA. (2009). *Coral Reef Habitat Assessment for U.S. Marine Protected Areas: Commonwealth of the Northern Mariana Islands*.
- NOAA. (2011). *Section 309 Assessment and Strategy Report 2011-2015*. CNMI Coastal Resources Management Program, Office of the Governor.
- Paulay, G. (2003). Marine biodiversity of Guam and the Marianas: Overview. *Micronesica*, 35-36, 3-25.
- PIFSC International Report. (2007). *Monitoring Strategy and Preliminary Survey Design for Guam/CNMI Coral Reef Ecosystem Studies with a Focus on Apra Harbor and Kilo Wharf*. Guam/CNMI Marine Natural Resources Monitoring Protocols Workshop, Honolulu HI.
- Rallu, J., Rodgers, G., & Reay-Jones, R. (2010). The demography of Oceania from the 1950s to the 2000s: A summary of changes and a statistical assessment. *Population (English Edition, 2002-)*, 65(1), 8-115.
- Regional Fisheries Livelihood Programme for South and Southeast Asia (RFLP). (2013). *Gender mainstreaming in small-scale fisheries*.
- Regional Fisheries Livelihood Programme for South and Southeast Asia (RFLP). (2013). *Ten Lessons for more effective co-management in small-scale fisheries*.
- Schroer, G. (2005). *Management Plan for the Mañagaha Marine Conservation Area*. Department of Lands and Natural Resources, Division of Fish and Wildlife, CNMI.
- Schroer, G. (2007). *Management Plan for the Bird Island Wildlife Conservation Area and Bird Island Marine Sanctuary*. Department of Lands and Natural Resources, Division of Fish and Wildlife, CNMI.
- Schroer, G. (2007). *Management Plan for the Kagman Wildlife Conservation Area and Forbidden Island Marine Sanctuary*. Department of Lands and Natural Resources, Division of Fish and Wildlife, CNMI.
- Starmer, J. et al. (2005). *The State of Coral Reef Ecosystems of the Commonwealth of the Northern Mariana Islands*. NOAA Technical Memorandum.
- Starmer, J. et al. (2008). *The State of Coral Reef Ecosystems of the Commonwealth of the Northern Mariana Islands*. From the NOAA Technical Memorandum NOS NCCOS 73.
- Starmer, J. (2009). *Northern Mariana Islands Needs Assessment for the Pacific Islands Ocean Observing System*. Pacific Marine Resources Institute, Saipan, CNMI.

- Stege, M. and Walsh, St. (2010). Funding the Micronesia Challenge: A Regional Plan for Sustainable Finance. Carried out for the Micronesia Challenge Regional Coordination Office with the financial and technical assistance of Micronesia Conservation Trust and The Nature Conservancy.
- Suntsov, A., & Domokos, R. (2013). Vertically migrating micronekton and macrozooplankton communities around Guam and the Northern Mariana Islands. *Deep Sea Research Part I: Oceanographic Research Papers*, 71(0), 113-129. doi: 10.1016/j.dsr.2012.10.009
- The Micronesia Challenge. (2012). Finalizing the Regional MPA Monitoring Protocol: Coral Reef Monitoring and 4th MC Measures Group Workshop. Workshop Report. Koror State Government Assembly Hall/Palau International Coral Reef Center Conference Room, Koror, Palau.
- van Beukering, Pieter, et al. (2006). How much are Saipan's Coral Reefs worth? Policy Brief. Cesar Environmental Economics Consulting.
- van Beukering, Pieter, et al. (2006). The economic value of the coral reefs of Saipan, Commonwealth of the Northern Mariana Islands. US Department of Commerce, National Oceanic and Atmospheric Administration, National Oceanographic Data Center, Coral Reef Conservation Program.
- Western Pacific Regional Fishery Management Council. (2011). Mariana Archipelago Fishery Ecosystem Plan 2009 Annual Report. Honolulu, HI.
- Western Pacific Regional Fishery Management Council. (2012). Archipelagic Fishery Ecosystem Annual Report. Sabater, M. (Ed.) Western Pacific Regional Fishery Management Council. Honolulu, HI.
- Western Pacific Regional Fishery Management Council. (2012). Archipelagic Fishery Ecosystem Annual Report. American Samoa and Marianas FEP Plan Team. Honolulu, HI.
- Wilkinson, C. (2008). Status of Coral Reefs of the World: 2008. Global Coral Reef Monitoring Network and Reef and Rainforest Research Centre, Townsville, Australia, 296 p.



*Recreational access to the coral reefs on the northern side of Laolao Bay.
(Photo credit: Glenn Page, SustainaMetric.)*

Appendix A: For More Information

Climate Change

Aaronson, D. and M. Manuel (2008). Conservation Easements and Climate Change. Sustainable Development Law and Policy, Winter 2008. <http://www.goldbergekohn.com/assets/attachments/110.pdf>

Allison, E.H. et al. 2005. Effects of climate change on the sustainability of capture and enhancement fisheries important to the poor: analysis of the vulnerability and adaptability of fisherfolk living in poverty. Summary Report Project No. R4778J. Fisheries Management Science Programme Department for International Development. http://www.fmsp.org.uk/Documents/r4778j/r4778j_1.pdf

Bethke, L., J. Good and P. Thompson (1997). Building capacities for risk reduction. Disaster Management Training Programme. United Nations Department of Humanitarian Affairs. <http://www.pacificdisaster.net/pdnadmin/data/documents/635.html>

Caribbean Disaster Mitigation Project. Hazard-resistant Construction. Organization of American States. <http://www.oas.org/cdmp/safebldg.htm>

Daw, T., N. Adger, K. Borwn and M. Badjeck. Paper 2: Climate Change and Capture Fisheries – impacts, adaptation, mitigation, and the way forward. University of Newcastle upon Tyne, WorldFish Centre. http://www.fao.org/fileadmin/user_upload/foodclimate/presentations/fish/Daw.pdf

Deutsche Bank Research (2008). Climate Change and Tourism: Where Will the Journey Lead? <http://www.dbresearch.com/> (search title)

Food and Agriculture Organization (FAO) (2006). Building Adaptive Capacity to Climate Change- Policies to sustain livelihoods and fisheries. New Directions in Fisheries – A series of Policy Brief on Development Issues, No. 08. Rome. 12 pp. www.fao.org/hivaid/publications/Policy_Brief-Final_En.pdf

