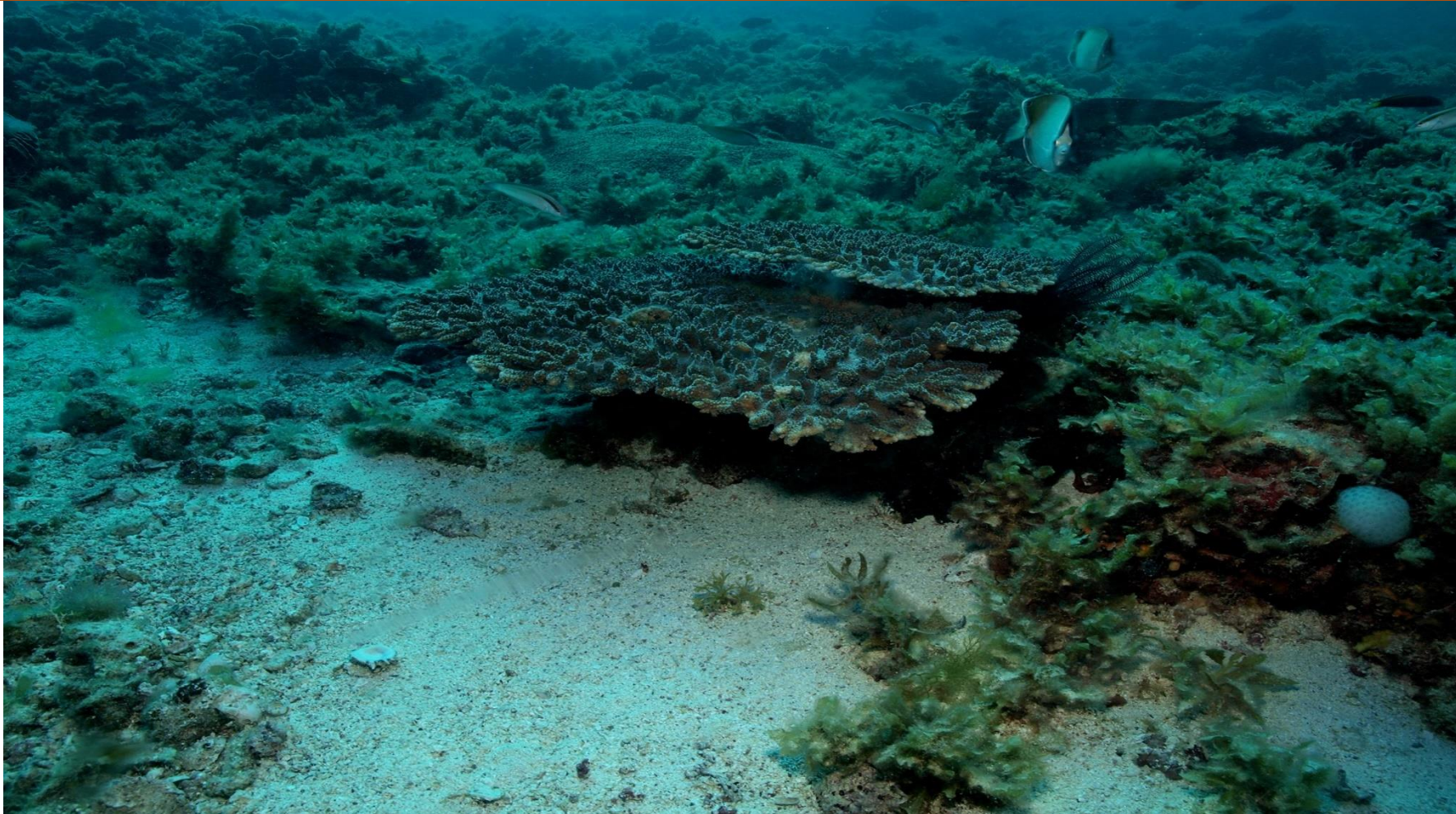


Habitat configurations shape trophic and energetic dynamics of reef fishes in a tropical-temperate transition zone: implications under a warming future



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MARINE
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Temperate reefs are being rapidly transformed by Anthropogenic climate change

Kelp forests (e.g. *Ecklonia radiata*)



Temperate reefs are being rapidly transformed by Anthropogenic climate change

Sargassum spp. beds



Temperate reefs are being rapidly transformed by Anthropogenic climate change

Reef-building corals (e.g. *Acropora* spp.)

