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Does Habitat Heterogeneity Predict High Ecological Diversity? A case study from Indonesian and Filipino Coral Reefs

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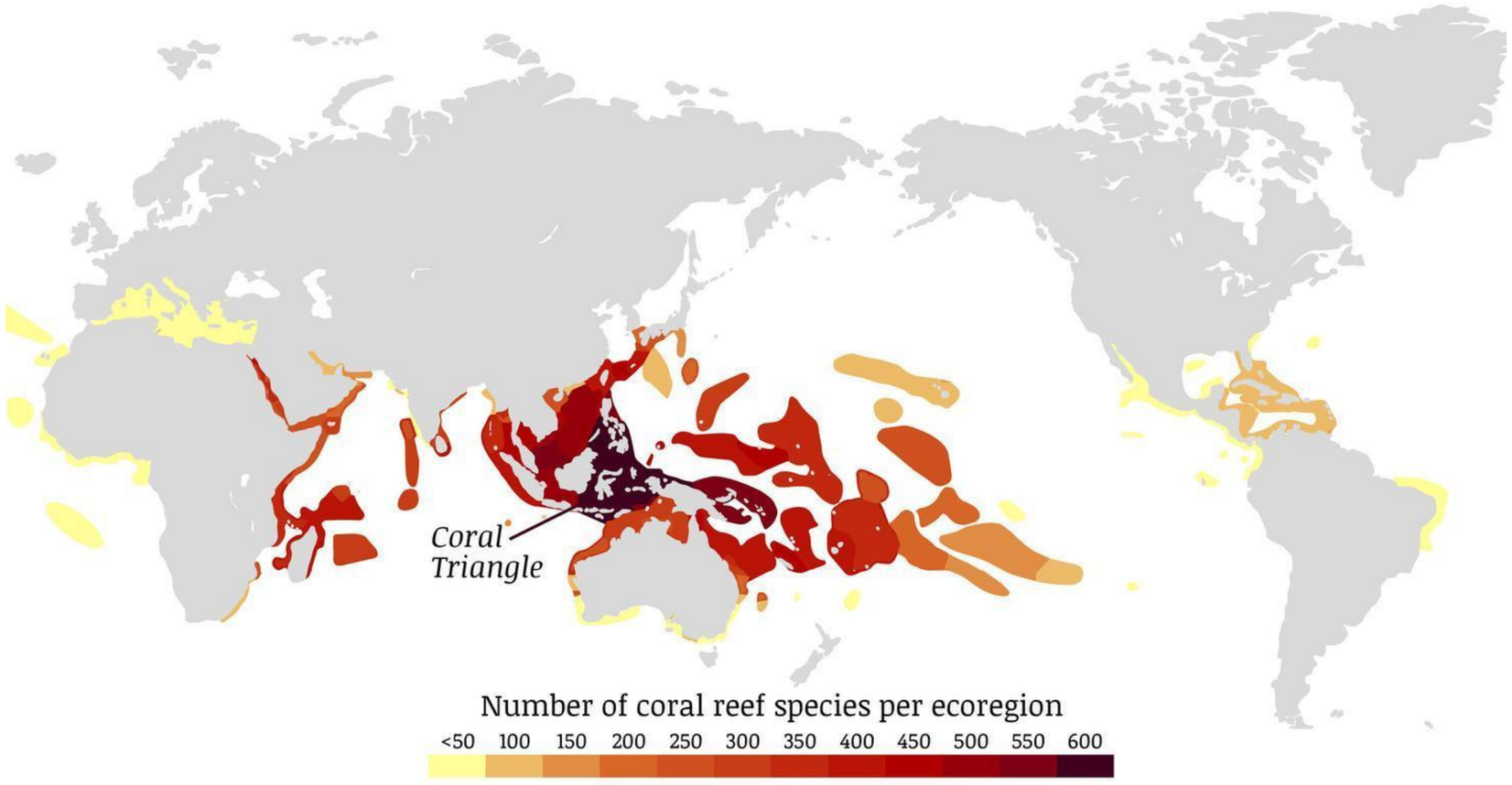
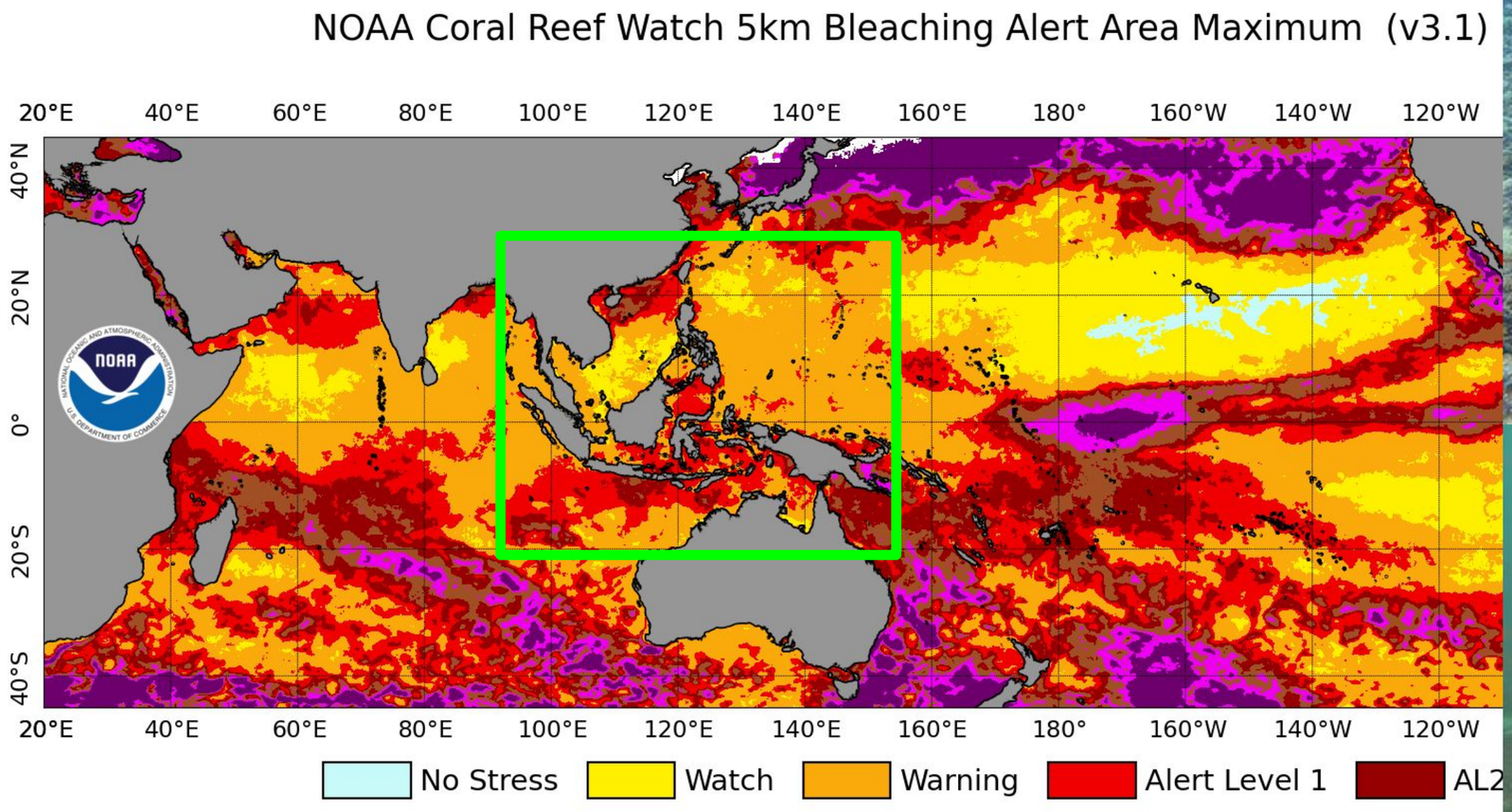
The World of Coral Triangle