Simpson, M.C., S. Gossling, D. Scott, C. M. Hall and E. Gladin (2008). Climate Change Adaptation and Mitigation in the Tourism Sector: Frameworks, Tools and Practices. UNEP, University of Oxford, UNWTO, WMO: Paris, France. <http://www.unep.fr/scp/publications/details.asp?id=DTI/1047/PA>

UNWTO, UNEP and WMO (2008). Climate Change and Tourism: Responding to Global Challenges <http://www.e-unwto.org/content/kk9027/?p=cf9070dafc494bd39462e4d3431e84e4&pi=0>

The WorldFish Center: Adapting to Climate Change: <http://www.worldfishcenter.org/>

Coastal Governance

Cambers, G. (1998). Coping with Beach Erosion. Environmental Development in Coastal Regions and in Small Islands. UNESCO. <http://www.unesco.org/csi/pub/source/ero1.htm>

Encora. 2008. Coastal and Marine Wiki. Internet encyclopedia of information pages for and by coastal professionals providing up-to-date high quality Coastal and Marine information http://www.encora.eu/coastalwiki/Category:Coastal_management

McConney, P., R. Pomeroy and R. Mahon (2003). Guidelines for coastal resource co-management in the Caribbean: Communicating the concepts and conditions that favour success. Caribbean Coastal Co-management Guidelines Project. Caribbean Conservation Association, Barbados. <http://www.dfid.gov.uk/r4d/Output/54318/Default.aspx>

Olsen, S. ed. 2003. Crafting Coastal Governance in a Changing World. Coastal Resources Center, University of Rhode Island, Narragansett, RI. http://www.crc.uri.edu/download/Crafting_Coastal_Governance.pdf

Olsen, S., K Lowry and J. Tobey (1999). The Common Methodology for Learning: A Manual for Assessing Progress in Coastal Management. Coastal Resources Center, University of Rhode Island, Narragansett, RI. http://www.crc.uri.edu/download/SEL_003F.PDF

Parish, F. (2006). Coastal Greenbelt Initiative: Development of green belts to protect coastal communities and resources. Global Environment Centre. <http://www.fao.org/forestry/media/12692/1/0/>

Rambaldi, G., M. L. Fernan and S.V. Siar (1998). Participatory Methods in Community-based Coastal Resource Management: Volume 2 Tools and Methods. International Institute of Rural Reconstruction (IIRR), Silang, Cavite, Philippines. <http://www.iapad.org/cbcrm.htm>

Marine Conservation

Coral Reef Alliance (CORAL). Guidelines and Best Practices http://www.coral.org/resources/guides_best_practices

General Approaches to Addressing Mariculture as an Element of Integrated Coastal Management programs <http://www.crc.uri.edu/index.php?themeid=1>

Global Water Partnership (GWP). Toolbox for Integrated Water Resources Management. <http://www.gwptoolbox.org/>

IUCN World Commission on Protected Areas (IUCN-WCPA) (2008). Establishing Resilient Marine Protected Area Networks – Making it Happen. IUCN-WCPA, National Oceanic and Atmospheric Administration and The Nature Conservancy. Washington, D.C. http://cmsdata.iucn.org/downloads/mpanetworksmakingithappen_en.pdf

Knowledgebase for Lessons Learned and Good Practices in the Management of Coral Reefs. GEF Lessons Learned, the ReefBase Project. <http://gefll.reefbase.org>

The Nature Conservancy (2008). Marine Conservation Agreements: A Practitioner's Toolkit. <http://www.mcacoolkit.org/>

Pomeroy, R.S., Parks, J.E. and Watson, L.M. (2004). How is Your MPA Doing? A Guidebook of Natural and Social Indicators for Evaluating Marine Protected Areas Management Effectiveness. IUCN, Gland Switzerland and Cambridge, UK. <http://www.mangrovesforthefuture.org/RTC-documents-resources.htm>

Reef Resilience. Building Resilience into Coral Reef Conservation. The Nature Conservancy. <http://www.reefresilience.org/>

Organizational Behavior

Bolman, L. G. (2008). Reframing Organizations: Artistry, Choice And Leadership (Wiley Desktop Editions) Author: Lee G. Bolman, Terrence E. Deal.

Bolman, L. G., & Deal, T. E. (2011). Leading with soul: An uncommon journey of spirit (Vol. 381). Jossey-Bass.

Earl, S., Carden, F. & Smutylo, T.S. (2001) Outcome Mapping: Building Learning and Reflection into Development Progress. International Development Research Centre, Ottawa, 139 pp.

Fullan, M. (2006). Turnaround leadership. San Francisco: Jossey-Bass.

Fullan, M. (2011). The six secrets of change: What the best leaders do to help their organizations survive and thrive. Jossey-Bass.

Fullan, M. (2013). The new meaning of educational change. Routledge.

Kotter, J. P., & Cohen, D. S. (2002). The heart of change: Real-life stories of how people change their organizations. Harvard Business Press.

Kouzes, J. M., & Posner, B. Z. (2006). The leadership challenge (Vol. 3). Jossey-Bass.

Pascale, R., Milleman, M., & Gioja, L. (2001). Surfing the edge of chaos: The laws of nature and the new laws of business. Crown Business.

Pfeffer, J. (2007). What were they thinking?. Ohio University Center for International Studies.

Pfeffer, J., & Sutton, R. (1999). The knowing-doing gap: How smart companies turn knowledge into action. Harvard Business School Press.

Senge, P. M. (2006). The fifth discipline: The art & practice of the learning organization. Crown Business.

Stacey, R. D. (1992). Managing the unknowable: Strategic boundaries between order and chaos in organizations. Jossey-Bass.

Stacey, R. D. (1996). Complexity and creativity in organizations. Berrett-Koehler Publishers, Inc.

Stacey, R. D. (2007). Strategic management and organizational dynamics: the challenge of complexity to ways of thinking about organizations. Prentice Hall.

Wheatley, M. J. (2007). Finding our way: Leadership for an uncertain time. Berrett-Koehler Publishers.

