

The influence of nutrient enrichment on the resilience of Indonesian Marine Protected Areas (MPAs): a multi-level analysis

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Motivation

More than half of coral reefs are degraded worldwide, urging scientists, governments, and conservation managers to monitor the remaining reefs and strengthen their resilience by reducing local stressors. One key local stressor that has received less attention is increased nutrient concentrations from land-based sources/activities. Nutrient enrichment can cause subtle impacts but poses a clear threat to coral reefs by enhancing the growth of algae and pathogenic microbes and preventing coral from recovering from disturbances. A significant challenge is understanding how combined local environmental disturbances and other stressors will erode reef resilience and understanding if/how marine protected areas (MPAs) enhance the resilience of coral reefs.

Aims and Objectives

The overall objective of this research is to fill the current knowledge gaps on the influence of nutrient enrichment on MPA resilience by identifying appropriate indicators to inform MPA management, allowing mitigation of adverse impacts and better management of future changes/shocks.

Method

A multi-faceted approach with a combination of systematic review, remote sensing analyses, empirical data collection, and qualitative modeling will be conducted and discussed in four research-based chapters (Figure 1).

This research will be conducted in Indonesia. We will do broad-scale analyses (all Indonesian MPAs) and fine-scale analyses (targeted MPAs in Ay-Rhun and Lease MPA in Maluku and Misool MPA in West Papua (Figure 2). The MPAs located in the global epicenter of marine biodiversity and the MPAs were selected because (i) they

differ in size, age, management body, and type of land-sea interactions/drivers of changes, (ii) their variation of reef health, (iii) the data availability, and (iv) the experience and network in the region.

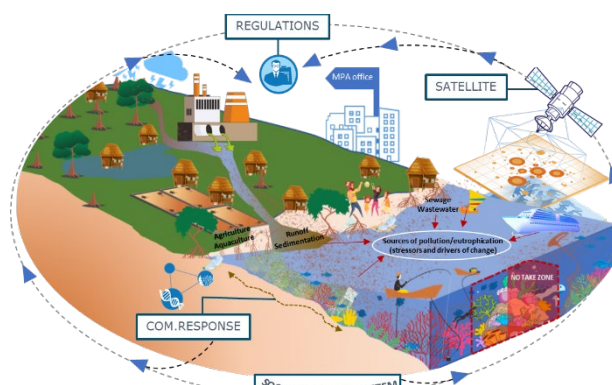


Figure 1. Conceptual framework of this Ph.D. project. The interplay between land-based activities and marine protected areas (MPAs). This research focuses on understanding the influence of local stressors on the resilience of Indonesian MPAs: multi-level analysis.

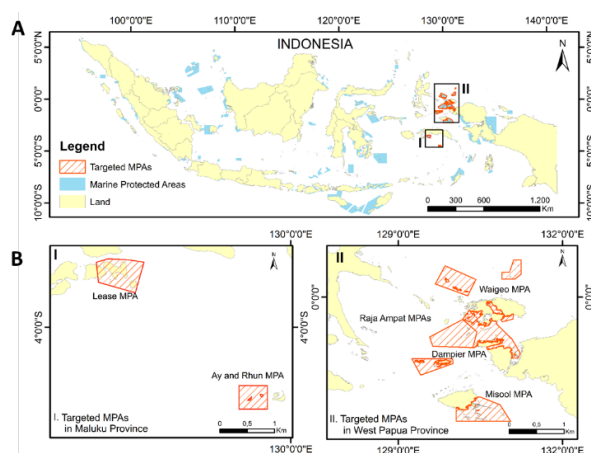


Figure 2. A. Marine protected areas (MPAs) across Indonesia with targeted MPAs pointed out; B. I. Targeted MPAs in Maluku Province covering Lease MPA and Ay-Rhun MPA (left). II. Targeted MPAs in West Papua Province covering Misool MPA (right). Note that each map has its bar.

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