Reef Degradation



Introduction

- > **100 million people** in Indonesia and the Philippines **rely on fisheries** for food security and livelihoods.
  - **Climate change threatens** reef fisheries and livelihoods via broadscale reef declines.
  - Need for scalable tools to **identify and save adaptive reefs** for sustainability.

Key question: can we use satellite derived metrics to monitor coral reef and sustain small scale fisheries?

Habitat Heterogeneity

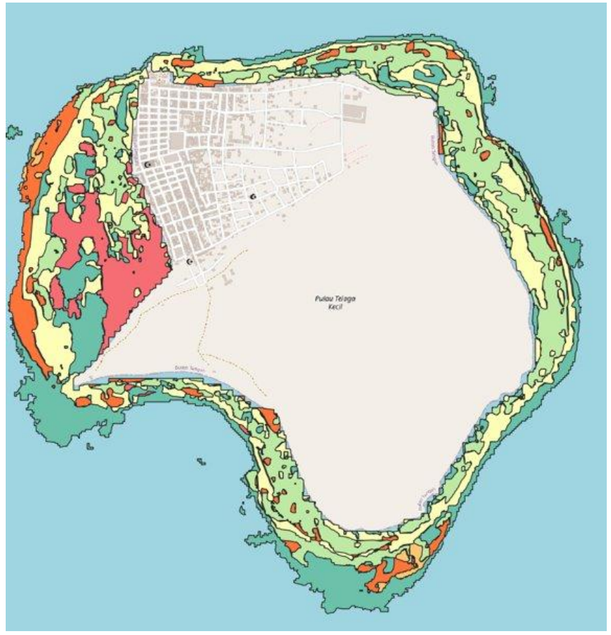
More structural complexity → more biodiversity