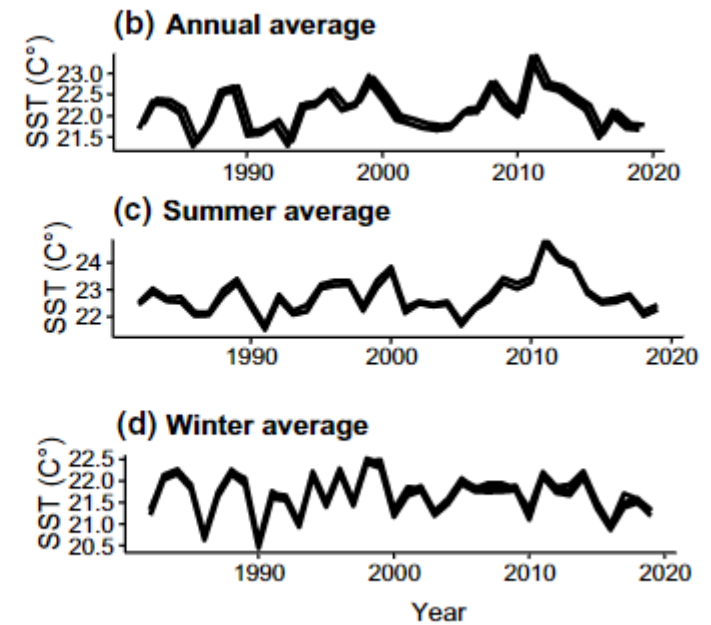
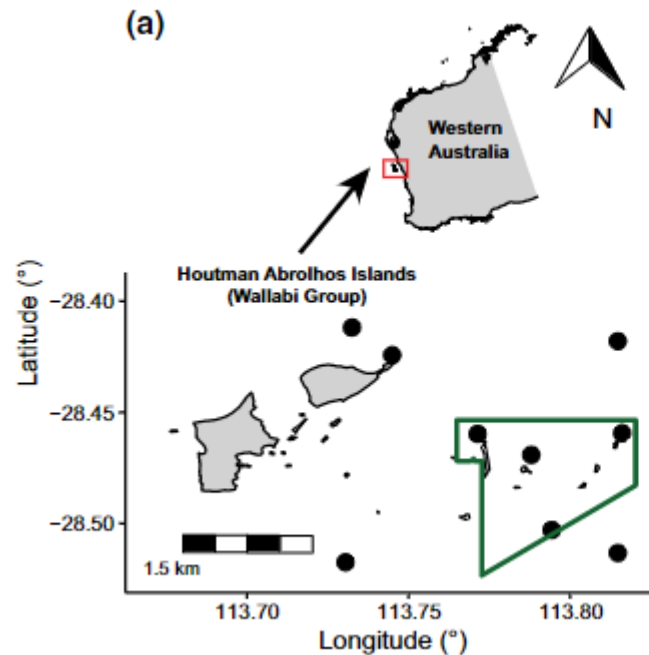
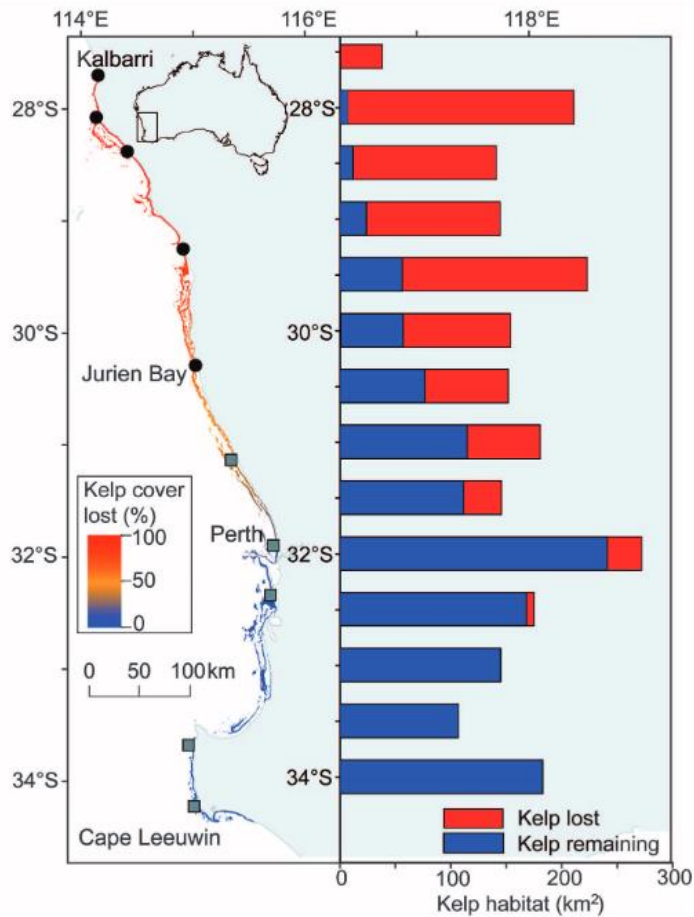


