

**Building Resilient Reefs
in Response to Climate
Change : A Comparative
Analysis of Bolinao and
Lakshadweep**





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**Expertise : Coastal habitats,
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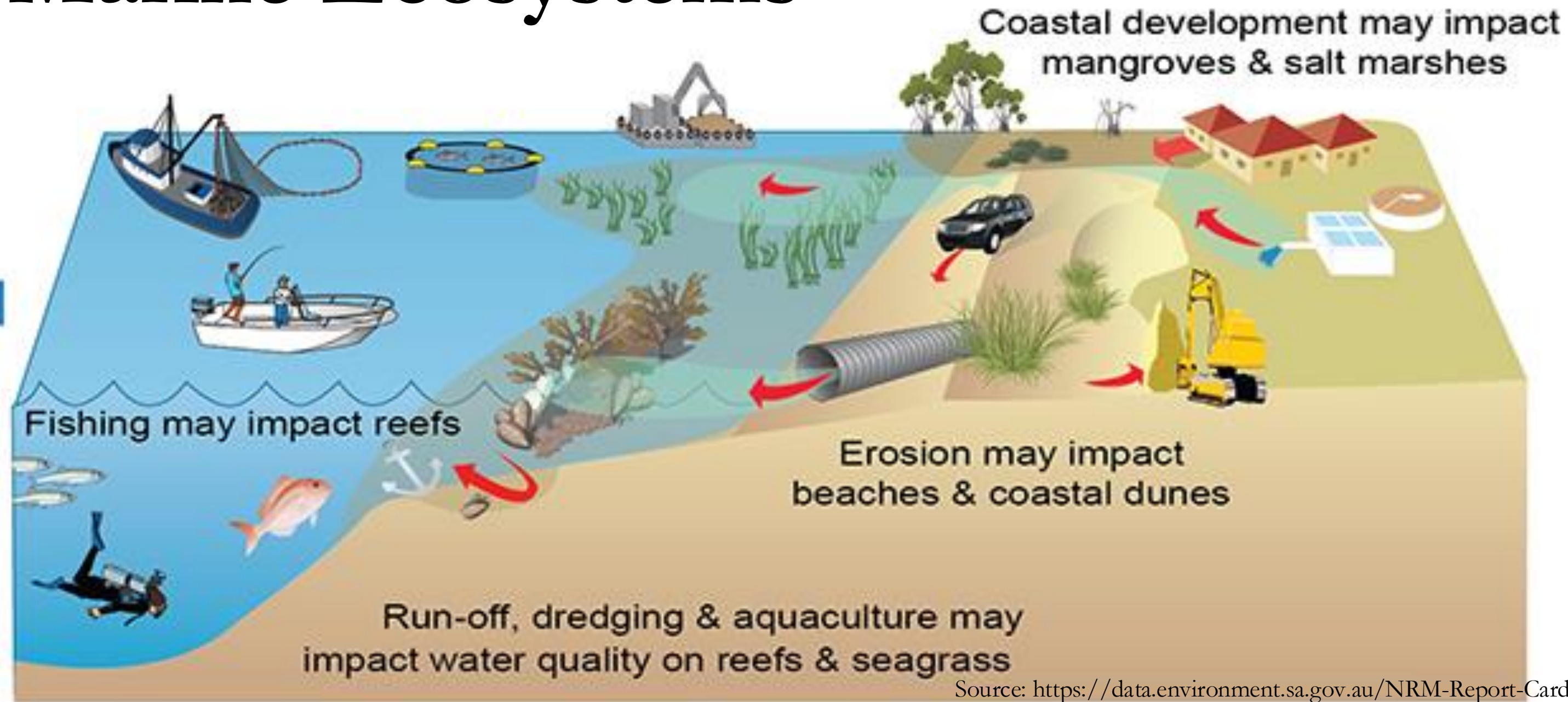


**Research area(s): coral reefs, coral
bleaching, ocean warming, nature-based
solutions (NBS), ecosystem-based solutions
and policy-driven economic strategies.**



Coastal and Marine Ecosystems

- Good & Services
- Food
- Recreation
- Tourism
- Biodiversity
- Trapping sediment
- Coastal erosion control
- Mining
- Shipping
- Aesthetic landscapes
- Culturally important places



Source: <https://data.environment.sa.gov.au/NRM-Report-Cards>



Research Problem

Rapid Degradation of the Coral Ecosystem

- Bolinao reef system faces acute stress from sedimentation and nutrient enrichment driven by human activities such as intensive mariculture (Ferrera et al., 2016)

