

# SeKarang! Save the Coral Reef!

Coral reefs in Indonesia are being destroyed by various human activities. In this pamphlet three reasons for degradation will be examined. Following each reason, a design prototype will look at different ways Indonesians can combat these destructive activities to protect their environment and live more sustainably.

Coral Reefs +  
Destructive Fishing +  
Sedimentation and Pollution +  
Overfishing +

## Coral Facts: Why are Coral Reefs Valuable?

- +Serve as shelter for tens of thousands of non-fish species.
- +Protect an estimated 15% of all beaches and coastlines from storms and erosion by reducing the action of ocean waves.
- +Contain many new or still unexplored materials that may represent medical breakthroughs and are currently a source for many pharmaceutical compounds.
- +Are made of polyps that remove carbon dioxide from the atmosphere as part of the carbon cycle.
- +Serve as tourist attractions and building materials in many parts of the world.

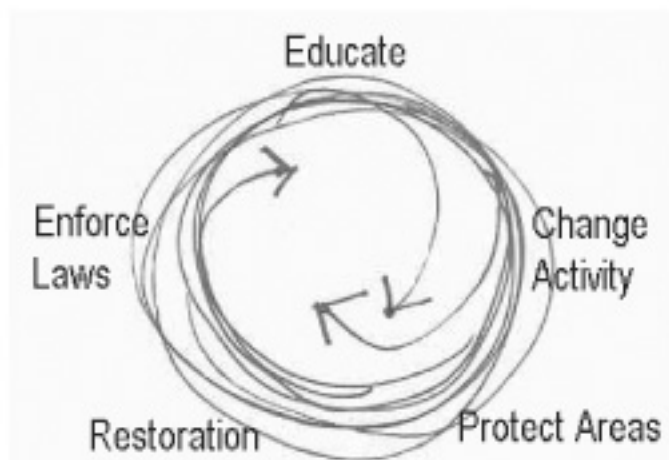


Diagram showing the action and process needed to make a change.



## Coral Reefs in Indonesia:

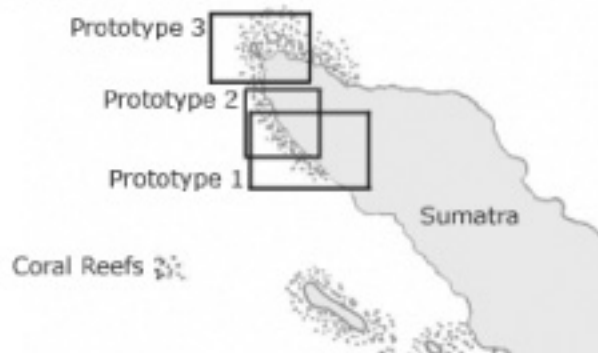
Indonesia has a vast array of coral reefs, many completely unknown. Several human activities are destroying these coral reefs. Stresses can be chronic, such as routine discharge of sewage, frequent sedimentation, and long-term overfishing at unsustainable levels. They can also be acute, as in the case of blast fishing or a month of unusually warm water temperatures.

## Prototype:

Three different problems that cause damage to coral reefs are presented. Each problem has a designed prototype to resolve the problem. Using "At Risk Maps" of coral reefs in Indonesia, I located a site where each problem likely occurs. The following prototypes in the pamphlet are: Pollution and Sedimentation, Destructive Fishing, and Over Fishing.

Blast fishing, in particular, is having an extremely detrimental effect across the country. Although illegal since 1985, few places have escaped it, even in protected areas.

## Threatened Coral Reefs

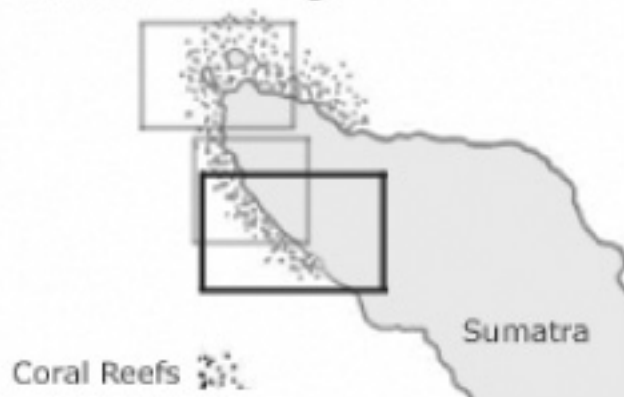


Location of prototypes.