Sustainable Development

Bien A. (2007). A Simple User's Guide to Certification for Sustainable Tourism and Ecotourism Center or Ecotourism and Sustainable Development. 3rd Edition. <http://www.iadb.org/IDBDocs.cfm?docnum=1028822>

UNESCO (2007). Sustainable development in Coastal Regions and in Small Islands. <http://www.unesco.org/csi/index.htm>

The World Bank. Best Practices in PES [Payment for Ecological Services] Design. [http://web.worldbank.org/WBSITE/EXTERNAL/ TOPICS/ENVIRONMENT/EXTTEEI/0,,contentMDK:20487921~isCURL:Y~menuPK:1187844~pagePK:210058~piPK:210062~theSitePK:408050,00.html](http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/EXTTEEI/0,,contentMDK:20487921~isCURL:Y~menuPK:1187844~pagePK:210058~piPK:210062~theSitePK:408050,00.html)

Terrestrial Conservation

International Union for Conservation of Nature (IUCN). Establishing Payments for Watershed Services. IUCN Water and Nature Toolkit Series. <http://www.iucn.org/about/work/programmes/water/resources/toolkits/?4914/Pay--establishing-payments-for-watershed-services>

The Nature Conservancy. Private Lands Conservation: Conservation Easements. <http://www.nature.org/aboutus/privatelandsc Conservation/conservationeasements/>

SERVIR Regional Visualization & Monitoring System. Regional modeling and visualization for Latin America, Caribbean, and Africa. <http://www.servir.net/index.php?lang=en>

Appendix B: Glossary

Adaptive Management: A central feature of the practice of any form of Ecosystem-based Management is that it must respond positively to changing conditions and to its own experience. In other words, the practice of coral reef management must be grounded in a process of learning and adaptation. Adaptive management is not reactive management whereby the practitioner simply responds to the unexpected. It is rather a conscious process of examining the course of events as they unfold at larger, or smaller, spatial and temporal scales, and being cognizant of future projections and developing adaptation options in consideration of these dynamics. In other words, in the face of uncertainty, this includes being able to change or redirect decision-making based on the evolving outcomes.

Actions: Projects, procedures or techniques intended to implement an objective as defined in the PSD.

Best Management Practices: Management measures or practices that are established and widely accepted as meeting the intent of coral reef conservation in a variety of disciplines (fisheries management, watershed management, biophysical monitoring, etc.)

Capacity: The overall ability of the individual or group to perform their responsibilities for coral reef management. It depends not only on the capabilities of the people (their knowledge, abilities, relationship and values), but also on the overall size of the task, the resources which are needed to perform them, and the framework within which they are discharged.

Capacity Building: Programs that are designed to strengthen the capacity (knowledge, abilities, relationship and values) to reach the goals as defined in the PSD. This includes strengthening the institutions, processes, systems, and rules that influence collective and individual behavior.

Capacity Development: A widely recognized definition of capacity development was published by the United Nations Development Programme in 1997 as: “the process by which individuals, organizations, institutions and societies develop abilities (individually and collectively) to perform functions, solve problems and set and achieve objectives.” We expand this definition to put greater emphasis on the strategic role of a facilitator in helping this process in an uncertain and changing environment. Our suggested definition is: “Externally or internally initiated processes designed to help individuals and groups to manage coral reefs and to enhance their abilities to identify and meet coral reef management challenges in a sustainable manner.”

Capacity Strengthening: Capacity strengthening is part of the capacity development process and is set within a dynamic context and involves individuals, networks, organizations and even societies who have a stake in functioning coral reefs. It involves such processes as continuous learning, adaptation and innovation in dealing with unanticipated problems or issues. A central feature of capacity strengthening is assessing and reacting to current and future needs in order to improve the ability to learn and solve problems in the long-term.

Commitment: In the case of coral reef management and governance, commitment often refers to governmental commitment to the policies of a program and expressed by the delegation of the necessary authorities and the allocation of the financial resources required for long-term program implementation. When commitment is used in a different context it will be defined.

Conservation Action Plans (CAPs): TNC’s process for “helping conservation practitioners develop strategies, take action, measure success, and adapt and learn over time.” From Conservation Action Planning: Developing Strategies, Taking Action, and Measuring Success at Any Scale--Overview of Basic Practices. The Nature Conservancy, 2005. Available in English and Spanish at:

http://conserveonline.org/workspaces/cbdgateway/cap/resources/1/TNC_CAP_Basic_Practices.pdf/download

Constituencies: While constituencies can be broadly defined, we use the word to define active support of the coral reef management program by a core group of well-informed and supportive people composed of stakeholders in the private sector, civil society and government agencies.

Coral Reef Management Priorities: Those goals and objectives that have been defined by a core group of coral reef managers and stakeholders in each of the seven jurisdictions and identified through a voting process as those that require immediate attention over the short-term of 3-5 years. For the purposes of the capacity assessment, the term goals will refer to the highest-level results the jurisdiction seeks to achieve (e.g., stable, sustainable coral reef ecosystems), as articulated in the jurisdictional PSD. These goals in general refer to efforts to understand and address the three major threats to reefs; impacts from climate change, fishing, and LBSP as well as other identified jurisdictional priorities.

Coral reef resilience: According to the Reef Resilience Toolkit (<http://www.reefresilience.org/>) website, resilience is more than being able to recover from a major disturbance, surviving bleaching, or resisting bleaching. For a coral community to be resilient, it must also be able to continue to thrive, reproduce, and compete for space and resources. For example, coral communities that have experienced bleaching but not mortality may be weakened and less able to thrive, grow, and reproduce in the competitive reef environment. Multiple factors contribute to resilient coral communities, some of them known and others to be discovered. Scientists are working to identify important factors (biological, physical and ecological) that managers can evaluate to determine the health or resilience of a coral community. It is important that managers build the capacity to be able to identify and better understand these factors, so management strategies can be focused on maintaining or restoring communities to more optimal conditions to maximize coral survival after stressful disturbances.

Core managers group: This term refers to the agencies/organizations involved in management of coral reefs in a jurisdiction not just a geographic site within a jurisdiction. Most locations have a core group like this and will be the central focus of the capacity assessment process.

Ecosystem approach: According to the COMPASS Scientific Consensus Statement, Ecosystem-based Management emphasizes the protection of ecosystem structure, function and key processes; is place-based in focusing on a specific ecosystem and the range of activities affecting it; explicitly accounts for the interconnectedness among systems, such as between air, land and sea; and integrates ecological, social, economic and institutional perspectives, recognizing their strong interdependences.

Local Action Strategy (LAS): LAS’s are a U.S. Coral Reef Task Force led initiative to identify and implement priority actions needed to reduce key threats to valuable coral reef resources in each U.S. coral reef jurisdiction. In 2002, the Task Force adopted the “Puerto Rico Resolution” which calls for the development of three-year LAS by each of the seven U.S. jurisdictions containing coral reefs: Florida, Puerto Rico, the U.S. Virgin Islands, Hawai‘i,

Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands. These LAS's are locally driven roadmaps for collaborative and cooperative action among federal, state, territory, and non-governmental partners.

Marine Protected Areas (MPAs): Any area of the marine environment that has been reserved by federal, state, territorial, tribal or community law, mandate, regulation or declaration to provide lasting protection for part or all of the natural and cultural resources therein.