ADAPTIVE REEFS

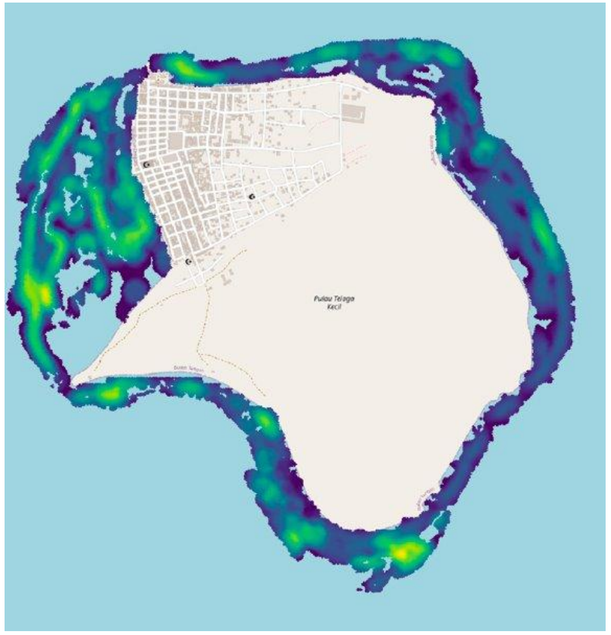
High Complexity

Low Complexity

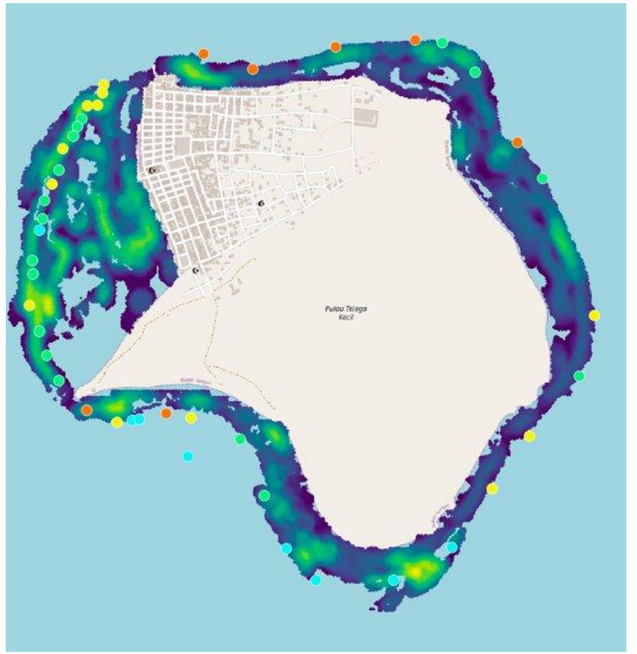
Research Gap and Objectives



Benthic classes from Allen Coral Atlas



Habitat Heterogeneity



Our Sites

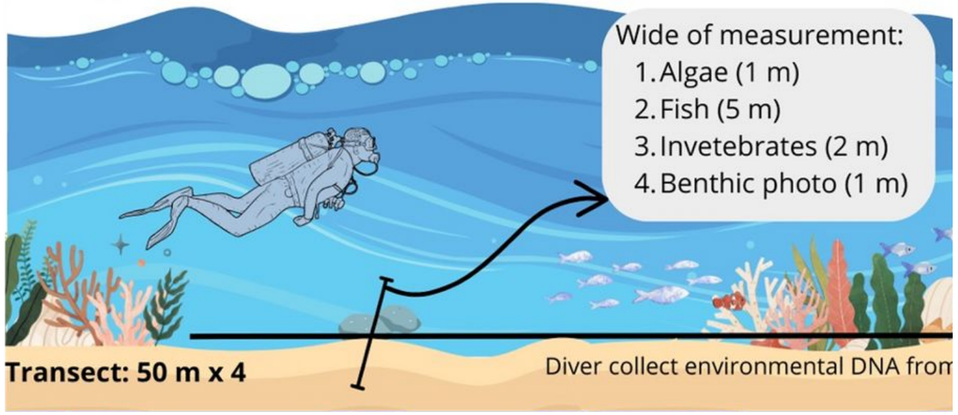
https://allencoralatlas.org/

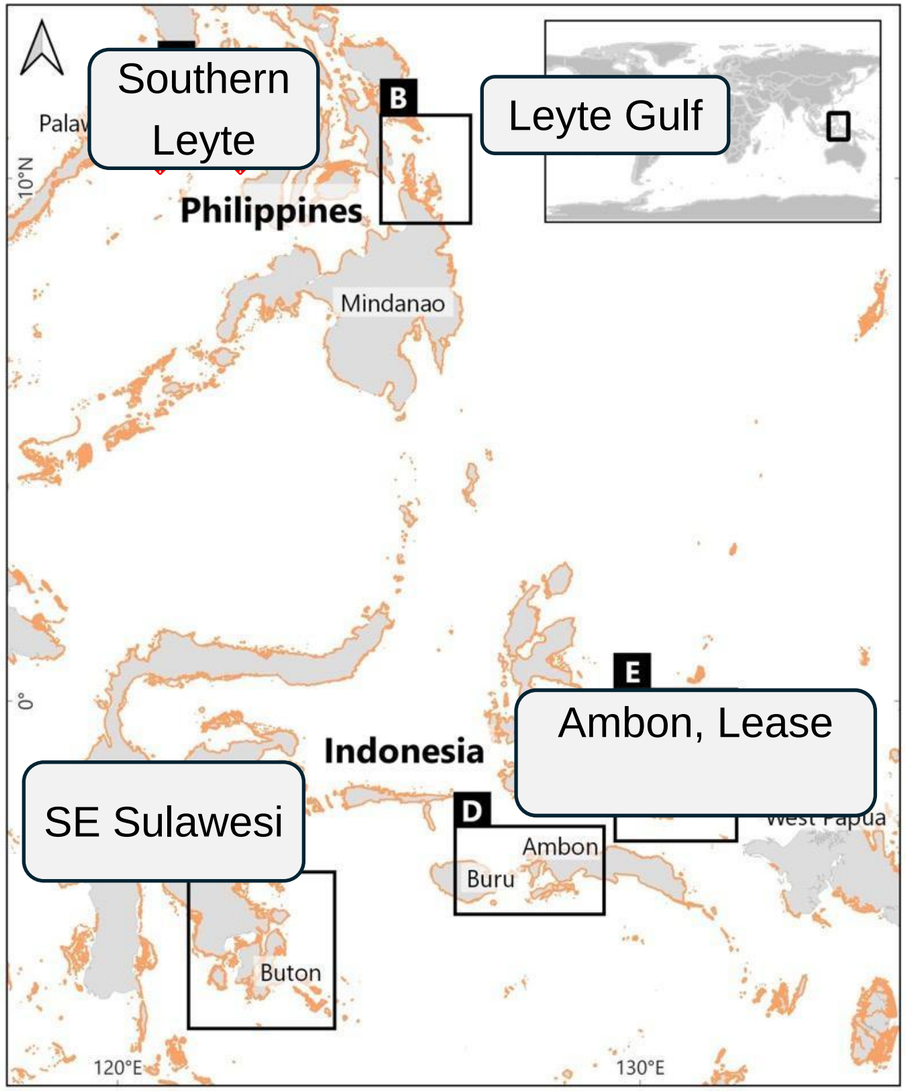
Can **remotely sensed habitat heterogeneity** metrics be a **proxy of biodiversity**?

