IBD2@25

ENHANCING CORAL REEF BIODIVERSITY THROUGH NOVEL RESTORATION TECHNIQUES FOR NATURE POSITIVE TOURISM IN THAILAND



BCE

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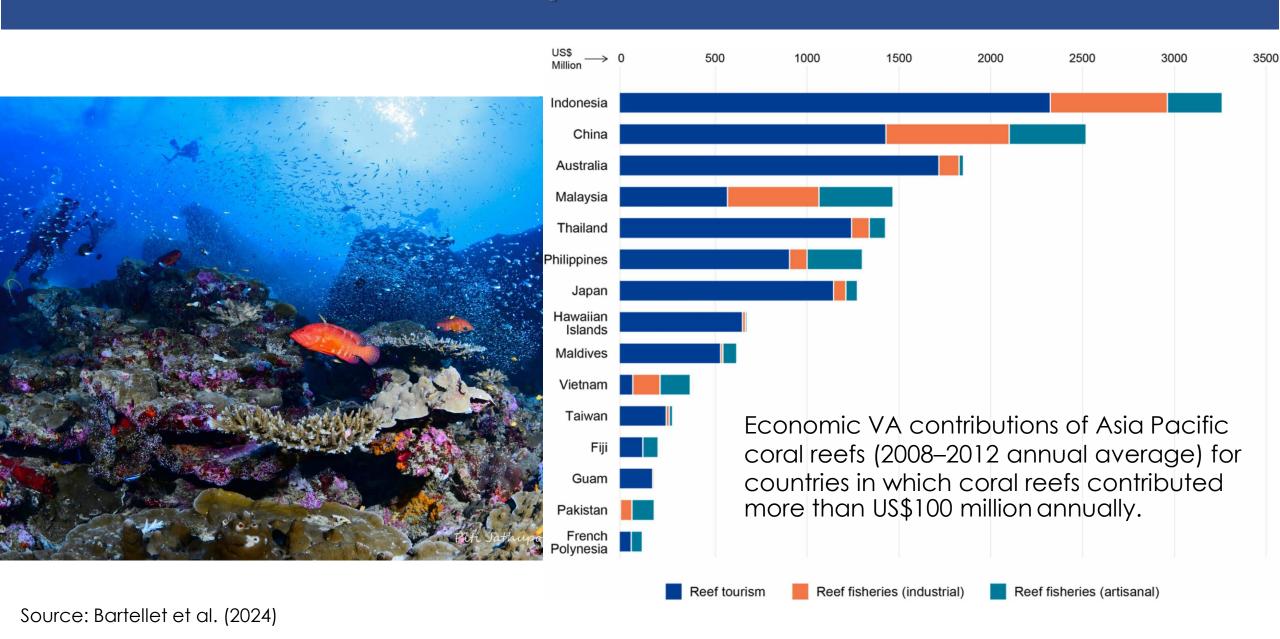
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OUTLINE

- Coral reefs as a marine tourism asset
- Threats to coral reefs
- Coral reef restoration
- Micro fragmentation technique
- Bridging restoration activities to nature-positive tourism