Nested Systems: Thinking in terms of nested systems is essential because issues of coral reef management impact upon, and are impacted by, conditions and actions at both higher and lower levels in an ecosystem and governance hierarchy. Some issues of coral reef management can be addressed more effectively at one level, and less effectively at another. The choice of the issue or set of issues to be addressed must therefore be made in full knowledge of how responsibility and decision-making authority is distributed within a layered governance system. Planning and decision-making at one scale, for example within a jurisdiction, should not contradict or conflict with planning and management at another – for example, at the scale of the nation. The reality is that such contradictions and conflicts are common across the world. A major challenge for the coral reef manager is to recognize these differences and work to either change them or select goals and strategies that recognize that such contradictions must be accommodated or resolved. In practical terms this means that a central feature of ecosystem approach is that all planning and decision-making must recognize and analyze conditions, issues and goals at least at the next higher level in the governance system. Thus, the ecosystem approach at the jurisdictional scale must – at a minimum – be placed within the context of governance at the smaller scale of the village or municipality while governance at the scale of a state/territory – at a minimum – be analyzed with an eye to governance at the scales of the village/municipality as well as that of the nation.

Objectives: The environmental, social, and institutional outcomes the jurisdiction must achieve to reach the end goal, generally actionable within a three to five-year time frame.

Participation: One of the defining characteristics of the practice of the ecosystem approach is its emphasis on participation and its relevance to the people affected by its practice of coral reef management. The ecosystem approach recognizes that the support of those whose collaboration is needed if a program is to be successfully implemented must be won by involving them in the processes of defining the issues that the program will address and then selecting the means by which goals and objectives will be achieved. Both individuals and members of institutions are more likely to comply with a management program when they feel that it is consistent with their values, responds to their needs and to their beliefs of how human society should function. Voluntary compliance by a supportive population lies at the heart of the successful implementation of a program. A participatory approach helps stakeholders and the public to see the efforts of a program as a whole.

Site managers: A person or persons designated with authority to manage the marine protected area at any level be it community, agency, state or federal.

Situation Analysis: A preparatory document for the priority setting process that summarized coral reef threats, condition and trends, key management issues, and goals of management agencies.

(Key) Stakeholder: A person, group, or organization that has direct or indirect stake in an organization that is involved with managing coral reefs.

Stewardship: Where equitable and sustainable forms of development are the ultimate goals of ecosystem approach, the practices of stewardship is the path to that destination. Ecosystem stewardship is an ethic practiced by individuals, organizations, communities and societies that strive to sustain the qualities of healthy and resilient ecosystems and their associated human populations. Stewardship takes the long-term view and promotes activities that provide for the well-being of both this and future generations.

Appendix C: Timeline

Event Title	Start Date	End Date	Description
Chamorro Settle the Islands	2000 BC		Settlers first reached the islands around 2000 BC and were since called the Chamorro.
Magellan first arrives to the Mariana Islands	1521		
Legazpi claims the islands for Spain	1565		After Magellan had first landed on the island to be greeted by the Chamorro people only to clash over a borrowed boat, Miguel Lopez de Legazpi claimed the Guam and surrounding island for the Spanish Crown. The Spanish then forced the Chamorro and other native people to the island of Guam to assimilate them to Christianity. In the mean time the Carolinians had become settled and are thus considered indigenous along with the Chamorro.
A Typhoon Hits the Caroline Islands	1810		A typhoon devastated the Caroline Islands and the survivors sailed to Guam, but only half of the population have survived. The Spanish authorities sent the survivors to Saipan and Tinian as labor to manage the cattle herds.
New Migration of Carolinians (Refaluwasch)	1815		A new wave of settlers arrive to Saipan from atolls West and North of Truk (Chuuk) in the Eastern Carolines
Spain Cedes Guam and Sells the Marianas	1889		After the Spanish-American War the Spanish cede Guam to the U.S. and sell the rest of the Marianas to the Germans
Eugenio Blanco-First Governor	1898	1899	After losing Guam to the U.S. the Spanish assigned the first official governor to the Marianas, a band of fleeing Spanish soldiers were put in charge of the island and installed martial law using fear and brutal beatings to maintain order. The Germans purchased the Marianas in 1899 and were welcomed by the locals to finally rid them of the Spanish. This represented the first time the Marianas had been officially separated from Guam and this trend would continue into present day, due to the U.S. owning Guam and the Germans now owning the Northern Mariana Islands, where the Spanish had previously owned all of the islands.
Germany Assigns George Fritz to Run the Mariana Islands	1899	1910	George Fritz stepped in to stand up for the Chamorro that held beliefs in private property, accumulating wealth, and nuclear family structure, which starkly contrasted with the communal and clan run Carolinians who had little aspiration for wealth accumulation. He then attempted to blend the two cultures through a punctual-trained police force consisting of members of both cultures. The Germans also heavily focused on Copra production with little thought to the health of the land.

Event Title	Start Date	End Date	Description
Japanese Invade and Take Over the Marianas from the Germans	1914		After WWI, the League of Nations awarded the Marianas to Japan as part of the South Pacific Mandate. During the Japanese rule, sugar cane became the main crop and imported Japanese labor.
The Japanese operate a pole-and-line fishery out of Saipan	1920	1944	
Japanese Invade Guam	1941		Hours after the attack on Pearl Harbor, the Japanese invade Guam using a force consisting of Chamorro and Japanese soldiers. This created a key rift that came between these two close islands that prevented them from reuniting even when voted for in multiple referendums in the 1960's.
Americans Invade Saipan and Capture the Marianas	1944		The remaining Japanese were kept in internment camps and repatriated at the end of the war. The Chamorro and Carolinians eventually returned to the island.
US Army Destroys Coral as a Building Material for Runway Construction	1944		Airfields were constructed on Guam, Saipan and Tinian. The construction of the airfields on Tinian was the largest building activity the U.S. Naval Construction Battalion (Seabees) had ever undertaken up to that time and the largest airport of WWII was on Tinian. Six runways, each 8,500 ft (2590 m) long, were constructed to support the B-29s. Barracks to accommodate 50,000 troops were built on Tinian, and Navy Seabees hauled, blasted and packed down enough coral to fill three times the volume of Boulder Dam--nearly 112 million cubic yards of fill.
WWII Alters Tinian and Damages the Landscape	1945		Prior to WWII, Tinian was a major sugarcane growing and processing center, but the War left only a denuded forest
Trust Territory Treaty of the Pacific Islands	1947	1986	The United States administered all of the Japanese territory formerly owned under the South Pacific Mandate, when the United Nations settled on the Trust Treaty of the Pacific breaking up the Japanese claims.
Shift to industrial production	1947	1978	Now under American authority, the CNMI experiences a cultural shift from eating predominantly fish to eating Spam and drinking Budweiser along with other American products. This also coincides with an explosion of the industrial sector and a decrease in subsistence fishing.
Population: 6,000	1960		
CNMI votes to reunify with Guam, Guam voters vote down the referendum	1969		
Population: 9,436	1970		
Clean Water Act	1972		
EPA Pacific Islands Office established	1972		