Methodology

Study Area and Data Collection

- 60 diver sites across Indonesia and the Philippines





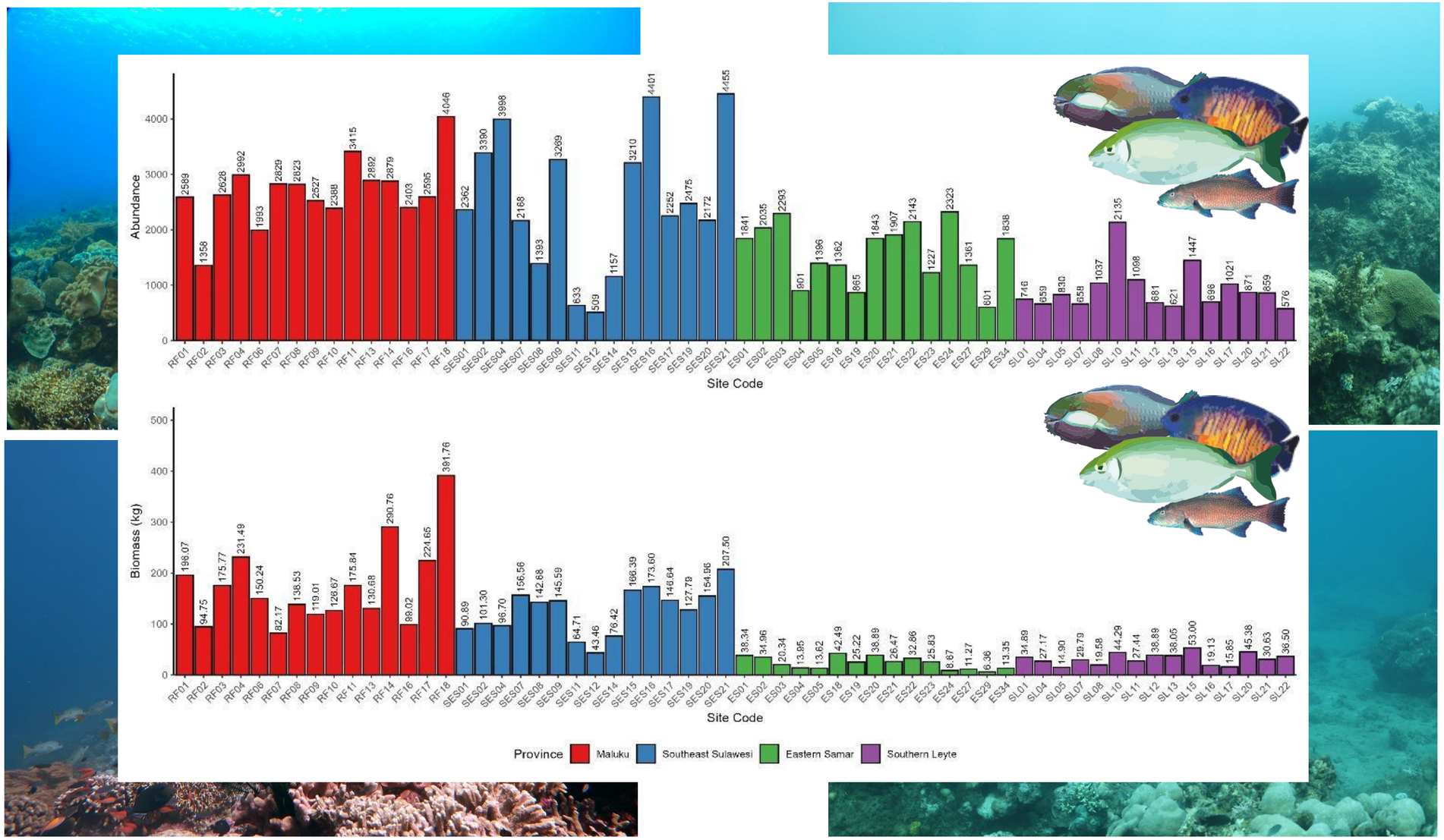
Data Collection and Analysis

- **Statistical models** to predict the relationship between predictor variables and reef health metrics