# SeKarang! Save the Coral Reef!

## Prototype 1:

### Coral Reefs Threatened by Destructive Fishing



### Ways to effectively protect coral reefs from destructive fishing:

1. Educate the locals and fisherman about the importance of healthy reefs.
2. Establish Marine Protected Areas (MPAs).
3. Promotion of more sustainable fishing practices.
4. Involving the community and park rangers can create a necessary sense of responsibility for managing and protecting their coral reef resources.
5. Promotion of other incomes such as raising seaweed and/or ecotourism such as dolphin or scuba tours.
6. Establish and enforce laws regarding blast fishing, cyanide fishing, fishing permits, ect.
7. Employ villagers to be reef watchers.
8. Install artificial reefs where blast fishing has destroyed reef beyond repair.

### Reefs Threatened by Destructive Fishing:

Poverty is a big issue in coastal areas. This is mainly because their work is highly dependent on the seasons, unlike that of inland people who can work throughout the year. In addition to economic purposes, the destructive practices are also due to lack of knowledge and information. However, some people understand their activities have negative impacts on the surrounding environment, but they ignore the damage they cause and continue to use unsound practices.

### What Can Locals Do?

- + Help make, install, and monitor artificial reefs systems.
- + Find other incomes than destructive fishing such as raising seaweed and/or ecotourism such as dolphin or scuba tours.
- + Turn in destructive fishing offenders.

**EcoReef:** Ceramic "snowflakes," designed to mimic a branching coral thicket. In time, biological reef will replace the ceramic structure, leaving minimal lasting evidence of human intervention.

**Reef Balls:** Are made of a special, marine friendly concrete and are designed to mimic natural reef systems. Reef Balls are made in many sizes to best match the natural reef type which is being mimicked.

**BioRock:** Uses electricity to grow limestone rock on artificial reef frames and increase growth rates of corals and other reef organisms.

For more info:

EcoReef: [www.ecoreefs.com](http://www.ecoreefs.com)

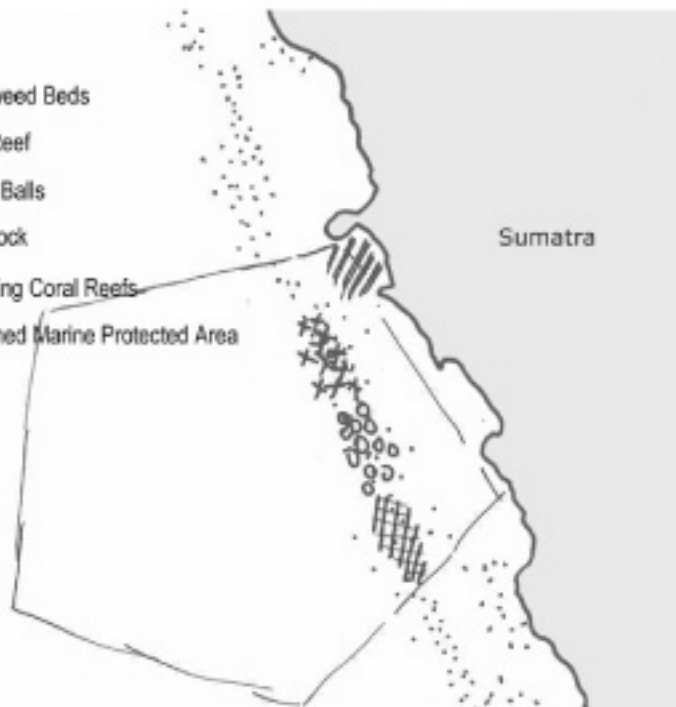
Reef Ball: [www.reefball.org](http://www.reefball.org)

BioRock: [www.globalcoral.org](http://www.globalcoral.org)

