

EXECUTIVE SUMMARY

Overview

This document is the final report on the activities performed by the United States National Oceanic and Atmospheric Administration (NOAA) from 2012 to 2016, through a partnership agreement with the United States Agency for International Development (USAID) Timor-Leste Mission, in support of the Government of Timor-Leste—particularly the Ministry of Agriculture and Fisheries (MAF). Based on consultative discussions among USAID, MAF, and NOAA, these activities provide essential baseline fisheries and marine resource information to inform ecosystem-based management of the nearshore waters of Timor-Leste. These efforts were funded primarily by the USAID Timor-Leste Mission, with significant in-kind contributions and support from NOAA, as part of the 5-year partnership between NOAA and USAID.

This document provides the basis for science-based management for fisheries conservation, which in turn can improve food security and strengthen climate change resilience for the benefit of the people of Timor-Leste. NOAA's Coral Reef Ecosystem Program (CREP) provides high-quality data and information products which inform ecosystem-based management decisions and conservation actions.

Collectively, the chapters on Satellite Mapping of Nearshore Habitats (Chapter 2), Coral Reef Ecosystem Assessments (Chapter 3), Establishing Ecological Baselines for Climate Change (Chapter 4), and Developing a Spatial Data Framework (Chapter 5) provide a baseline assessment of Timor-Leste's nearshore habitats and coral reef ecosystems for the areas surveyed. As the survey methods described and used herein are also implemented as part of the NOAA Pacific Reef Assessment and Monitoring Program (Pacific RAMP)—an ecosystem-scale interdisciplinary coral reef monitoring program—the data from Timor-Leste are directly comparable to and informed by data collected by NOAA-CREP throughout the U.S. Pacific Islands and Territories. Furthermore, the methods used for establishing ecological baselines for climate change in Timor-Leste (Chapter 4) are being adopted and implemented at 21 sites across eight member states of the Intergovernmental Oceanographic Commission within the Western Pacific (WESTPAC) region. These data provide a foundation for comparing the ecological baselines under current and future stresses associated with climate change in the Coral Triangle region.

Findings

The baseline data collected by NOAA-CREP through partnership with USAID show that the waters surrounding Timor-Leste support high fish diversity as well as areas of localized high coral cover. Yet, the seawater carbonate chemistry observed in the shallow water reef environments of Timor-Leste suggests an area of concern and warrants continued long-term monitoring to assess whether low reef accretion rates are indeed an early indication of the effects of ocean acidification reducing reef growth and survival in the region.

Satellite Mapping of Nearshore Habitats

- Bathymetry was successfully derived from the shoreline to approximately 15-m depths for Atauro Island, Oecusse, and most of the north shore of Timor-Leste with relatively few spatial gaps.
- Over 190 km² of shallow water habitats were classified into hard and soft substrate, mangrove, seagrass, intertidal, rock and lagoon habitats.

Coral Reef Ecosystem Assessments

- The average fish species richness for all sectors was extremely high in Timor-Leste (averaging 57 species per site) compared to any other Pacific region that NOAA-CREP surveys.
- Small-bodied fish biomass in Timor-Leste was similar to other remote, unpopulated areas in the Pacific islands, while medium- and large-bodied fish biomass (including species important as fishery targets) was comparable to values from other human-populated areas in the Pacific.
- Fish biomass was greatest in West Atauro comparable to other remote areas in the Pacific, suggesting that West Atauro fish assemblages are relatively unimpacted by human activities and/or this is an area of high productivity.
- The surgeonfish family had the highest biomass, accounting for 20% of the total fish biomass.
- With respect to benthic cover, hard coral cover averaged 15.6% among the eight survey districts. Hard and soft corals as well as crustose coralline algae were more dominant than turf and macroalgae in Atauro, Liquica, and Manatuto districts, favoring reef structure and integrity. In the remaining survey sectors, turf and macroalgae were more dominant than corals and crustose coralline algae.
- Live hard coral cover reached 40% within the recently designated Nino Konis Santana National Marine Park and 38% in the Belio Barrier Reef complex, reflecting some of the highest quality reefs in the country.
- A diverse number of crustaceans have been found in the biodiversity assessments conducted using autonomous reef monitoring structures (ARMS), including important fishery targets, such as shrimp, crab, and lobster, with the highest mean cryptobiota diversity at the Biauou and Tutuala sites.

Ecological Baselines for Climate Change

- Net calcium carbonate accretion rates (used to track early responses to acidifying seawater conditions) were among the lowest recorded among NOAA-CREP's Pacific monitoring sites, and fell below predicted values based on water chemistry parameters.
- Recorded reef seawater temperatures from Oct 2012 to Oct 2014 exceeded the previously reported maximum for northern Timor-Leste from the NOAA Reynolds Optimal Interpolation Sea Surface Temperature (OISST) dataset.
- Timor-Leste's reefs have lower pH, aragonite saturation state, and net carbonate accretion values than many Pacific reefs monitored by NOAA-CREP. These low measurements suggest that

ocean acidification impacts are part of a suite of threats currently facing growth of Timor-Leste's reefs.

Recommendations and Best Practices

The Ministry of Agriculture and Fisheries (MAF) and other key stakeholders can use the data collected by NOAA-CREP as a starting point, or baseline, for long-term monitoring of the status and trends of the habitats, marine resources, and biodiversity of Timor-Leste with the objective of informing coastal management decisions and evaluating the effectiveness of the resulting actions for sustainably managing coastal fisheries and development for the long-term benefits of the people of Timor-Leste. These benefits include improving food security, sustaining marine-based livelihoods, and ensuring coastal protection. This report both highlights the special nature of the nearshore waters of Timor-Leste and demonstrates that habitats and marine resources, as well as threats, are heterogeneously distributed. As such, the information provided in the report provides a robust foundation for MAF or other coastal stakeholders to implement various types of marine spatial planning for responsible use of Timor-Leste's nearshore habitats and ecosystem resources. The successful delineation of nearshore habitats and bathymetry and their associated mapping products, in conjunction with the Coral Reef Ecosystem Assessments, will aid MAF in establishing spatially-explicit management approaches that can target specific habitat types or areas of high reef productivity (for example, high coral cover or abundant fish biomass). Continued monitoring and assessment of the coral reef communities, seawater chemistry, and reef processes using the NOAA-CREP methodologies described herein will build upon these baseline datasets and help MAF understand how the nearshore and coral reef ecosystems of Timor-Leste change through time under differing management and climate change scenarios.

