

Implications of Coral Reef Degradation for Fisheries

Mark Hamilton

Supervisors: Prof Nick Graham, Prof Christina Hicks, Associate Prof Aaron MacNeil

Background

Tropical coral reefs are diverse marine ecosystems that provide humans with a wide range of benefits, including fisheries, coastal protection and tourism. The degradation of reefs is a global issue, caused primarily by the effects of climate change (e.g. rising sea temperatures causing coral bleaching events). As reef habitats are degraded, the services they provide to people are also negatively affected.

My research focuses on how various aspects of small-scale fisheries, such as:

- 1) Fisheries productivity
- 2) Catches
- 3) Fishing patterns
- 4) Fishing communities

are affected by coral reef degradation

Summary

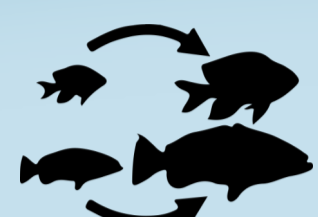
My project will use a range of approaches to investigate the multiple impacts coral reef degradation has on small-scale tropical fisheries, including:

- 1) The productivity of fish assemblages and the implications for associated fisheries
- 2) How changes in fish assemblages translate to changes in fishers' catches
- 3) How ecosystem changes alter where, when and how fishing activity occurs
- 4) How changing ecosystems and associated fisheries influence local communities' relationships with reefs.

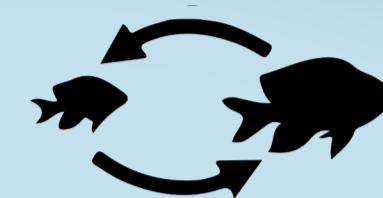
As coral reef degradation is expected to increase as climate change progresses, it is important to gain a better understanding of how fisheries are impacted, which has implications for food security, coastal livelihoods and ecosystem health.



Biomass: the total weight of fish on a reef at a given point in time.



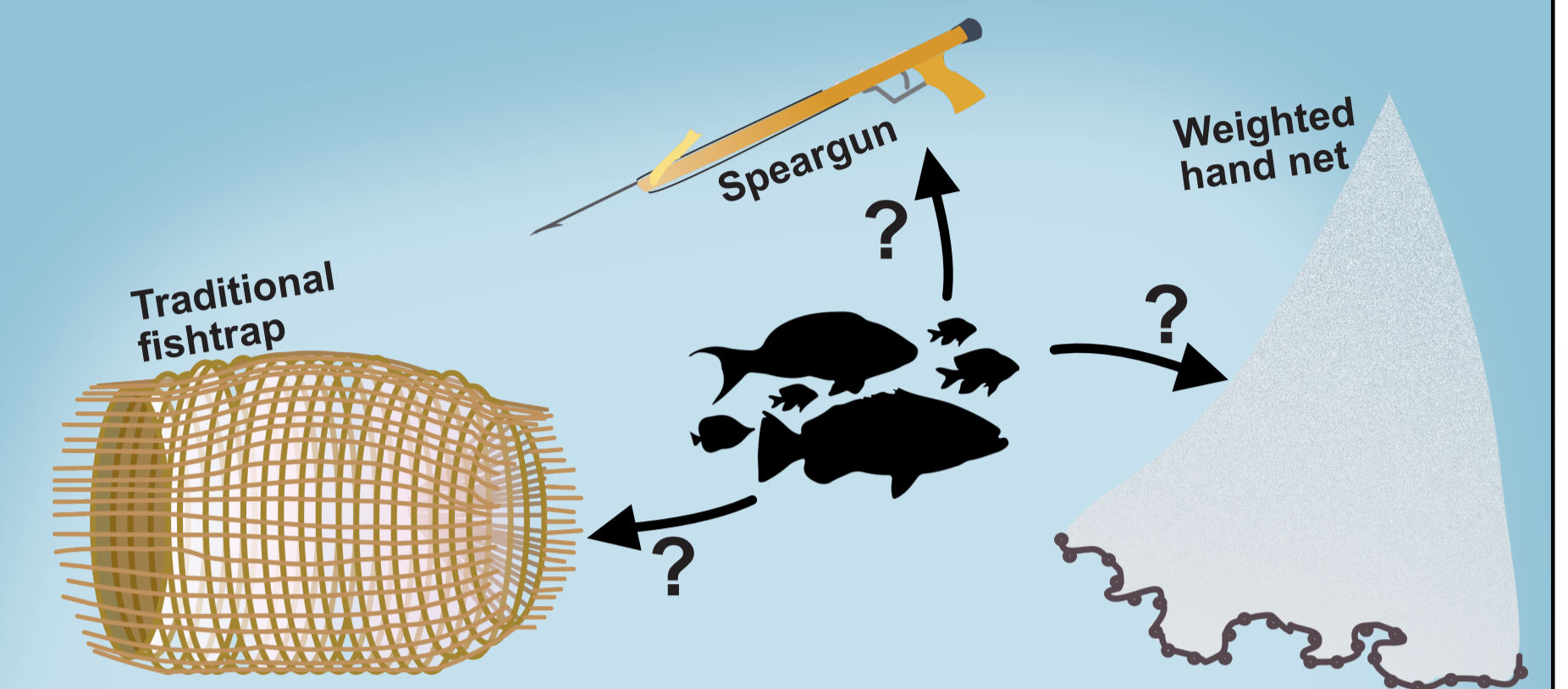
Productivity: the rate at which biomass is produced over time.