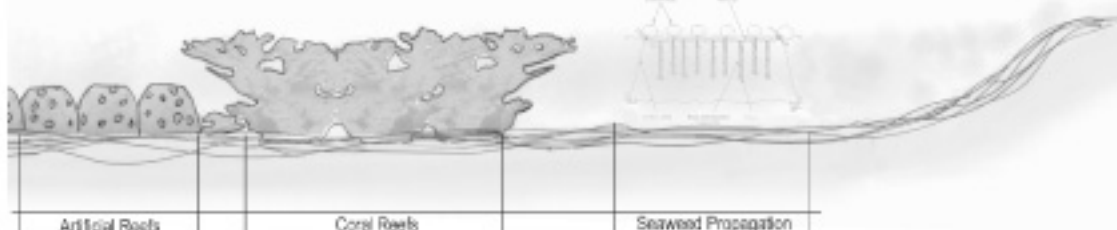


### Zones:

- Seaweed Beds
- EcoReef
- Reef Balls
- BioRock
- Existing Coral Reefs
- Planned Marine Protected Area



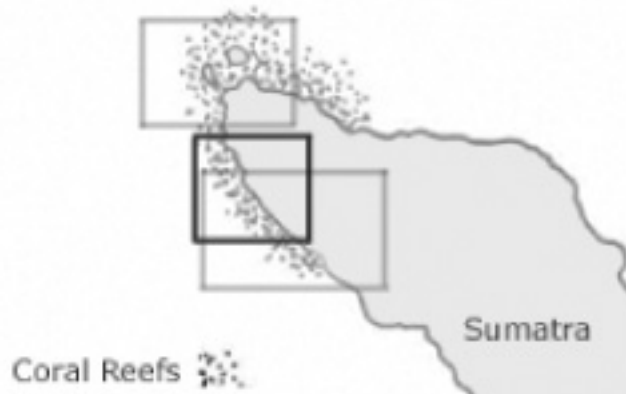
### Typical Section



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## Prototype 2:

### Coral Reefs Threatened by Sedimentation and Pollution



### Ways to effectively protect coral reefs from sedimentation and pollution:

1. Proper disposal of sewage and storm water. Construction and maintenance of waste water treatment plants to ensure that they are not overloaded, malfunctioning, or have outfalls that are incorrectly positioned.
2. Establish Marine Protected Areas (MPAs).
3. Promotion of more sustainable land use practices, land development and agricultural practices.
4. Educate public.
5. Establish laws or regulations regarding development permits, fishing permits, factory emissions, ect.
6. Establish buffer vegetation on land such as mangrove forest and seagrass beds.

financial

### Reefs Threatened by Sedimentation and Pollution:

Sedimentation and pollution from land-based sources is causing widespread degradation of coral reefs. Increased nutrients in coastal waters from agricultural fertilizers, forest burning and sewage discharge increase algal growth and decrease water clarity. This impedes coral growth and, in some cases, causes algae to overgrow corals previously present. In addition, increased sedimentation from changes in land-use and from coastal development activities can adversely impact coral reefs through smothering of coral, screening out sunlight needed for photosynthesis, scouring of the coral by sand and other transported sediment, and decreasing the survival of juvenile coral due to lack of suitable substrata for colonization.

### What Can Locals Do?

- + Don't destroy existing native vegetation that decreases sedimentation and pollution.
- + Plant native vegetation, look around area to see what species grow successfully there.
- + Don't dump waste into or near ocean.