Temperate reefs are being rapidly transformed by Anthropogenic climate change

Turfs



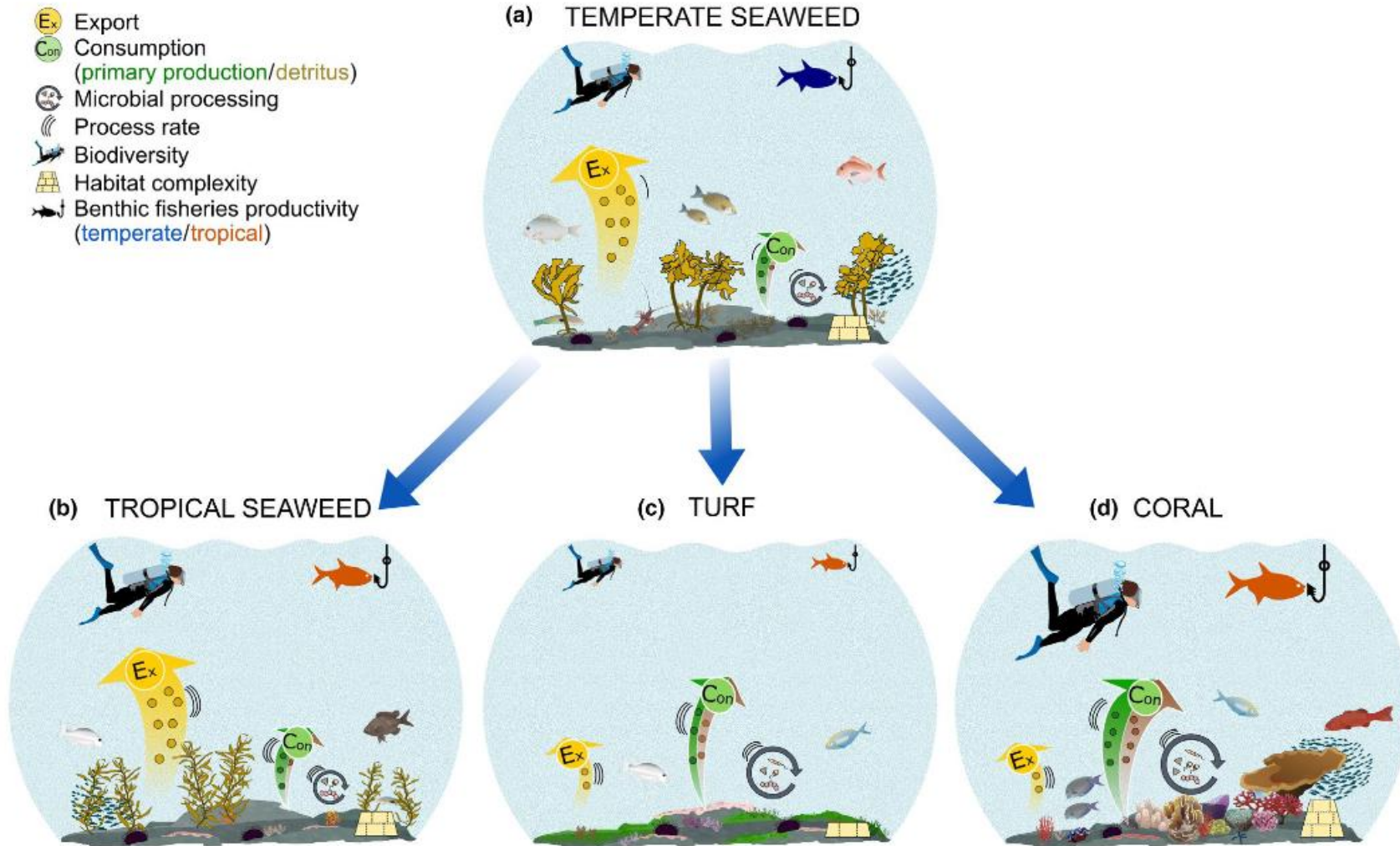
Biogeographic transition zones are at the forefront and can provide insights on ecological changes occurring over longer timescales