Research Gap

Lack of Effectiveness of Current Reef Management Plan in Coastal Communities

- Despite concerted efforts to conserve coral reefs in the region, including extensive histories of research, community-based and co-management initiatives, and the establishment of marine protected areas (e.g. Cabral et al. 2014), the decline of reefs in Southeast Asia continues unabated (Cvitanovic, 2024)



Mapped SDGs and International Policies



Direct contributions to SDGs:

- 13. Climate Action
- 14. Life Below Water
- 17. Partnership for the goals

Indirect contributions to SDGs

- 04 Quality Education
- 06 Clean water & Sanitation
- 10 Reduced Inequalities
- 12 Responsible Consumption & Production



International Policies

- Paris Agreement
- Convention on Biological Diversity (CBV)
- Coral Triangle Initiative (CTI)
- National Coastal Zone Management Plan

Expected Outcome



**Create Policies on
Conservation and
Management Frameworks**



**Localized
Action Plan**

Objectives

Aims to develop a strategic and specific action plan for a robust reef management system. Specifically:

1. To identify **key stressors of the reef system** and its **spatial and temporal scale**

2. To explore the **current status** of the existing reef management system and the stakeholders involved

3. To investigate **potential solutions** to the identified stressors

OBJECTIVES

METHODOLOGY

OUTCOMES

OVERALL OUTCOME



UNU
IAS



To identify key stressors of the reef system and its spatial and temporal scale;



- Extensive literature review
- Compare forecast and hindcast models projections
- Geographic Information Systems (GIS) mapping
- Localized sampling in high- and low-risk areas
- Ecosystem modeling for stressor impacts



A report on most common reef stressors in Bolinao and Lakshadweep.

To explore the current status of the existing reef management system and the stakeholders involved;



- Data collection of reef management system
- Local knowledge integration
- Participatory mapping with stakeholders
- Policy impact studies



Parameters list of data that needs to be accumulated/how data is going to be accumulated



Improved understanding of reef management systems

To investigate potential solutions to the identified stressors



- Conduct review of case studies
- FGD and KII with stakeholders
- Structured survey with fishermen



Identification of context-specific interventions based on best practices and lessons learned from case studies.
Development of a well-informed, stakeholder-driven strategy to address the key stressors of coral reef degradation.



Develop a localized action plan for the reef management system.

METHODOLOGY

Specific Areas in NBS and Climate Change Mitigation Being Addressed



Sedimentation

- **Seagrass Meadows Management**
- **Mangrove Forests Protection**



Enrichment

- **Natural Feeds Preparation**

Bleaching

- **Coral Breeding Program**

Initial Proposed Solution

A. Against Enrichment

- Reduce eutrophication by using Sargassum-based feeds, lowering phosphorus inputs and algal dominance.
- Pilot testing of Sargassum-based feeds in fish pens to monitor fish growth, water quality, and coral health.
- Empower communities through training in Sargassum collection and feed preparation
- Monitor and evaluate ecological and socioeconomic impacts to refine practices.
- Scale up implementation of Sargassum feeds across mariculture operations.

B. Against Sedimentation

- Restore mangroves to reduce nutrient and sediment input into coastal waters.
- Conserve and plant seagrass meadows to enhance nutrient cycling and sediment stabilization.
- Implement integrated ecosystem management connecting mangroves, seagrass, and coral reefs.
- Train local communities in sustainable practices and ecosystem monitoring.- Promote eco-tourism and carbon credit programs to fund restoration activities.

Initial Proposed Solution

C. Against Bleaching

- Identify and establish a genetic repository of thermally resilient coral species to enhance resilience
- Breed and propagate heat-tolerant corals using nurseries and assisted evolution techniques.
- Conduct strategic out planting of resilient corals to degraded reef sites to restore ecosystem functions
- Involve communities in coral restoration through training, eco-tourism, and partnerships with NGOs and institutions.
- Monitor coral recovery and reef health, using findings to guide adaptive management practices.

CONTRIBUTIONS

To Corals

- Reduction of Eutrophication
- Mitigation of Sedimentation
- Enhanced Resilience to Climate Change
- Support for Biodiversity

To Coastal Communities

- Economic Opportunities
- Capacity Building
- Climate Adaptation and Protection
- Education and Awareness
- Sustainable Livelihoods

A background image of a sunset over a rocky coastline. The sun is low on the horizon, creating a bright glow and lens flare effects. The sky is a mix of light blue and white. The foreground shows dark, jagged rocks. The text 'THANK YOU' is centered in a bold, black, serif font.

THANK YOU