Coral reefs as an important marine tourism asset

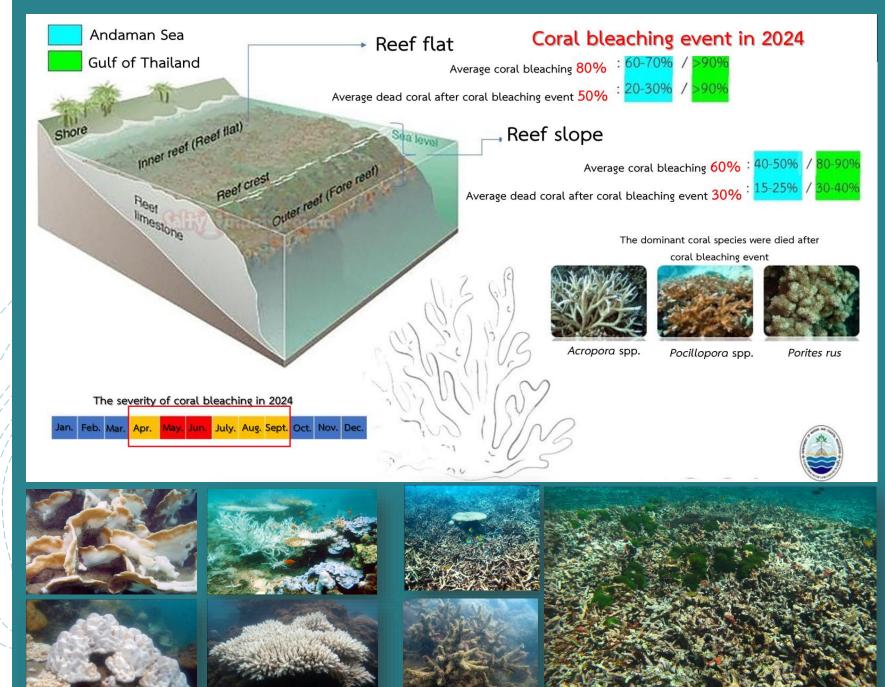




Reefs in climate change era





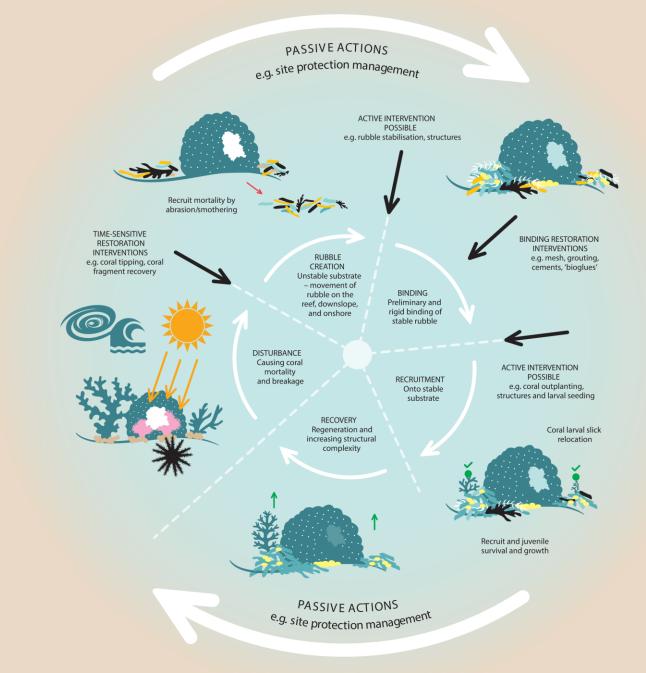


(DMCR, 2024; Filho, 2023; Suttacheep et al., 2013)

Coral reef restoration

Hughes, et al. (2023) recommend combining two key concepts that can provide important insights into the dynamics and feasibility of restoration

- Principles of ecological succession
- Responses and resilience of ecological systems to anthropogenic pressures.