Event Title	Start Date	End Date	Description
Approve Commonwealth Status	1975		Feb 15, In local elections 78.8% of the residents approved a covenant under which the Northern Marianas would become a U.S. Commonwealth. In 1976 the U.S. Congress approved a covenant whereby Saipan became the capital of the Commonwealth of the Northern Mariana Islands. The 34,000 permanent residents became US citizens but could not vote in U.S. presidential elections. The CNMI was allowed to set its own tax, immigration and labor policies. A new government and constitution went into effect in 1978.
CNMI Approve Commonwealth Status and the New Constitution	1978		Similar to the U.S. territories, CNMI doesn't have representation in the Senate, but do have a delegate to represent them in the House of Representatives although the delegate can not vote in the House, only in committees.
Carlos S. Camacho is Elected Governor	1978	1982	
Division of Environmental Quality (DEQ) formally established by EPA Region 9 Pacific Islands Office	1979		
Volcanic Eruption in Pagan	1980		
Population: 16,780	1980		
Tourism and Apparel Manufacturing Explode	1980		Due to the lax labor laws and lack of a minimum wage, companies rush to the island to begin clothing production. The garment industry likewise explodes bringing additional foreign contract workers to the island to supply the labor need. Now easier than ever to travel to Saipan and now on the international scene, the tourism industry also receives a boost in incoming money and investment opportunities.
Division of Fish and Wildlife (DFW) established	1981		
Pedro P. Tenorio Elected Governor	1982	1990	
Daily sale of "Trip-Tickets" initiated	1983		
Coastal Resources Management Office (CRM) established	1983		Responsible for Lagoon and Reef A.P.C.
DEQ started enabling act	1983		
First garment factory opens in Saipan	1983		Commonwealth Garment Factory - Written in the Law-Government Act to be completed by 2010
Crown-of-Thorns Outbreak	1983		

Event Title	Start Date	End Date	Description
Saipan Fisherman's Association Started	1985		
Saipan International Fishing Tournament began	1985		Boat-based until 1997, inshore component created in 1994
CNMI Coastal Resources Management Office Proposed MPAs	1985		
First Saipan Lagoon Use Management Plan (SLUMP)	1988		
Comprehensive Land Use Plan developed by Duenas and Associates	1989		
Northern Mariana Diving Operators Association (NMDOA) established	1989		18 dive operators total
CZM and EPA combined efforts merging Section 319 and Section 6217 of U.S. CZMA	late 80s	early 90s	HQ approval required
Population: 43,345	1990		
Lorenzo I. De Leon Guerrero Elected Governor	1990	1994	
Large Hotel and Tourist development	1991		
Over 505K tourist arrivals	1992		
University of Guam hosts the International Coral Reef Symposium	1992		
Anti-litter Act established	1993		
Froilan C. Tenorio Elected Governor	1994	1998	
Sasanhaya Bay Fish Reserve in Rota is designated	1994		
Sea Cucumber fishery started in Rota	1995		
Sea Cucumber fishery started in Saipan	1996		
Pacific Year of the Coral Reef	1996		Two meetings in Fiji; Strategy document and Management Plan; hosted by the South Pacific Commission
736K tourist arrivals	1996		

Event Title	Start Date	End Date	Description
Updated version of Saipan Lagoon Use Management Plan (SLUMP)	1997		
Sea Cucumber fishery closed	1997		
Education Summit	1997		"Island Ecology" text started
International Year of the Reef	1997		Presidential Declaration
Sharp decline of arrivals of tourists	1997	1998	Coincides with the Yen fallout
Pedro P. Tenorio is Re-elected Governor	1998	2002	
Executive Order forms the U.S. Coral Reef Task Force	1998		Executive order to protect coral reefs forms the U.S. Coral Reef Task Force
Class-action Lawsuits Filed Against Sweatshop Working Conditions	1999		Nine large companies settle to reimburse workers and to create a program to monitor island contractors. The nine companies include Nordstrom, J. Crew, Cutter & Buck, Gymboree, Ralph Lauren, Philips-Van Heusen, Bryland L.P., Karan Int'l, and Dress Barn.
Mañagaha Marine Conservation Act (MMCA) under Public Law 12-12	2000		"Managaha Marine Conservation Act of 2000" Designates Managaha Island and its surrounding waters as a Marine Conservation Area; to provide for management policies, administration and enforcement of marine conservation areas;
Mañagaha Marine Conservation Area established by Public Law 12-12	2000		
Boat-based CREEL surveys started	2000		
Marine Monitoring Team established	2000		
Population: 69,221	2000		
U.S. Coral Reef Task Force creates National Action Plan to Conserve Reefs	2000		The National Plan is formed along with the Coral Reef Conservation Act of 2000. NOAA also creates the Coral Reef Conservation Program's 1st Pacific RAMP cruises
Large Coral Bleaching Event	2000		60-70% mortality reported
Eurotex suspended by the Garment Factories Association	2000		The suspension followed a demonstration by the workers for withheld wages; Eurotex filed bankruptcy and closed in October and many other factories followed suit

Event Title	Start Date	End Date	Description
NOAA Pacific Islands Fisheries Science Center forms Coral Reef Ecosystem Division	2001		
Coral bleaching event	2001		
Juan N. Babauta Elected Governor	2002	2006	
NOAA and the U.S. Coral Reef Task Force produce the National Coral Reef Action Strategy	2002		
Forbidden Island and Bird Island MPAs established	2002		
Effective enforcement begins for Mañagaha Marine Conservation Area	2002		
Local Action Strategies completed	2003		
Volcanic eruption in Anatahan	2003		
Marianas Crown of Thorns outbreak	2003		
Natural Resource Management program started at the Northern Marianas Community College	2003		
Asia Pacific Academy of Science, Education and Environmental Management (APASEEM) started	2003		
US Coral Reef Task Force Meeting held in CNMI	2003		
Saipan Fishermen's Association starts Mahi Mahi Derby	2003		
Volcanic eruption at Anatahan	2003		