human

social



Seagrass

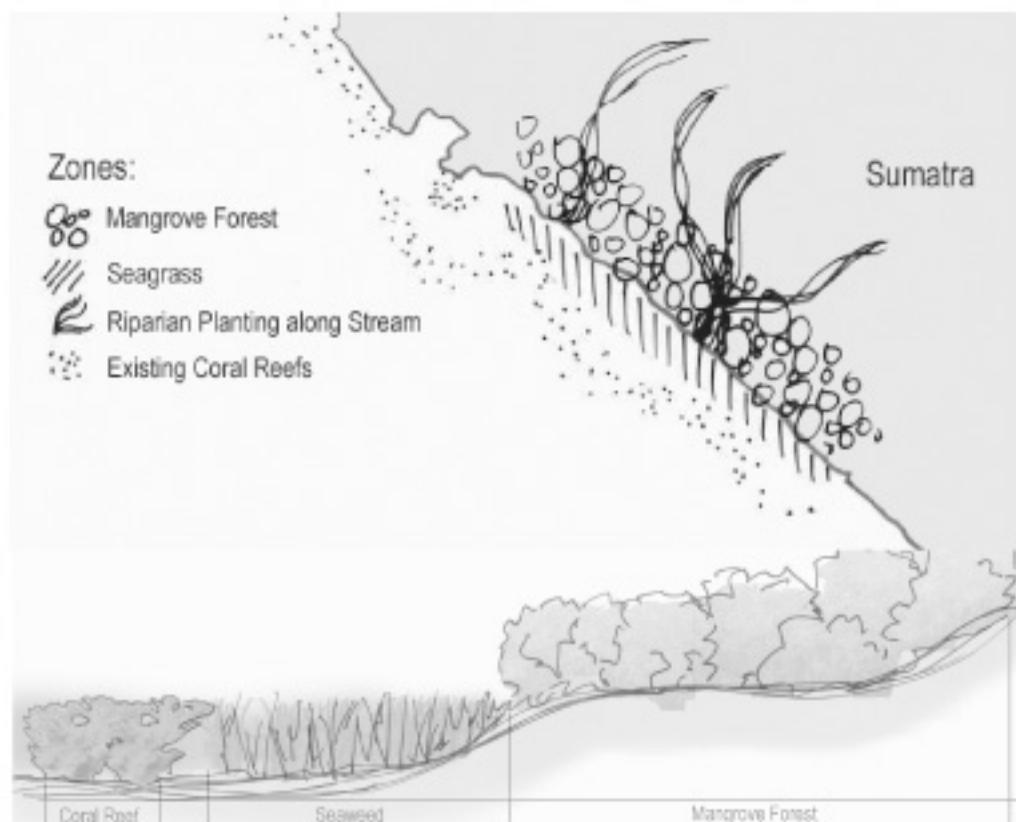


Mangrove Forest



Riparian Planting

Typical Section



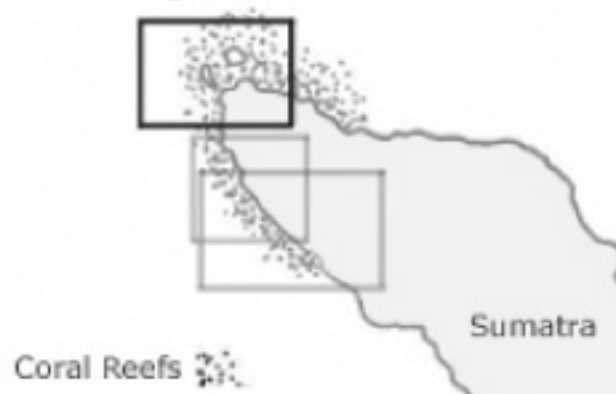
physical

natural

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## Prototype 3:

### Coral Reefs Threatened by Overfishing



### Reefs Threatened by Overfishing:

The demand in wealthy Southeast Asian countries and other nations around the world for marine aquarium fish, live reef food fish, pelagics, and bottomfish has further fueled region wide exploitation of certain species. Overfishing is a complex problem with varied impacts on coastal communities, the economy, and coastal ecosystems. If effectively managed, fisheries can provide a renewable source of food and livelihoods, but in Southeast Asia, many fish species are currently overexploited.



Net used to propagate seaweed.