Turnover: the rate fish move through the system, i.e. recruitment to reefs vs. removal of fish from reefs.

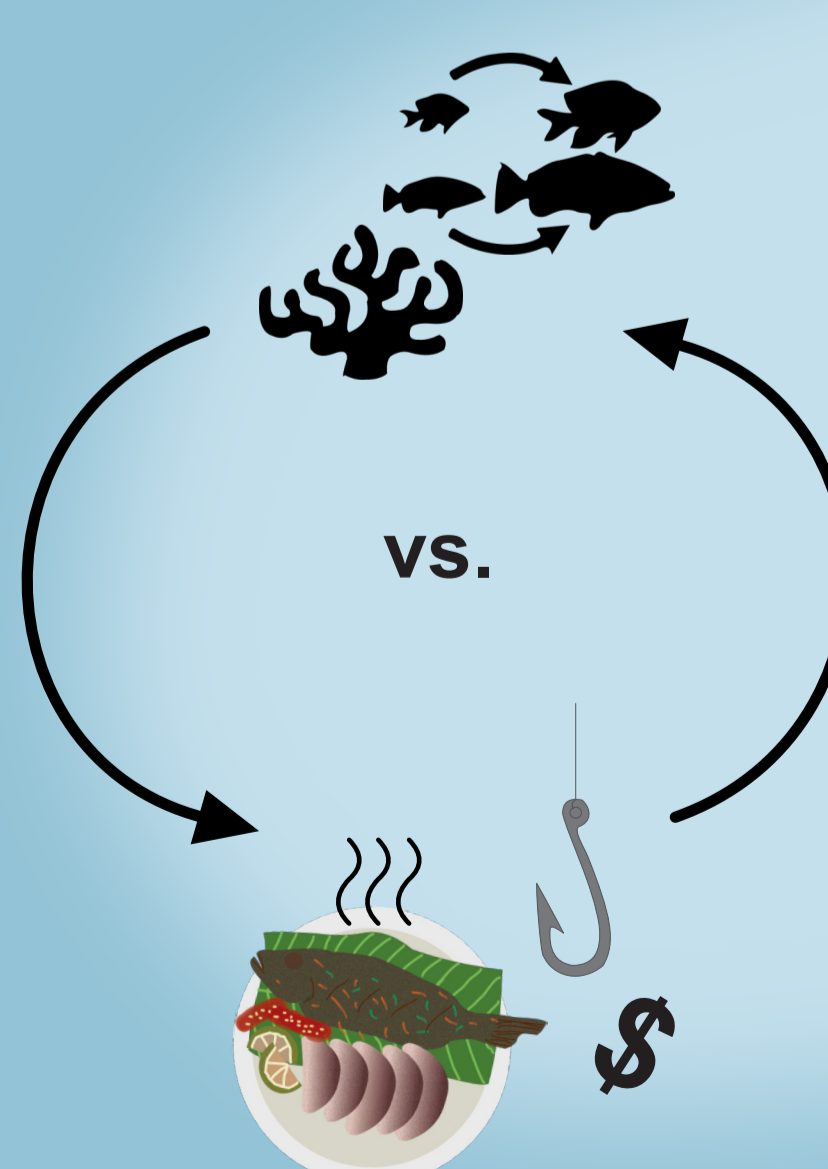
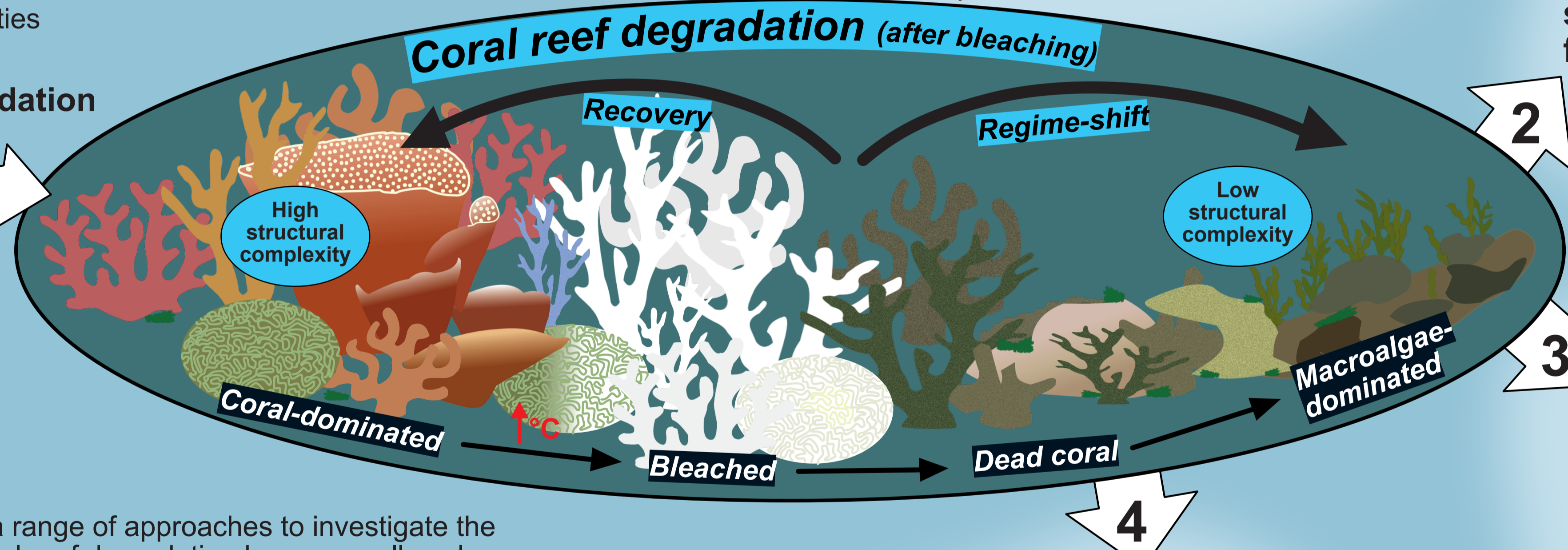
How are fish growth metrics affected by reef degradation?