Coral reef restoration in Thailand





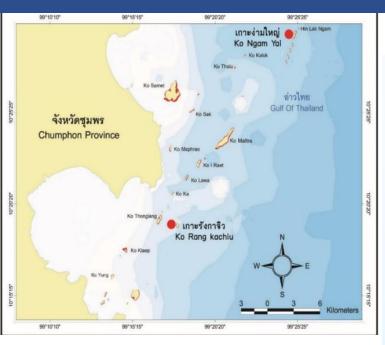


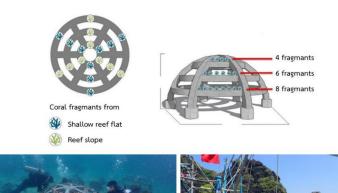


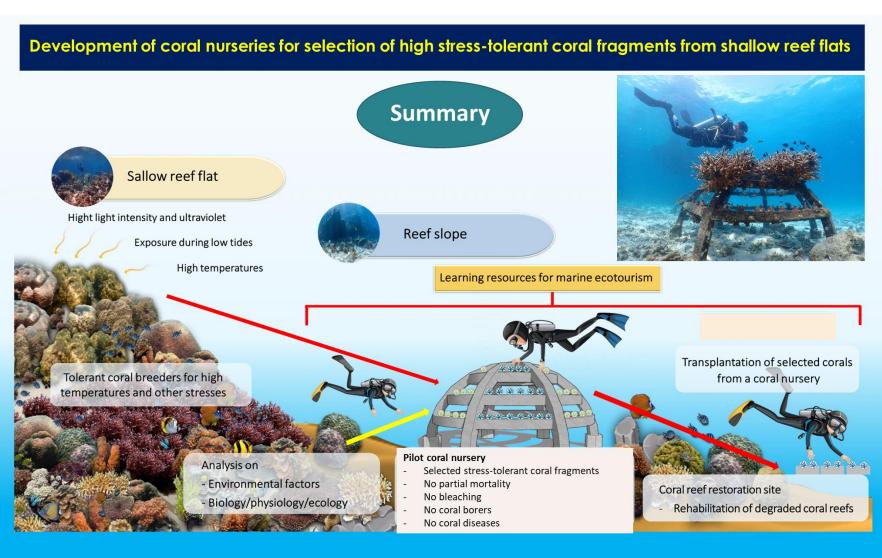
The methods used in Thailand during the last decade:

- coral transplantation and translocation
- reattachment of coral fragments and the provision of artificial substrata for natural recruitment.
- Larval supply, settlement and recruitment of planulae.
- Regeneration of damaged corals, fragmentation, and consolidation of substrata

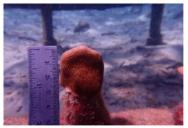
Coral reef restoration in combatting climate change







Monitoring the growth rates of coral fragments in the nursery plots



after 2 months



after 6 months Porites lutea



after 1 year



after 2 months



after 6 months Pocillopora acuta







after 6 months Dipsastraea favus



after 1 year

- Coral fragments in the shallow reef flat exhibited higher growth rate than in the reef slope.
- No bleaching of coral fragments was found.
- No disease was found in coral fragments
- Partial mortality of coral tissue with only a few fragments









after 2 months

Coral micro-fragmentation

A technique used in coral reef restoration to accelerate the growth of coral colonies by cutting them into very small pieces (micro-fragments), enhancing rapid tissue growth, with fragments potentially growing 25 to 50 times faster than normal. These fragments can then be fused together, creating larger, more resilient colonies and speeding up reproduction and reef-building.



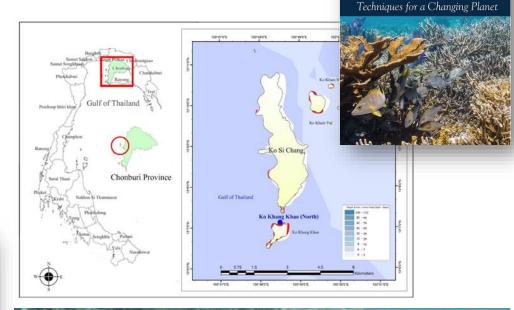




coral colony fusion

coral microfragmentation

This is the first coral reef restoration in Thailand (Ko Larn and Ko Khang Khaw) applying coral micro-fragmentation.

