

COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS

The 290 km long Mariana Islands Archipelago encompasses 14 islands of the U.S. Commonwealth of the Northern Mariana Islands (CNMI), the U.S. Territory of Guam, and numerous offshore banks (Figure CNMI-1). From a geological perspective, the islands can be divided into two groups: a southern and a northern island arc region. Although the islands of the older southern arc, which includes Rota, Tinian, Saipan, and Farallon de Mendinilla, are volcanic in origin, they are nearly all covered with uplifted limestone derived from coral reefs. The West Mariana Ridge is a series of seamounts, lying 145 to 170 km west of and parallel to the main island chains. The southern arc islands have the oldest and most developed reefs in CNMI, which are predominantly located along the western (leeward) sides. The majority of CNMI's residents live on Rota, Tinian, and Saipan (the capital). The volcanic islands north of Saipan make up the northern island arc region. In general, limited modern reef development exists along this active arc, although recent surveys show numerous patches of extensive reef growth are found on Maug, Asuncion, Agrihan, Pagan, Alamagan, and Guguan. Although some of the islands north of Saipan have held small permanent and seasonal communities, most permanent residents were evacuated in 1981 after the eruption of Pagan.¹⁰

Coral reef ecosystems in CNMI are, on the whole, in reasonably good condition. However, it must be recognized that coral reef ecosystems in CNMI cannot be realistically treated as a single entity since the geology, oceanography, ecological history, and human activities vary widely across the 14 islands and associated reef shoals and banks. Biological diversity, across coral reef taxa, is variable among islands and isolated reefs, with limited data indicating that offshore banks and reefs support lower diversity, probably due to lower habitat diversity.

Anthropogenic effects, such as nonpoint source pollution and fishing pressure, have clearly affected areas in proximity to the populated southern islands. Based on fisheries information, the northern islands and more distant banks and reefs appear to be in better condition than those closer to population centers. Environmental stressors such

as volcanic ashfall, elevated sea surface temperature, and crown-of-thorns starfish, *Acanthaster planci*, predation have clearly had localized negative effects on coral reefs in the Marianas (Figure CNMI-2). Past military activity in the northern part of Tinian has had an impact on the condition of the island due to improper waste disposal, but current military activities have shown minimal damage to the coral reefs themselves.

Establishment of MPAs to serve as spawning stock areas and to ensure habitat integrity, not only for coral reef fish but for food organisms as well, may be the most effective management tool available to maintain levels of spawning stock biomass necessary to replenish or sustain coral reef fisheries. In 1994, the first no-take MPA was established in CNMI at Sasanhaya Bay Fish Reserve in Rota. In the late 1990s, a bill was introduced to create two additional MPAs – Tinian Marine Sanctuary (Tinian Island) and Managaha Marine Conservation Area (Saipan Lagoon). The Managaha Marine Conservation Area was established by law in 2000, but the Tinian Marine Sanctuary has yet to be created.¹¹



Figure CNMI-2. Crown-of-thorns starfish, *Acanthaster planci*, feeding on live coral adjacent to an artificial reef. Photo credit: James P. McVey, NOAA Sea Grant Program.

¹⁰ It should be noted that residents have resettled several of the northern islands since 1981.

¹¹ Introductory material was taken, with slight modifications, from Starmer et al. (2002, 2005).