- I will be looking at how biomass, productivity (growth rates) and turnover differ between fish on recovering reefs and regime-shifted reefs using reef survey data from the Seychelles.
- How will reef degradation affect these metrics for fish species commonly targeted by local fisheries?



How does reef degradation influence catches in small-scale fisheries?

- By analysing catch data from small-scale fisheries, I will investigate how fishing yields differ from reefs with varying levels of degradation.
- Specifically, I will focus on how factors such as catch per unit effort (CPUE; e.g. kg per fishtrap) and catch composition (which species and what sizes) vary with reef degradation, and how variable trends are across different types of fishing gear (e.g. fish traps, nets, spearguns).



How are relationships between reefs and fishing communities affected by reef degradation?

- I aim to compare ecological information on reef condition and fish populations to social information on lifestyle choices and livelihoods within fishing communities to produce an assessment of how reef degradation has influenced the dynamics between coral reef ecosystems and fish harvesting and consumption.
- How does reef degradation affect local diets? And have changes in local diet preferences or fishing practices influenced how sustainably certain species are harvested?

Have fishers' use of fishing grounds changed in response to reef degradation?

- Working with local reef fishers, I aim to gather information regarding how fishing activity has been affected by reef degradation.
- By conducting fishing ground mapping activities and interviews with local fishers, I hope to find out if reef degradation has caused spatial and temporal changes in fishing activity.
- Do fishers travel further to reach healthier areas of reef habitat? Or different habitats altogether, such as seagrass beds or mangroves? Have changes in fish species on different fishing grounds caused fishers to change the types of fishing gear they use?