Bosch et al. 2022. *Oecologia*

Wernberg et al. 2016. *Science*

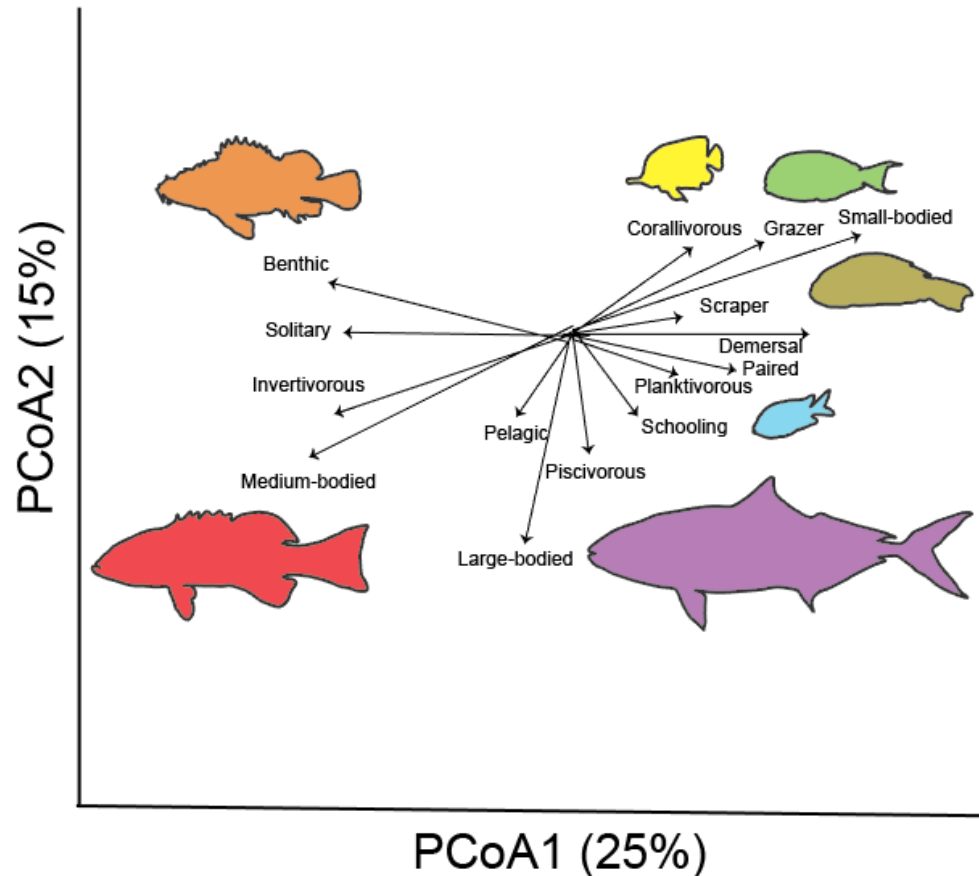
New management and conservation paradigm: ecological functions



Vergés et al. 2016. *Functional Ecology*

New management and conservation paradigm: ecological functions

Ecological functions are largely driven by the traits of species rather than their taxonomic identity