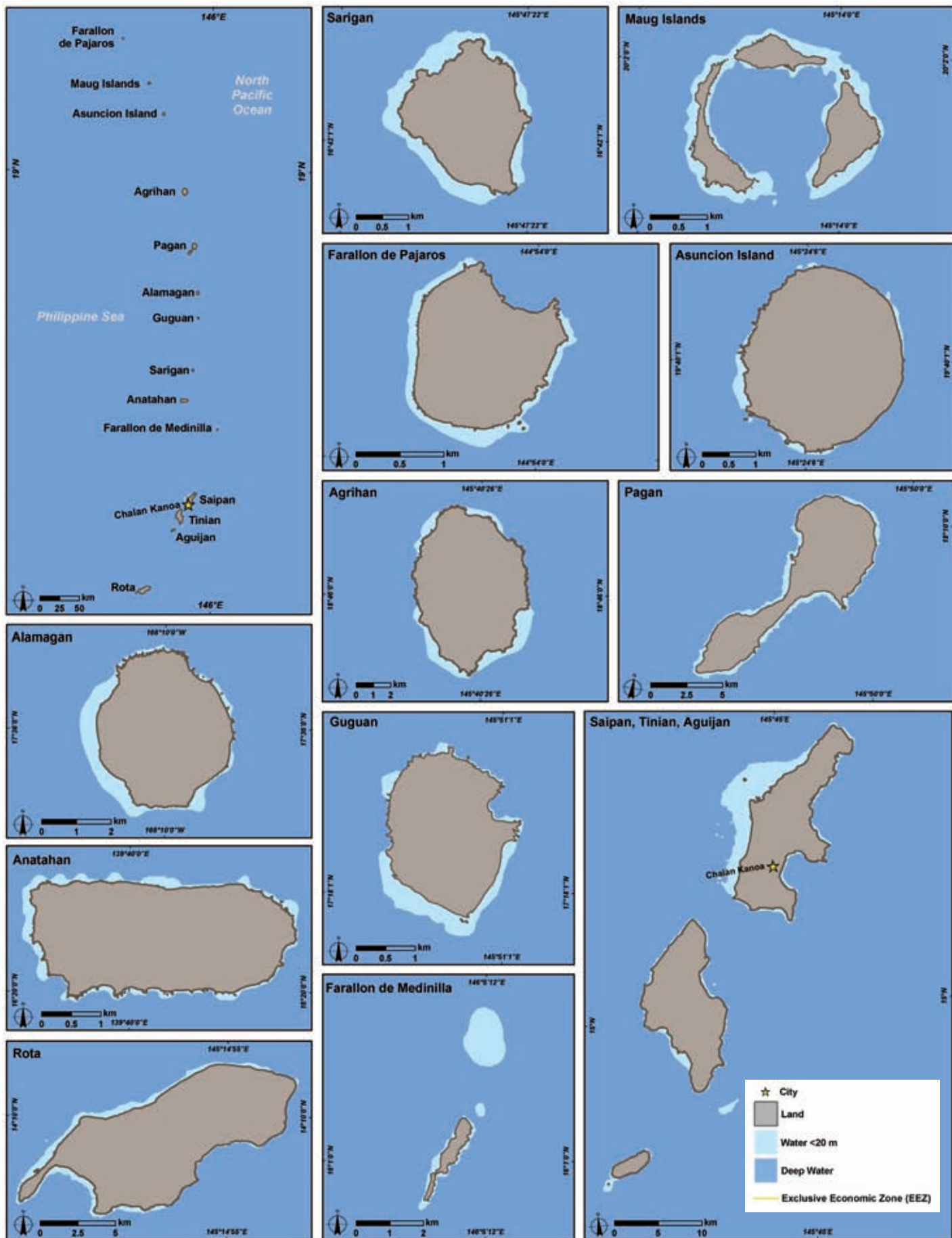


Figure CNMI-1. Locator map for the Commonwealth of the Northern Mariana Islands. (See Figure 5 for geographical context.) Map: A. Shapiro. Source: Stamer (2005).

Research Needs

CNMI	FISHING
<i>Management Objective</i>	<i>Research Need</i>
Conserve and manage fisheries to prevent overfishing, rebuild stocks, and minimize destructive fishing. <i>See Jurisdiction-Wide Section for additional research needs.</i>	Evaluate fishing effort and catch per unit effort in the Saipan Lagoon.
	Conduct stock assessments in the Saipan Lagoon and other selected nearshore locations and compare to 2005 fish stock assessments to evaluate the effectiveness of the net ban.
	Conduct a socioeconomic valuation of recreational and subsistence coral reef fisheries.
	Determine the archipelago-wide population status of managed reef species using fishery dependent and independent programs.
	Establish the home ranges of key target or indicator species.
Evaluate and improve the effectiveness of MPAs as a fisheries management tool. <i>See Jurisdiction-Wide Section for additional research needs.</i>	Evaluate the impact of establishing a user fee structure for MPAs and fishing activities based upon willingness to pay and economic valuations of uses and users.
Increase fishers' participation in fisheries management.	Evaluate the current level of participation by fishers in fisheries management and determine the desired level of participation to best manage fisheries.
	Document historical and cultural knowledge of CNMI coral reef resources and their ecology, and their historical trends in abundance, size, distribution, and community composition.