Event Title	Start Date	End Date	Description
Resolution 10.5 Proposal on Coral Reefs, Climate and Coral Bleaching Initiative in CNMI and Guam	2003		The USCRTF and partners, both domestic and international, developed A Reef Manager's Guide to Coral Bleaching which articulates the state of knowledge on the causes and consequences of coral bleaching and provides information on responding to mass bleaching events, developing bleaching response plans, assessing ecological, social and economic impacts, and tools for identifying and building long-term reef resilience.
"CNMI Three-Year Coral Reef Protection Local Action Strategy	2003		
US Federal Judge Ruled Submerged Lands Belong to the US	2003		Some 264,000 square miles of submerged were ruled to be within U.S. possession by the U.S. judiciary.
Spearfishing using scuba and hookah is prohibited on all islands	2003		
1st Coral Reef ED Mariana Archipelago Reef Assessment and Monitoring Program (RAMP) Cruise	2003		Included Coral Reef Mapping: In 2003, the R/V AHI was deployed from the Sette in Saipan Harbor and worked independently around Saipan, Tinian, Rota, and Guam during the cruise period. The bank tops and shelf environments of Saipan and Tutuila, as well as the offshore banks of Marpi and Tatsumi, were completely characterized in water depths ranging from 20 to 250 meters. Only partial surveys were done at Rota and Guam, due to time limitations and equipment problems. Optical validation surveys during 2003 collected a total of 126 seafloor video segments from underwater camera sled deployments were completed at 27 different islands and banks over the course of 40 days at sea.
2nd Mariana Archipelago Reef Assessment and Monitoring Program (RAMP) Cruise	2005		Added water sampling
Garment Factories Shut Down, None Left in Saipan	2005	2009	
Shoreline Based CREEL survey started	2005		
Mañagaha Management Plan completed	2005		
Demonstration BMP created	2005		Pervious pavement and vetiver grass (<i>Chrysopogon zizanioides</i>) on Quartermaster Road
Governor of CNMI signs the Micronesia Challenge	2006		
"Island Ecology" textbook published	2006		

Event Title	Start Date	End Date	Description
van Beukering valuation study of Saipan's coral reefs	2006		Valued Saipan's coral reefs at #61.16 million/year
Commonwealth Utility Corporation's previously subsidized power rates tripled	2006		Created economic hardship
Benigno R. Fitial Elected Governor	2006		
3rd Mariana Archipelago Reef Assessment and Monitoring Program (RAMP) Cruise	2007		Included mapping, coral disease surveys, and sampling for carbonate chemistry: In 2007, the R/V AHI returned to Saipan aboard the NOAA Ship Hi'ialakai, which also has two multibeam sonars, an EM3002D and an EM300. During HI0702 (12-22 May, 2007) multibeam surveys were conducted around Santa Rose Reef, Guam, Rota, Aguijan, Tinian & Saipan. The AHI was used to conduct hydrographic surveys to International Hydrographic Organization standards of Saipan (#81076), Tinian (#81067), and Rota harbors in collaboration with personnel from NOAA's Office of Coast Survey. During HI0703 (25 May - 12 June, 2007) both vessels surveyed around the Northern Mariana Islands, including Anatahan, Sarigan, Guguan, Alamagan, Pagan, Agrihan, Asuncion, Maug, Supply Reef, and Farallon de Pajaros, which are all part of the Izu-Bonin-Mariana island arc system.
Focus Workshop on Mariana Archipelago Monitoring	2007		In late October 2007, PIFSC received funds from NAVFAC for CRED to convene a focused workshop to discuss and develop a statistically rigorous survey design to address the monitoring requirements in Apra Harbor and elsewhere in the Mariana Archipelago. Due to the shortness of time prior to the planned initiation of dredging and construction at Kilo Wharf and limited availability of key personnel, a four-day workshop was convened at the East-West Center in Honolulu, Hawaii over the period December 7-10, 2007, bringing together key scientists and statisticians from CRED, UoG, RSMAS, HIMB, the Navy, Sea Engineering Inc., and Marine Research Consultants, and a few resource managers from NOAA, EPA, and the CNMI Division of Fish and Wildlife.
Management Plan for the Kagman Wildlife Conservation Area and Forbidden Island Marine Sanctuary	2007		
Bird Island Marine Sanctuary Management Plan	2007		
CNMI Marine Operators Handbook	2007		

Event Title	Start Date	End Date	Description
UH Report on Mañagaha Erosion with CRM	2007		
APASEEM becomes an official NGO	2008		
Zoning developed for CNMI	2008		
APASEEM forms the Tinian Discovery Camp	2009		
SARS Outbreak	2009		
National Monuments Designated in CNMI	2009		Jan 6, Pres. Bush designated parts of 3 Pacific island chains as national monuments to protect them from oil and gas extraction and commercial fishing. The areas totaled some 195,274 square miles and included the Mariana Trench as well as waters and coral surrounding 3 islands in the Northern Mariana Islands, Rose Atoll in American Samoa and 7 islands along the equator in the central Pacific Ocean.
4th Mariana Archipelago Reef Assessment and Monitoring Program (RAMP) Cruise	2009		"Improved fish surveys: increased number, added stratified random sampling design and expanded depth range to 0–30 m
Laolao Bay Conservation Action Plan completed	2009		
Population: 53,883	2010		
24th U.S. Coral Reef Task Force Meeting Saipan, CNMI	2010		The CCWG presented the U.S. Coral Reef Task Force Climate Change Working Group Progress Report on Resolution 18:1: Coral Reefs and Climate Change at the 24th Meeting of the USCRTF in Saipan, CNMI.
Airlines Move out of CNMI	2010	2011	Due to rising costs
Services and Economy in Rota and Tinian are Very Strained	2010	2011	Many hotels shut down
Homeland security takes control of airline security	2010		May be deterring visitors to CNMI
Laolao Bay Watershed Restoration Project initiated	2010		
Marine Sports Operators Forum	2010		Created to discuss issues affecting Saipan Lagoon
Lost La Fiesta Mall and Hotel Nikko	2010		Investors pulled out from the project, negatively affected the northern section of Saipan