Findings

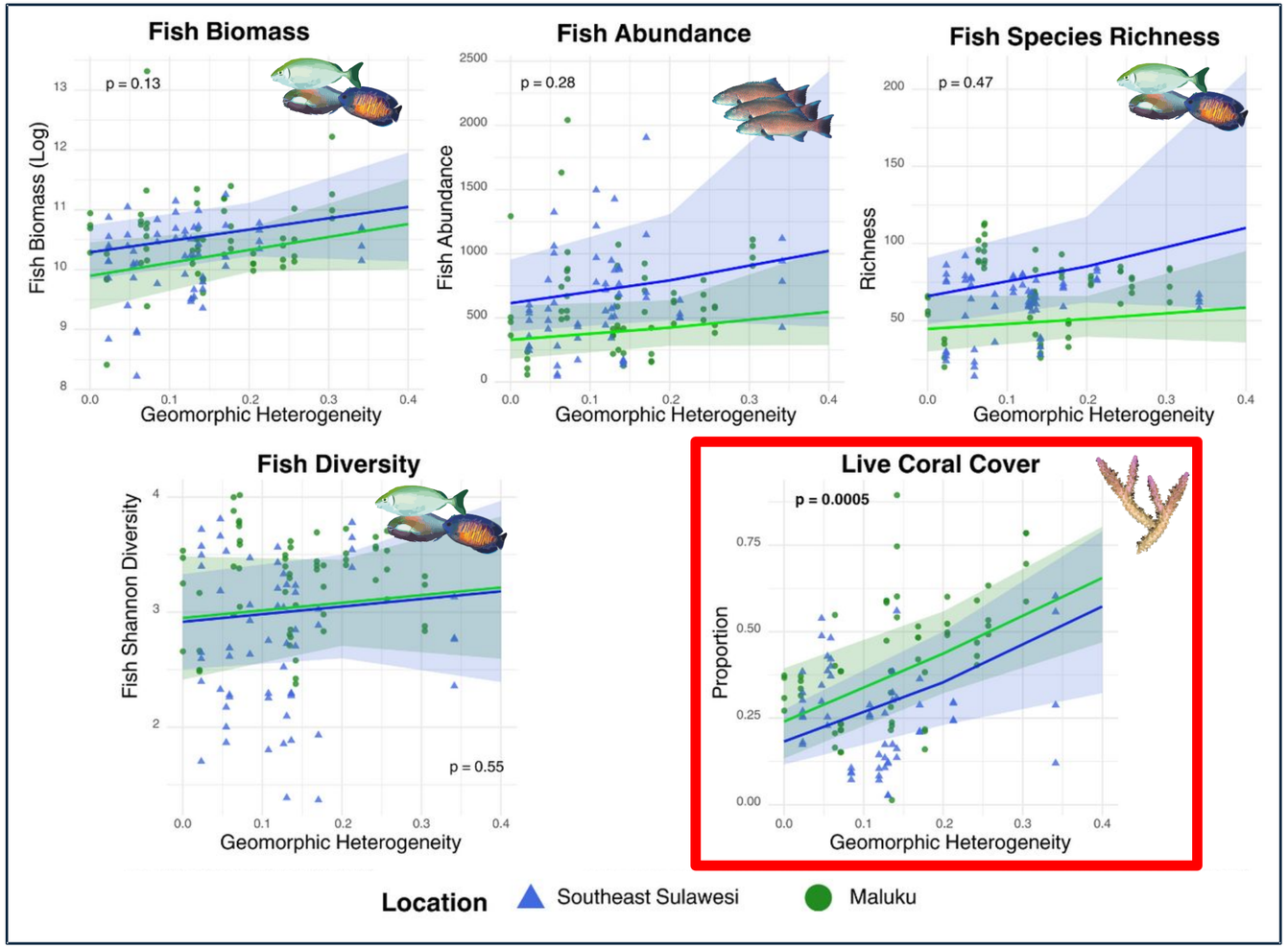
Indonesian Sites

Filipino Sites



Findings

Live Coral Cover: Strong, significant positive relationship with habitat heterogeneity.