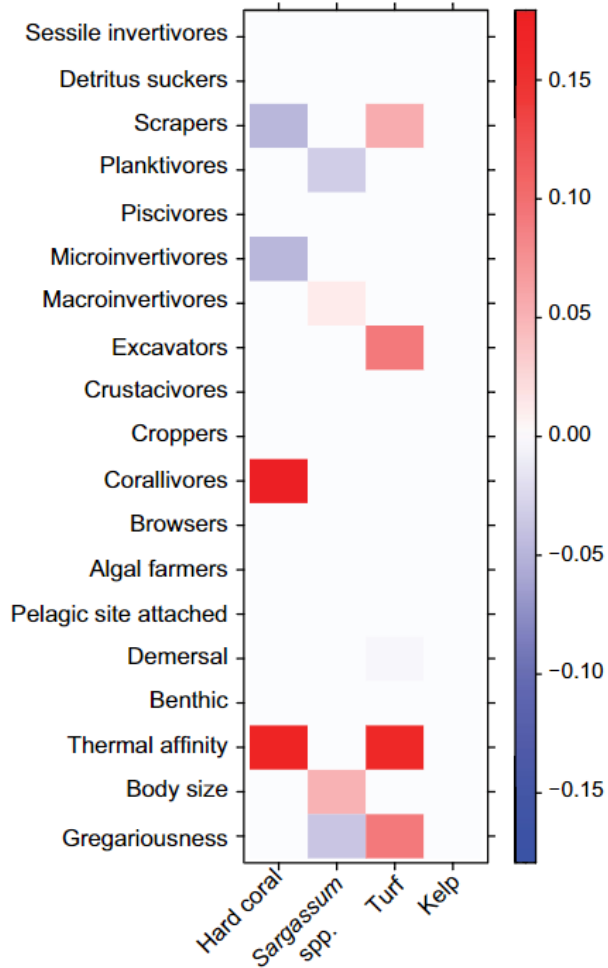
- Body size
- Gregariousness
- Water column position
- Thermal affinity
- Trophic guild

Q1: Do different habitat configurations select species with particular traits

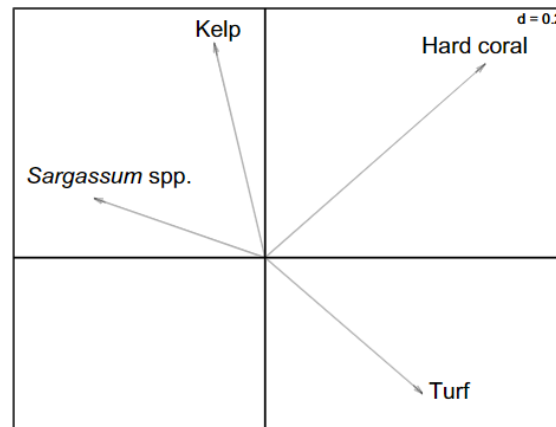
Fourth-corner problem

Model-based (GLMs)

(a)

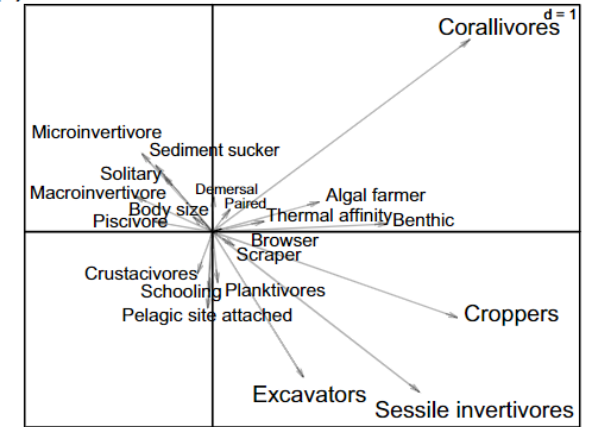


(b)