CNMI	POLLUTION
<i>Management Objective</i>	<i>Research Need</i>
Reduce the impacts of pollutants on coral reef ecosystems by improving the understanding of their effects. <i>See Jurisdiction-Wide Section for additional research needs.</i>	Identify the effects of pollution and other anthropogenic factors on CNMI's coral reef ecosystems.
	Determine the concentration and impacts of pollutants on nearshore water quality between Taga Beach and Barcinas Bay on Tinian.
	Evaluate the ability of monitoring programs to detect ecosystem change associated with land-based pollutants.
	Identify the sources and impacts of pollutants (e.g., sewer outfalls, Puerto Rico dump site, and golf courses) on coral reef condition.
Improve water quality by reducing land-based pollutant inputs and impacts on coral reef ecosystems. <i>See Jurisdiction-Wide Section for additional research needs.</i>	Develop and test methods for improving water quality.
	Model the impacts of land-use activities on nearshore water quality to predict the efficiency of various management schemes.
	Identify appropriate methods and plants for Talakaya watershed to stabilize soil and provide a habitat conducive to the restoration of the native terrestrial ecosystem.
	Assess effectiveness of revegetation in reducing soil erosion in Talakaya watershed.
	Evaluate effectiveness of management actions to restore (and in some cases create) mangrove and wetland areas to reduce land-based pollutants.
Improve the understanding of the economic benefits of improved water quality.	Identify reasons for low stakeholder participation in management opportunities and means to increase support.

CNMI	COASTAL USES
Management Objective	Research Need
<p>Reduce the impacts from recreational use, industry, coastal development, and maritime vessels on coral reef ecosystems.</p> <p><i>See Jurisdiction-Wide Section for additional research needs.</i></p>	<p>Develop criteria to use in the review of environmental assessments and environmental impact statements.</p> <p>Determine resource base and human pressure (including land-based pollution and fishing pressure) trends in the northernmost islands.</p> <p>Identify the environmental impacts associated with existing marine-related activities and user conflicts among these activities.</p> <p>Assess the impacts from non-extractive activities on coral reef condition.</p> <p>Evaluate the effectiveness of management measures to reduce pressures from coastal uses on CNMI's coral reef ecosystems.</p>
<p>Balance resource use to minimize user conflicts, provide equitable uses, and ensure optimal benefits to present and future generations.</p>	<p>Conduct an economic valuation of coral reef ecosystems in CNMI.</p>
<p>Reduce impacts from and restore habitat damaged by vessel anchoring and groundings.</p>	<p>Assess the identity, location, condition, and ownership of derelict and grounded vessels and determine their impacts to assist in prioritizing vessel removal.</p>
<p>Restore injured and degraded coral reef habitats.</p> <p><i>See Jurisdiction-Wide Section for additional research needs.</i></p>	<p>Evaluate the effectiveness of management actions to restore shoreline, sandy beach, and nearshore water quality.</p>
<p>Manage coral reef ecosystems and their uses in a holistic manner.</p> <p><i>See Jurisdiction-Wide Section for additional research needs.</i></p>	<p>Compare the historical extent and condition of mangroves, grass beds, and coral reefs with their current status to determine if conservation measures are necessary.</p>
<p>Evaluate and improve the effectiveness of MPAs as a management tool.</p> <p><i>See Jurisdiction-Wide Section for additional research needs.</i></p>	<p>Conduct specific valuation of the impact of MPAs on resident fishing populations.</p> <p>Evaluate the effectiveness of current MPAs to protect the long-term stability of CNMI's coral reef ecosystems.</p> <p>Evaluate the impact of establishing a user fee structure for MPAs and fishing activities based upon users' willingness to pay and economic valuations of uses.</p>

CNMI	INVASIVE SPECIES
<i>Management Objective</i>	<i>Research Need</i>
Minimize the introduction and spread of alien species.	<i>See Jurisdiction-Wide Section for research needs.</i>
Control or eradicate invasive species that have the potential to cause damage to coral reef ecosystems.	Identify those species in CNMI waters with the potential for invasive behavior (e.g., <i>Tilapia</i>) and develop appropriate management plans for each species.

CNMI	CLIMATE CHANGE
<i>Management Objective</i>	<i>Research Need</i>
Minimize the effects of climate change on coral reef ecosystems.	<i>See Jurisdiction-Wide Section for research needs.</i>

CNMI	EXTREME EVENTS
<i>Management Objective</i>	<i>Research Need</i>
Identify causes and consequences of diseases in coral reef ecosystems and mitigate their impacts. <i>See Jurisdiction-Wide Section for additional research needs.</i>	Determine the distribution, abundance, and types of coral diseases prevalent in CNMI and their impacts on coral reef condition.
Reduce the collateral impacts from harmful algal blooms on nearshore areas.	Assess the relative importance of ground water and surface water discharges in contributing to harmful algal blooms in Saipan.
Identify and reduce the negative impacts of <i>Acanthaster planci</i> .	Determine the ecological and economic impacts of <i>Acanthaster planci</i> populations and identify strategies to minimize outbreaks.