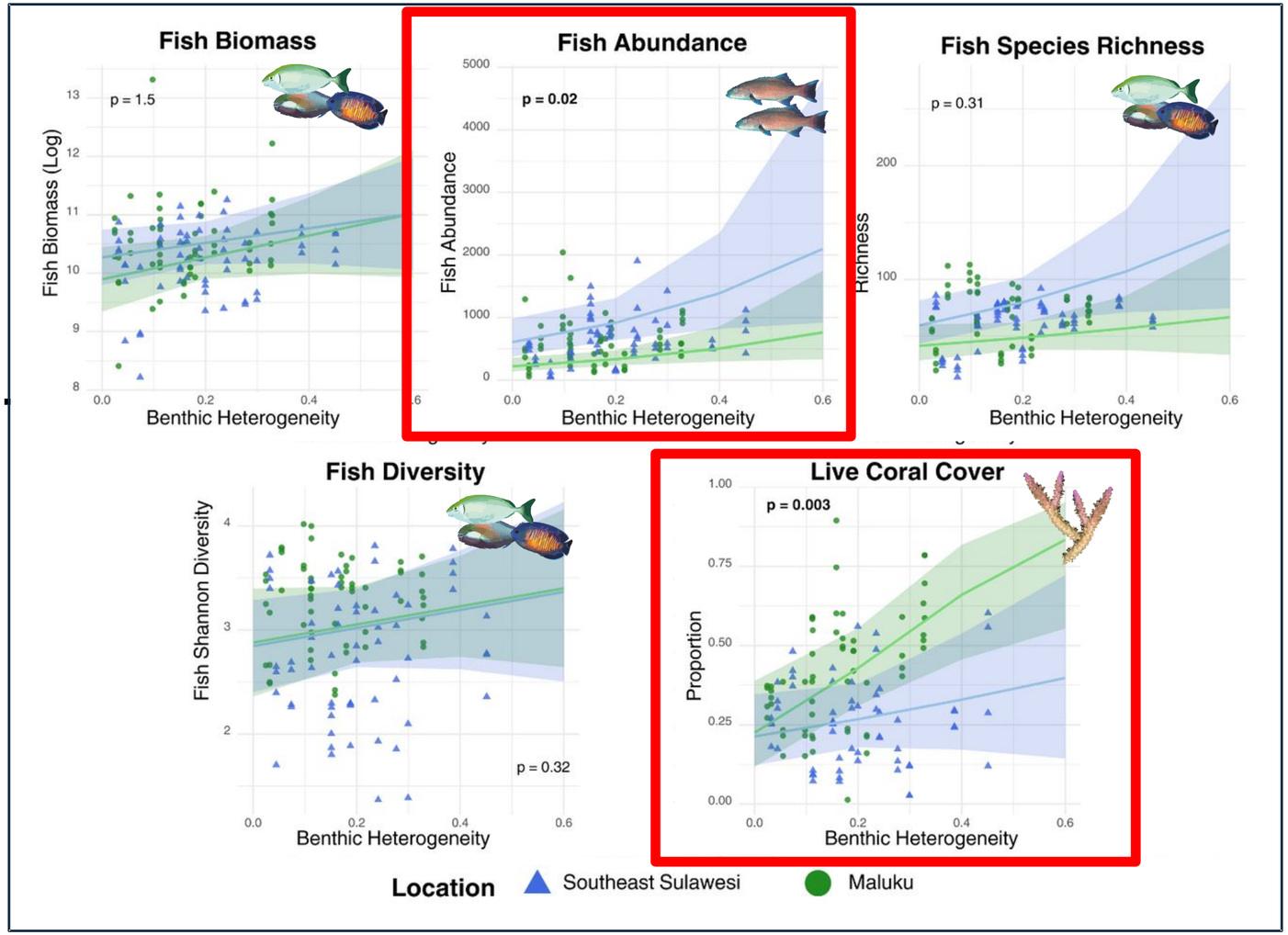
Fish Diversity and **Species Richness**: Positive but non-significant trends.

Abundance and **Biomass**: Higher in Southeast Sulawesi, but uncertain and marginally significant effects.

Findings

Live Coral Cover: Significant positive effect; stronger in Maluku than Southeast Sulawesi.

Fish Biomass: Positive but non-significant.