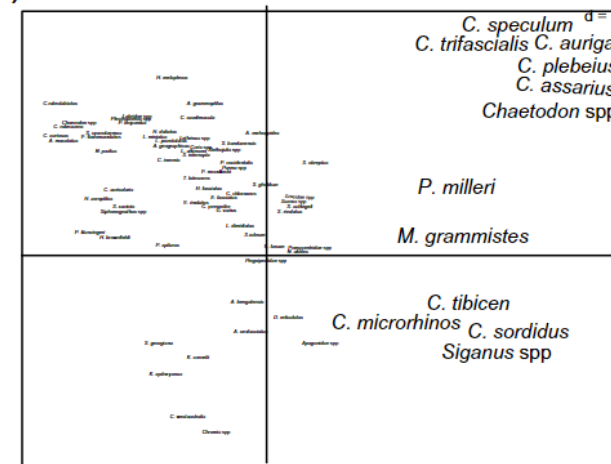


RLQ

(c)

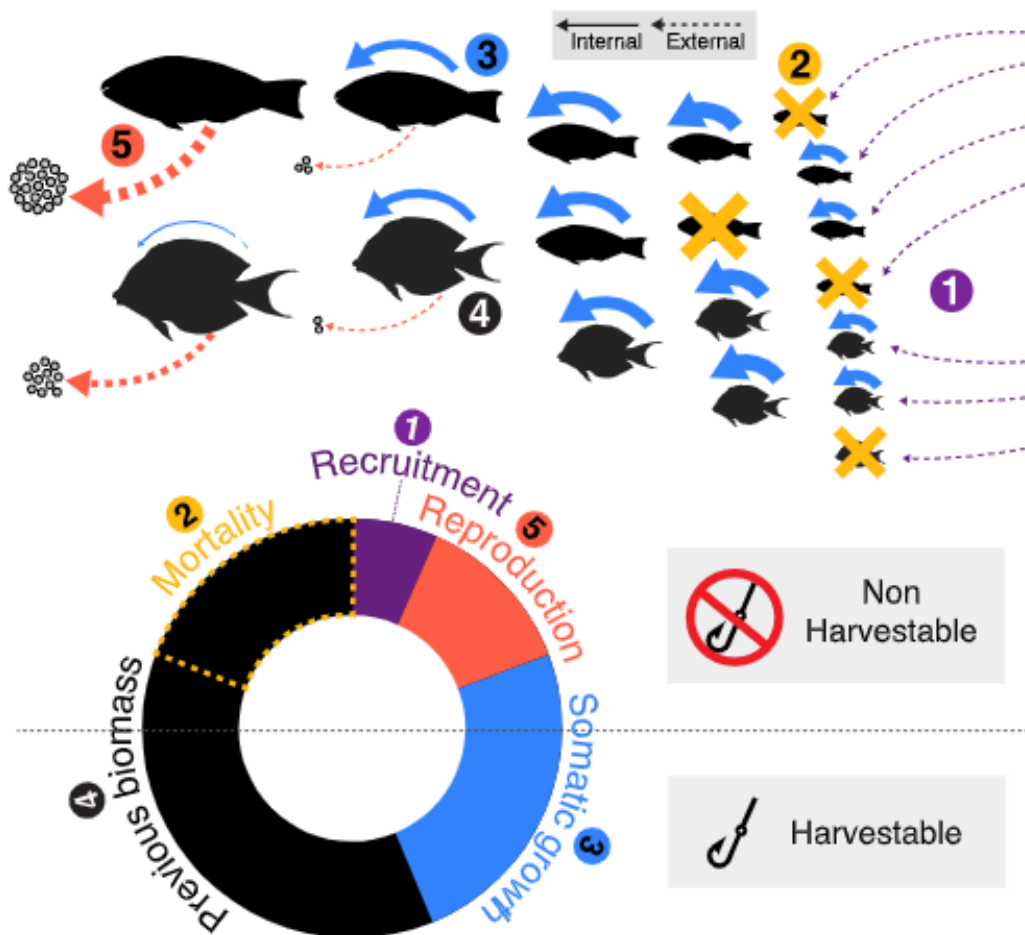


(d)



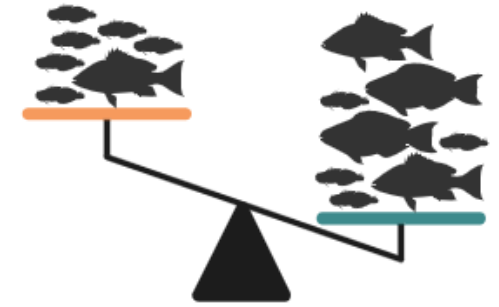
Q2: What are the implications for trophic and energetic dynamics?