Event Title	Start Date	End Date	Description
CNMI Coral Reef Resilience and Monitoring Program	2011		Beginning in 2011 funding has been secured for the development of the CNMI Reef Resilience and Monitoring Plan, the development of education and outreach protocols, and contracted support for bleaching monitoring and baseline setting through a coordinated effort of local and federal partners. The CNMI introduced the "Take the Right Route" project, engaging the community in the reduction of their carbon footprint by encouraging carpools, biking and walking. Working group members have also attended workshops to help understand the threats and response alternatives to dealing with climate change issues.
Immigration Law Amended	2011		The bill made CNMI immigration laws more similar to those of the Mainland US.
Northern Islands Development Summit	2011		
Gas Prices Rise to \$4.77 in Saipan and \$6-\$7 in Tinian and Rota	2011		
Marianas Trench Marine National Monument Management Team Created	2011		
Federal Grants Management Office enabling legislation - Public Law 16-48	2011		
CNMI Bio-Sampling Program started	2011		
"Size Matters" fishing campaign started	2011		
APASEEM holds a group training in reef biodiversity and health	2011		
Tasi Watch Program created by Mariana Islands Nature Alliance (MINA)	2011		
Increase in the number of scholarships for undergraduates in the Natural Resource Management Program at NMC	2011		Funds came from a Land Grant
Talakhaya/Sabana Conservation Action Plan completed	2012		
Laolao Bay Conservation Action Plan addendum	2012		

Event Title	Start Date	End Date	Description
Increase in tourism	2012		
Through Executive Directive the Governor attempts to establish Executive Branch control of the CUC and Retirement Fund	2012		
Education Collaboration Meeting	2012		
Rain Garden collaboration between DEQ, Forestry and NMC	2012		
Update of Saipan Lagoon Use Management Plan (SLUMP)	2012		
Garapan Conservation Action Plan drafted	2013		
Governor Fitial resigns, Governor Inos sworn in	2013		
Fishermen's Co-op opens	2013		
NRM goes through "Developing a Curriculum" process	2013		
Projected failure of the CNMI Retirement Fund	2014		\$50 million/year on-island, \$20 million/year off-island

Appendix D: Interviews

Name	Institutional Affiliation and Title	Method
PRE-SITE VISIT		
Dana Okano	NOAA CRCP, Coral Management Liaison for CNMI	Phone (1/31)
Fran Castro	DEQ, POC and Nonpoint Source (NPS) Manager	In Person (2/20)
Steven Johnson	DEQ, Biologist	Phone (3/18)
Brooke Nevitt	PMRI, Science Communications Coordinator	Phone (3/20)
Dana Okano	NOAA CRCP, Coral Management Liaison for CNMI	Phone (3/25)
Avra Heller	DEQ, Coral Reef Project Coordinator	Phone (3/25)
Steven McKagan	NOAA PIRO, Fisheries Liaison	Phone (3/27)
Sean Macduff	DFW, Biologist	Phone (3/28)
Trina Leberer	TNC, Director of the Micronesia Program	Phone (4/3)
J-CAT Meeting #1	J-CAT Members	Phone (4/18)
Dana Okano	NOAA CRCP, Coral Management Liaison for CNMI	Phone (4/29)
Fran Castro	DEQ, Coral Reef POC	Phone (5/2)
Sam Sablan	MINA, Executive Director	Phone (5/3)
J-CAT Meeting #2	J-CAT Members	Phone (5/8)
Dana Okano	NOAA CRCP, Coral Management Liaison for CNMI	Phone (5/14)
J-CAT Meeting #3	J-CAT Members	Phone (5/29)
Nancy Gottfried	Attorney General Procurement Attorney	Phone (5/30)
SATURDAY 6/15/13		
Frankie Eliptico	MINA/NMC	In Person
Tim Lang	TRL	In Person
Kodep Uludong	MINA/Rare	In Person
MONDAY 6/17/13		
Fran Castro	DEQ, Coral Reef POC	In Person
Esther Fleming	Governor's Chief of Staff	In-Person (Executive Level Briefing)
Mathilda Rosario	Special Assistant to Personnel	In-Person (Executive Level Briefing)
Frank Rabauliman	DEQ, Director	In-Person (Executive Level Briefing)
Arnold Palacios	DLNR, Secretary	In-Person (Executive Level Briefing)
Herman Sablan	Procurement, Director	In-Person (Executive Level Briefing)
Virginia Villagomez	Special Asst. Office of Management and Budget	In-Person (Executive Level Briefing)

Name	Institutional Affiliation and Title	Method
Larissa Larson	Secretary, Dept. of Finance and Accounting	In-Person (Executive Level Briefing)
Ryan Okano	DEQ - Coral Reef Monitoring Program	In Person
John Iguel	DEQ - Coral Reef Monitoring Program	In Person
Arnold Palacios	DLNR, Secretary	In Person
John Gourley	Micronesia Environmental Services	In Person
Mike Trianni	NOAA National Marine Fisheries Service	In Person
Frank Rabauliman	DEQ, Director	In Person
Greg Moretti	PMRI, Executive Director	In Person

TUESDAY 6/18/13

Nicole Schafer	CRM, Outreach Coordinator	In Person
Larissa Larson	Secretary, Dept. of Finance and Accounting	In Person
Bernie Palacios	Director of Federal Grants Management	In Person
Virginia Villagomez	Special Asst. Office of Management and Budget	In Person
Herman Sablan	Procurement, Director	In Person
Sue Ellis	Procurement	In Person
Jack Reyes	Procurement	In Person
Doris Chong	CRM, Grants Coordinator	In Person
Kate Fuller	Natural Resource Attorney	In Person
James Kearney	Natural Resource Attorney	In Person
Chech Sablan	Natural Resource Attorney	In Person
Gus Harb	Natural Resource Attorney	In Person

WEDNESDAY 6/19/13

Gene Weaver	Saipan Fisherman's Association, President	In Person
Frannie Salas	Officer of Personnel Management	In Person
Ana Agulto	CRM, Acting Administrator	In Person

THURSDAY 6/20/13

Tony Mareham	DFW, Conservation Officer	In Person
Mike Tenorio	DFW, Biologist	In Person
Manny Pangelinan	DFW, Acting Director	In Person
John Furey	APASEEM	In Person
Richard Seman	Legislator, former DFW Director, Aquatic Education Specialist	In Person
Toshi Yamaguchi	President of NMDOA	In Person
Patrick Ulechong	Co-Founder of NMDOA	In Person
Roman Benavente	Legislator, Fisherman	In Person

FRIDAY 6/21/13

Name	Institutional Affiliation and Title	Method
J-CAT Meeting #4	J-CAT Members	In Person
POST-SITE VISIT		
Marlowe Sabater	NOAA, Western Pacific Regional Fisheries Management Council staff	Phone (7/13)
J-CAT Meeting #5	J-CAT Members	Phone (7/24)
J-CAT Meeting #6	J-CAT Members	Phone (8/28)

Appendix E: Portfolio of Training Modules

Long-term capacity building requires an explicit focus on systematic learning. While there is a wide range of potential training modules, a defined set of in-person training courses, distance learning modules, and methods to cultivate local leaders are suggested below to focus on current and emergent topics. A key feature of these trainings and continuing education courses should be the building of a common management framework built around the Management Cycle and the Orders of Outcomes framework.

