

# Coral Reef Restoration: Viable Way to Respond to Coral Loss?

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Transplanting coral restoration method. Image from Pol Bosch

## Executive Summary

- Corals are threatened by human activity: pollution, ocean warming, ocean acidification, coral bleaching, climate change, nutrient runoff, habitat destruction, etc.
- We rely on resources from coral reefs: protection from storms, medical discoveries, economic value, ecological needs for fisheries, but could lose 70-90% of coral reefs by 2050.<sup>5</sup>
- Coral restoration is a form of re-building coral reefs by supplementing reefs with more corals and/or more resilient corals. It is likely to be most effective when combined with climate change mitigation efforts.



## What are Corals?

Corals are unique animals related to jellyfish & anemones. They are made up of colonies of individual polyps. They have a symbiotic relationship with photosynthetic algae which live in their tissues and provide food to the coral.

**Act Now:** Corals are rapidly declining, the IPCC projects we could lose 70-90% of tropical corals by 2050.<sup>5</sup>

## Importance of Corals

### Social

- Reefs act as a **speed bump** to protect coastal communities from storms and intense weather.
- Contain chemicals potentially useful in drugs & **medicines**.

### Economic

- Support livelihoods via employment from tourism and fishing.
- Reefs support economically valuable species i.e. fisheries. (**\$200M commercial value**)<sup>1</sup>

### Ecological

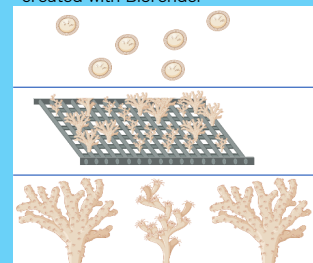
- Reefs are a nursery for growing fish and invertebrates.
- Corals support **¼** of all marine species.<sup>1</sup>

## What is Coral Restoration?

Active methods to assist recovery of degraded coral reef ecosystems to improve reef habitats and maintain ecosystem function<sup>2</sup>

- Larval Enhancement:** baby coral are grown until they are mature enough to attach to the reef.
- Coral Gardening & Micro-fragmentation:** small fragments of corals are reared in a nursery then brought to a reef.
- Transplantation:** directly attaching corals to a reef.

Image of each restoration technique created with Biorender



## Protective vs. Reactive Measures for Coral Conservation

Protective (before damage)	Reactive (after damage)
<ul style="list-style-type: none"> <li>• Limitation of anthropogenic/climate change pressures: CO<sub>2</sub> emissions, pollution, habitat destruction.</li> <li>• Fisheries management measures.</li> <li>• Marine Protected Areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Coral transplantation.</li> <li>• Coral gardening.</li> <li>• Increasing coral resilience through genetic enhancement of heat tolerance.</li> </ul>



### How do we measure effectiveness of restoration?

- Restored ecosystems are considered restored once they contain enough biotic & abiotic resources to survive with no assistance after restorative activities.<sup>2</sup>
- **Metric:** monitoring how much live coral tissue is present in each colony of coral as a percentage. If the area scores above a mean of 80% live tissue per coral, this region receives a passing score.<sup>3</sup>
- Restoration can encourage community involvement providing social benefits.

### Recommendations

- Mitigate anthropogenic pressures by establishing policies to reduce CO<sub>2</sub> emissions, enhance renewable energy, and reduce nutrient runoff to limit overall coral damage.
- Integrate the importance of climate change in reef restoration efforts.
- Encourage individuals to support restoration & coral protection via social media. Collaborate with stakeholders to increase community engagement involving coral restoration programs.
- Integrate data from various restoration sites to get a fuller picture of how well restoration is working!

### Conclusions

Example: restoration program in Indonesia<sup>4</sup>

Pros	Cons
<ul style="list-style-type: none"> <li>• Higher coral density.</li> <li>• More coral diversity.</li> <li>• Supported higher diversity of fish species.</li> </ul>	<ul style="list-style-type: none"> <li>• Water temperature increased and killed almost the whole reef after restoration.</li> </ul>

#### 1. Protect

- Proactive actions like marine protected areas, fisheries management and reducing anthropogenic/climate change pressures should be top priority to mitigate coral declines.

#### 2. Restore

- Restoration activities have benefits, but do not replace the need for climate change action.<sup>2</sup>
- Boosting coral resilience via genetically enhancing heat tolerance may be beneficial on a smaller scale but is more difficult to match the large scale of climate change.<sup>2</sup>



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# Contacts

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