Community-level processes

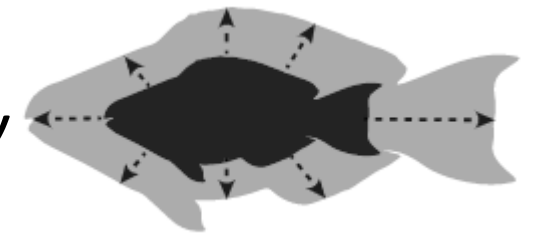


Morais & Bellwood 2020. *Coral Reefs*

Biomass



Productivity



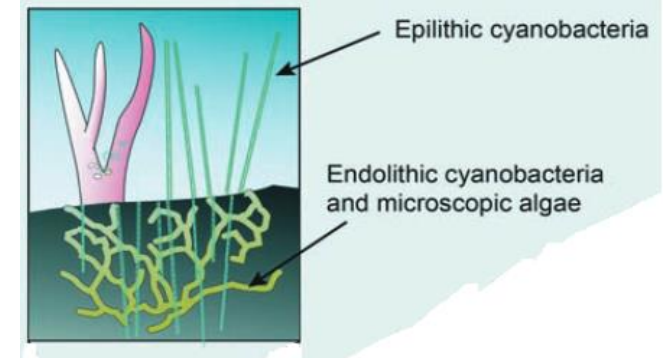
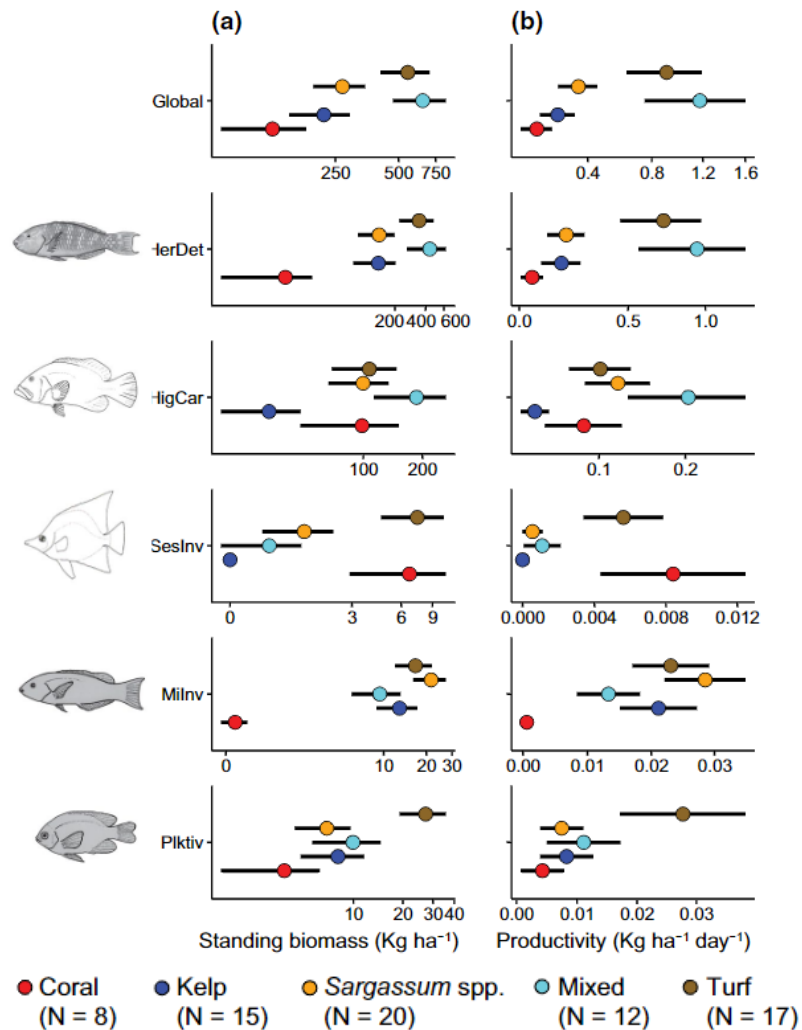
Turnover