Recommended Standard CNMI Coral Reef Management Training Course

On-site training courses are recommended to be conducted every two years, to respond to the staff turnover rate, including the following modules:

- Modules on the causes and drivers of reef decline, including LBSP, fisheries impacts and effects of climate change and ocean acidification;
- Modules on the Management Cycle, and the steps needed to build political will;
- Modules on sustainable financing and coordination of funding across agencies, and grants management;
- Modules on fostering high quality collaboration that includes essential elements of effective meetings, including effective dialogue, conflict resolution and decision-making;
- Modules on codification of good practices for coastal zone management, marine protected areas etc. that are made available to staff and the subject of mini-courses and trainings (e.g. Code of Conduct for Responsible Fisheries (FAO, 2007)); and,
- Modules on dealing with persistent administrative barriers such as staff turnover, improved collaboration, and integration across agencies, and writing standard operating procedures.

Routine trainings are a well-established practice for building knowledge and skills for effective coral reef management and could feature a formal process for new staff (at all levels) to build a basic understanding of coral reef management issues and convey current knowledge and lessons learned so as to retain institutional knowledge. Here are many sources available for building a custom curriculum and lessons learned for structuring training modules. For example, the Coastal Resources Center at the University of Rhode Island is developing a set of modules for the certification of professionals involved with MPAs. Custom modules for three levels of participants (field operations, management staff and policy and decision makers) have been prepared, applied and tested in East Africa. The CRC/WIOMSA certification program is one source of training materials that may be appropriate for the CNMI.

Produce Modules for Distance Learning

A set of pre-produced modules and resources are available from a wide variety of sources including Sea Grant, NOAA's Coastal Services Center, Center for Watershed Protection, International Waters Learning Exchange and Resource Network (IWLEARN), and UN Train Sea-Coast. There are a growing number of publications that

would be useful in developing these modules to build capacity such as Reef Resilience Tool Kit, How's My MPA Doing,

Healthy Reefs Healthy Communities, International Waters Experience Notes, World Fish Centers Lessons Learned 1804, Great Barrier Reef 2009 Baseline, and GEF's capacity building programs.

Strategies for Cultivating Local Leaders

To more effectively practice the ecosystem approach, the following six core competencies are necessary for practitioners:

- Competency in facilitation, mediation, stakeholders engagement, and public education;
- Competency in strategic design/improvement of stewardship initiatives;
- Competency in design and implementation of monitoring and evaluation in support of adaptive learning and acting;
- Competency in analysis of long-term changes in condition and use of ecosystems;
- Competency in analysis of governance structures and processes; and,
- Competency in building leadership required to influence political will.

Traditional approaches of peer-to-peer exchanges, learning journeys, and further investment in professional development is a worthwhile investment for leadership development. We recommend specific criteria to guide, encourage and reward emerging leaders. While a wide range of literature exists, the following set of leadership characteristics is useful to consider (NRC, 2008):

- Critical and reflective thinking and a willingness to challenge the status quo and invite inquiry into potential new ways of doing and seeing;
- Ability to see the big picture, as well as the parts and their interrelationships;
- Skillful and honest communication, including listening skills and the ability to speak and write with clarity, vision and purpose;
- Openness to the diversity of world views and perspectives and ability to make choices, especially when a decision goes against popular thought or opinion; and,
- Ethical foundation of word and action to navigate the political arena without susceptibility to corruption.

Principles for Building Adaptive Capacity

- **Issues Drive Need for Building Capacity.** Building adaptive capacity needs to be directed at a set of issues, as described in this and earlier reports on coupled social biophysical issues relating to coral reef health. There should be direct links between the issues and this strategy. Issues should matter most to the people of the place and represent both challenges and opportunities. Issues change and may become more or less important over time and new ones will form in the coming years, some through crisis and others gradually

over time. Therefore an adaptive strategy is needed to respond to the range of issues associated with management of coral reefs.

- Define the Audience: Once the issues are identified, an assessment of capacity needs should follow that is directed at the appropriate “levels” in the management system (field operations, managers, decision makers). Capacities can be directed at an individual, groups, teams, organizations, and across networks. What matters most is defining who currently needs the capacity and who may need such capacity in the future.
- Focus on the Purpose of Building Capacity: Once the audience has been identified, the questions center around defining what capacity is needed and what it will accomplish. Identifying the competencies that are desired in precise terms is essential and best accomplished with clear and unambiguous goals.
- Context is Key: There is no “one” strategy to build capacity, and if one strategy works well in one location, it may or may not work well elsewhere. Given the complexities in coral reef management, bundles of capacity building strategies are needed that fit in the local context, are timely, appropriate and balanced across audiences. While basic capacity building needs in the CNMI are mostly similar across the territory, issues play out differently across the mosaic of contexts in the CNMI.
- Long-Term and Sustained Action, Built on Success: A long-term and sustained commitment to building capacity must address frequent staff turnover, shifts in the social, political and environmental issues, ongoing learning and the need for adaptation. Fortunately, such a long-term perspective seems to be evidenced across current federal, Commonwealth and NGO partners. A long-term strategy must be built on successes within the CNMI to keep momentum strong.
 - Evoke purpose: “To build capacity to cope with and adapt to the long-term pace of ecosystem change that’s likely ahead and still have functional reefs to support a tourism economy, fishing communities and a unique way of life.”
 - Must understand current governance structures – what does exist – and what does not yet exist but may be needed.
 - Great progress has been made in developing a range of management responses to coral reef condition but the proper fit, interplay and scale of governance response to ecosystem change will be an issue into the future. We recommend using a range of effective diagnostic methods¹ to periodically assess the capacity to manage coral reefs and the governance structures within which they fit as a central feature of a long-term strategy.
 - Periodically review the issues (every three to four years) and the degree to which the issues are important to key stakeholders. Such an assessment should include a review of the power relationships, effectiveness of enforcement and compliance, BMPs and the degree to which there is formal commitment and supportive constituencies for sustained coral reef management. Excellent facilitation is needed to host the dialogue and invite other key stakeholders from across civil society, market forces such as tourism and other forms of government to engage.