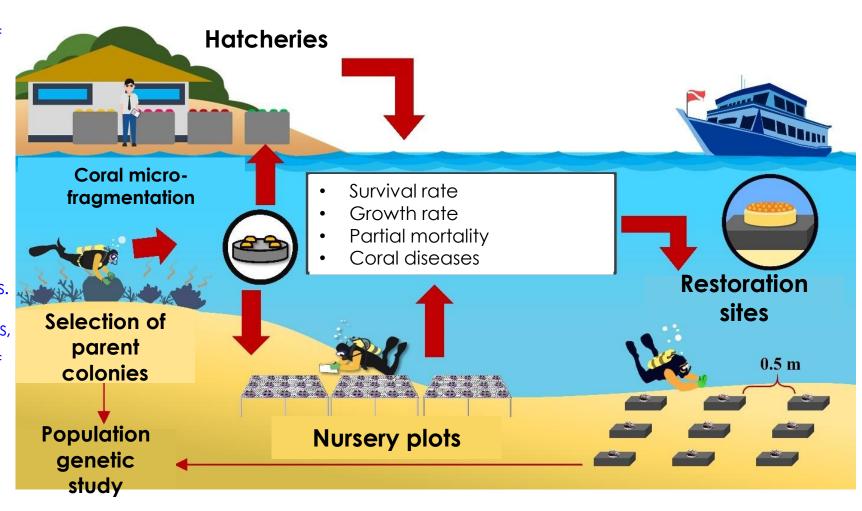




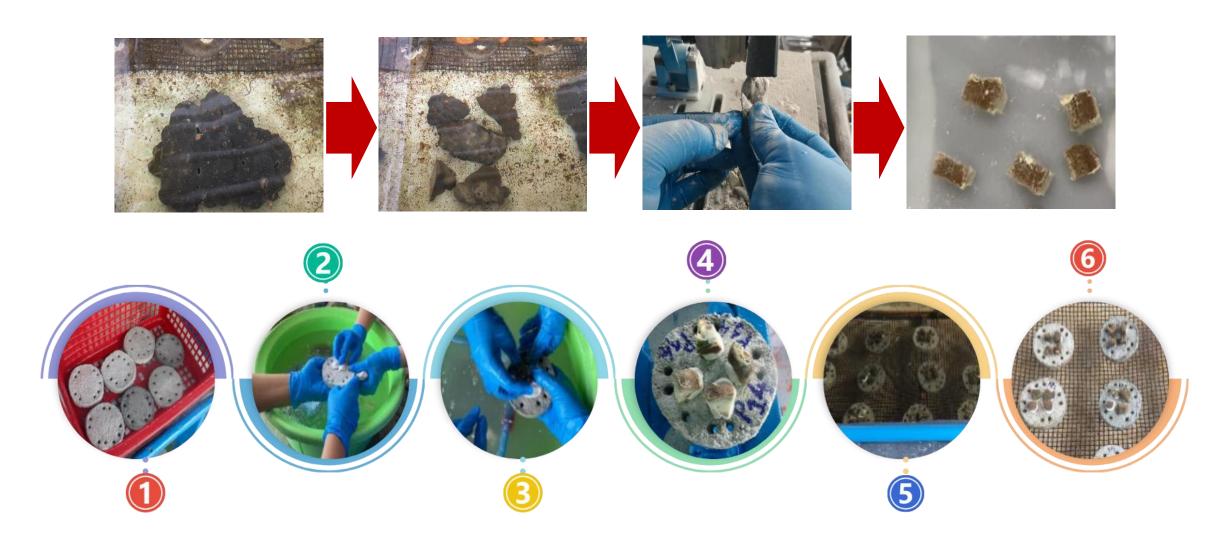
(Yeemin et al. 2024; Manager Online, 2024)

Coral micro-fragmentation

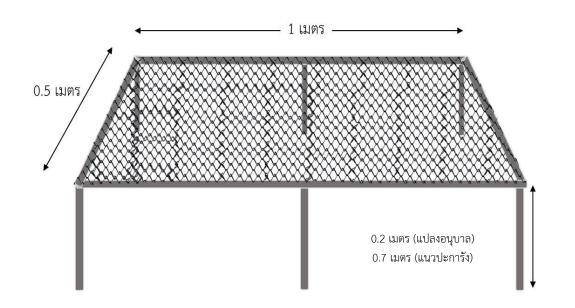
- Survey sources of coral broodstock, nursery plots in coral reefs, and coral reef restoration sites.
- Establish nursery plots in coral reefs and select coral species
- Create coral reef restoration areas using small coral fragments that have been selected and grown to form colonies in hatcheries and nursery plots in coral reefs.
- Study environmental factors in hatcheries, nursery plots in coral reefs, and coral reef restoration sites.
- Study the genetic diversity of coral populations in natural coral reefs and in coral reef restoration sites.