Morais et al. 2020. *Functional Ecology*

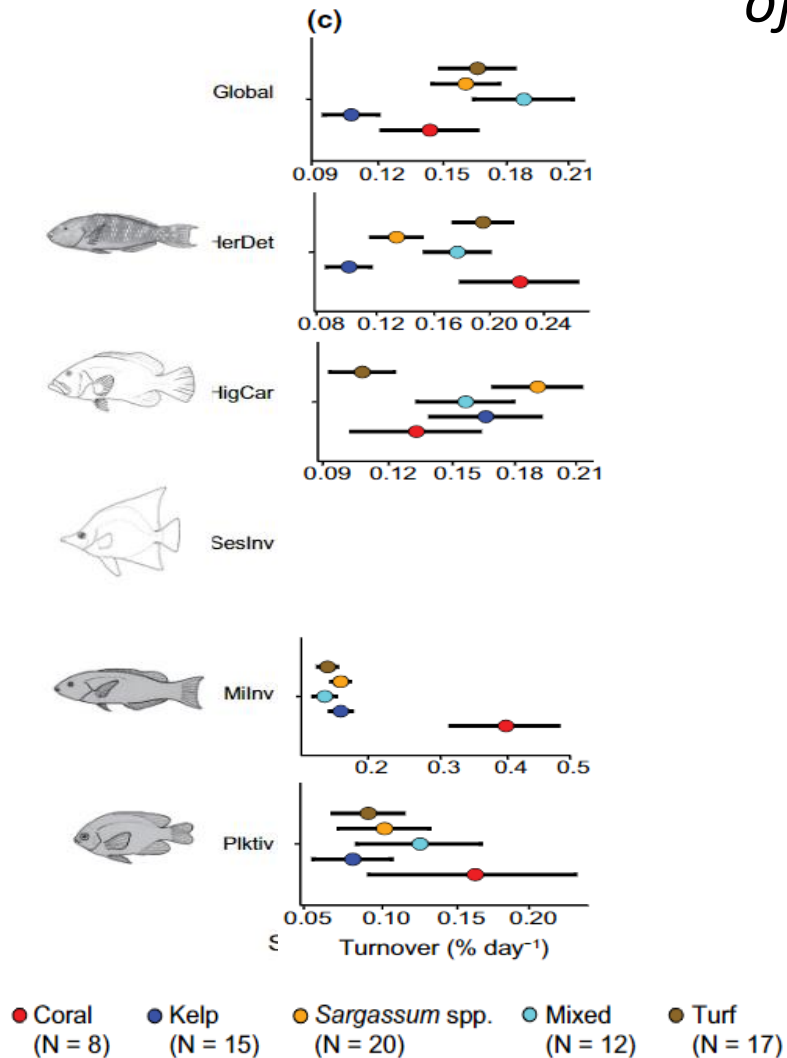
Q2: What are the implications for trophic and energetic dynamics?

Biomass and productivity were highest in turf and mixed habitats. Patterns were contingent in trophic guild, largely driven by very high productivity of scraping herbivores (parrotfishes, 0.56 kg ha⁻¹ day⁻¹)



Q2: What are the implications for trophic and energetic dynamics?

Turnover was generally decoupled, particularly for microinvertevorous fishes that act as conduit of energy to higher trophic levels

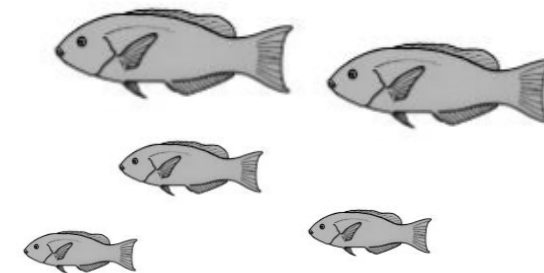


Complexity

Storage



Replacement



Complexity

Conclusions – Take home messages

- *Habitat reconfigurations are projected to cause predictable shifts in the trait composition of local fish communities*
- *Affect rates of fish biomass production and replenishment, but not equally across consumers relying on different trophic resources*
- *Implications for long-term maintenance of ecological processes and fisheries yields*

Acknowledgements



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