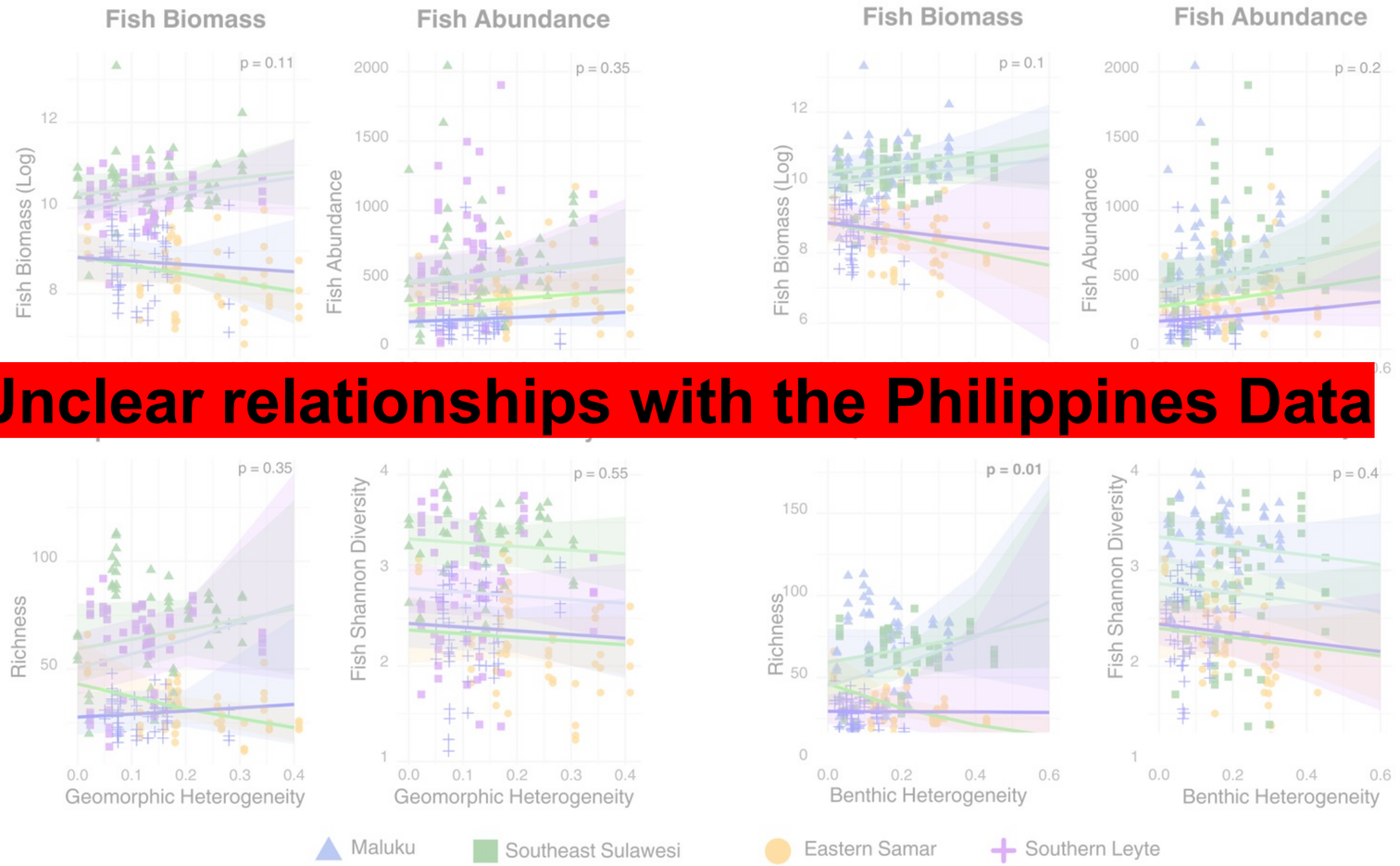


Fish Abundance: Strong, significant positive effect; higher in Southeast Sulawesi.

Species Richness: Positive but non-significant; higher in Southeast Sulawesi, effect uncertain.

Findings

Unclear relationships with the Philippines Data



Discussion

Effect of Habitat Heterogeneity:

- **Habitat heterogeneity shows potential** to predict higher coral cover and fish abundance in Indonesia, though relationships are not always strong.
- **Reefs are dynamic systems**, making biodiversity responses complex and varied.

Alternative Metrics for Biodiversity:

- SST and sea water chlorophyll a concentration are also **key factors influencing biodiversity metrics.**
- Exploring these additional metrics could help refine our understanding of reef health and dynamics.

Conclusion

Future Directions

Further finetuning of habitat heterogeneity metrics is needed to **better identify and monitor adaptive reefs.**

Identifying more consistent **predictors of reef resilience** is crucial for long-term conservation.

Conservation & Management Implications

Findings highlight the importance of **considering habitat heterogeneity** when **designing reef conservation strategies in Indonesia.**

Policy makers and stakeholders should **focus on identifying and protecting adaptive reefs** for future management efforts.

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THANK YOU

Ngā mihi nui!

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