Coral micro-fragmentation Preparation of coral micro-fragments



Coral micro-fragmentation Hatcheries and nursery grounds







Hatchery 1 (Porites lutea) (Yeemin et al. 2024)



Hatchery 2 (Leptastrea purpurea)



Hatchery 3 (Galaxea fascicularis)



Hatchery 4 (Favites abdita)

Coral micro-fragmentation — Survival and Growth

Survival rate of coral micro fragments in hatcheries and nursery plots

> Survival rates:

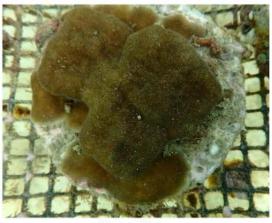
- Porites lutea >80%
- Favites abdita >94 %
- Galaxea fascicularis >84 %
- Leptastrea purpurea >96 %

> Growth rates:

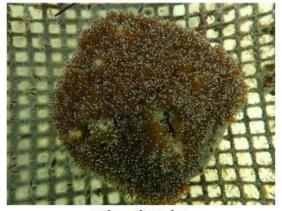
- ❖ 1 cm wide
- ❖ 2 cm wide
- ❖ 3 cm wide



- ❖ 0.78±0.27 cm²/month
- ❖ 0.52±0.39 cm²/month
- ❖ 0.48±0.24 cm²/month



Porites lutea



Galaxea fascicularis



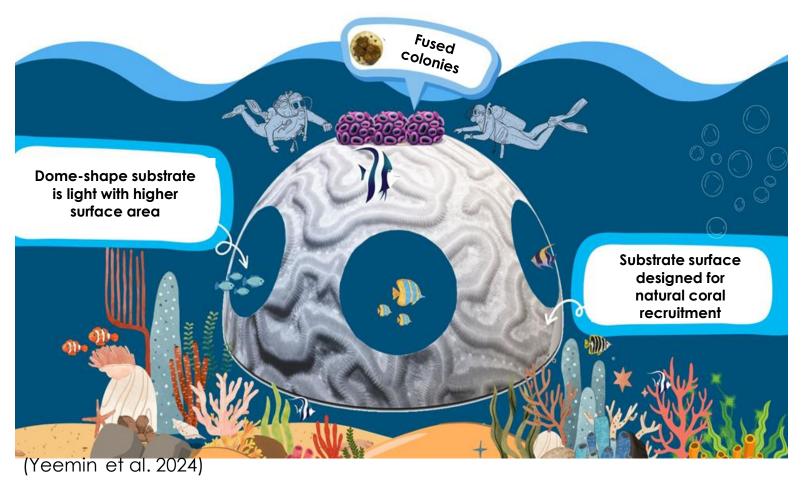
Favites abdita



Leptastrea purpurea

Coral micro-fragmentation- site restoration

Transplanting fused colonies to restoration sites – substrates designed to support BCG model











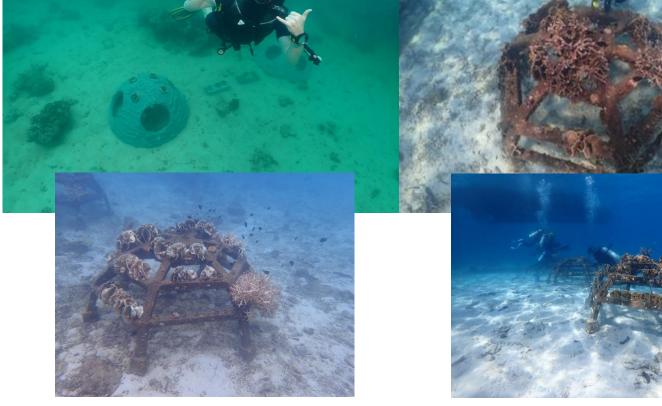
Coral restoration and nature-positive tourism









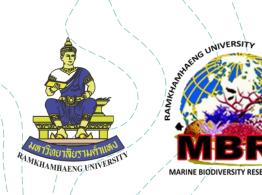


(Yeemin et al. 2024)

Summary

- The success of coral micro-fragmentation and coral fragment selection in Thailand underscores the potential for synergy between marine conservation and naturepositive tourism.
- Coral restoration contributes to biodiversity recovery and climate resilience, while tourism generates economic incentives and awareness to support ongoing conservation.







THANK YOU

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