### Ways to effectively protect coral reefs from over fishing:

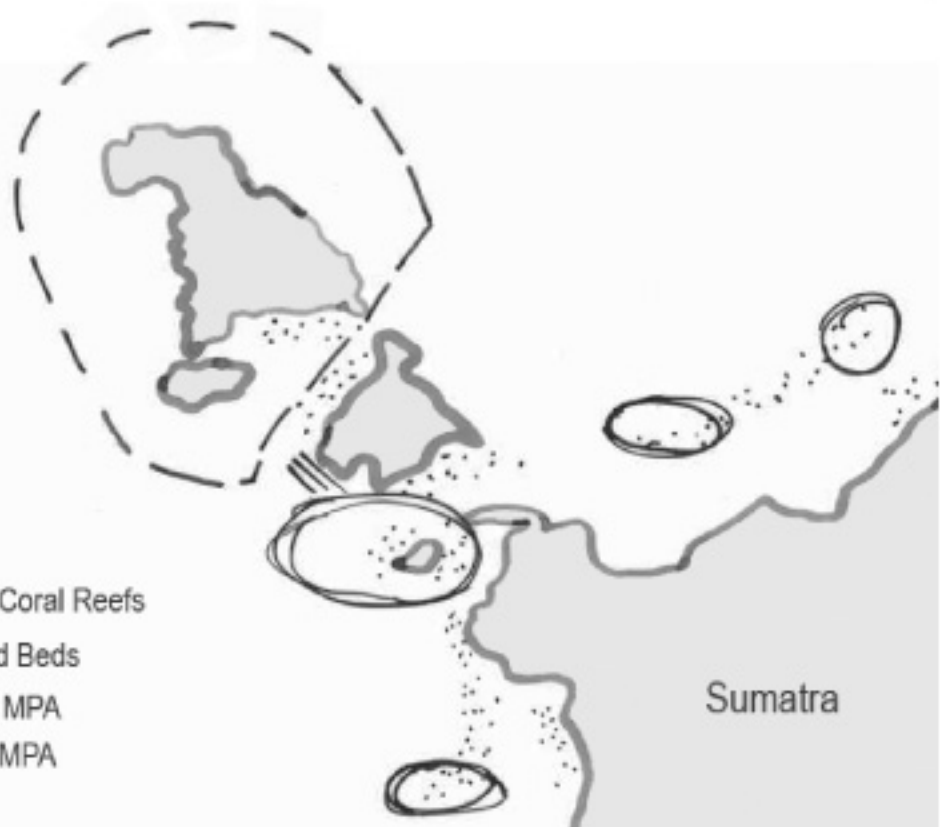
1. Educate villagers and fisherman about the importance of sustainable fishing.
2. Establish Marine Protected Areas (MPAs) that are scattered through out the coast. Preferably the MPAs should be located on important breeding grounds or the MPA should have some important ecological significance.
3. Promotion of more sustainable fishing practices such as nondestructive gear and nets that have large holes to release smaller fish.
4. Spread fishing among several species of carnivorous fish.
5. Promotion of other incomes such as raising seaweed and ecotourism.
6. Establish and enforce laws regarding fishing.
7. Promote the development of alternative livelihoods such as raising seaweed.
8. Establish minimum and maximum length requirements to keep fish.
9. Establish laws where there is no fishing during certain breeding times.

### What Can Locals Do?

- + Use less destructive fishing practices, such as nets with larger holes.
- + Don't fish near breeding areas.
- + Find other incomes than fishing such as raising seaweed and/or ecotourism such as dolphin or scuba tours.

### Zones:

- Existing Coral Reefs
- /// Seaweed Beds
- Planned MPA
- - Existing MPA



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social

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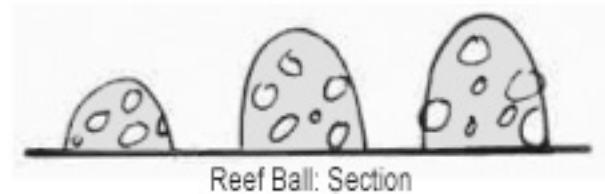
natural

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## Appendix:

### Reef Ball:

A Reef Ball is a designed artificial reef used to restore ailing coral reefs and to create new fishing and scuba diving sites. Reef Balls are used for beach protection, freshwater mitigation, and many other uses too. Reef Balls are made of a special, marine friendly concrete and are designed to mimic natural reef systems, they are used around the world to create habitats for fish and other marine and freshwater species. Reef Balls are made in many sizes to best match the natural reef type which is being mimicked.

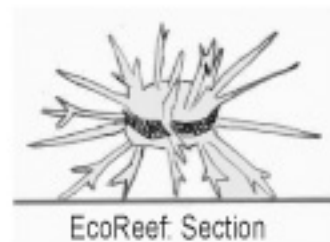


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### EcoReef:

Ceramic "snowflakes," designed to mimic a branching coral thicket, immediately attracts large numbers of both schooling and sedentary fishes to the previously barren and lifeless rubble field.

In the short term, even large-scale deployments look natural, especially with live coral transplants on the modules. In the long term, the branching design (combined with the inherent fragility of ceramic) allows the modules to fragment and disperse as living corals colonize them.



human

### BioRock:

Biorock is a radical new approach to artificial reef construction by means of Mineral Accretion to literally grow reefs. Mineral Accretion is a chemical process pioneered and patented by Professor Wolf Hilbertz and Dr. Tom Goreau, two marine scientists.

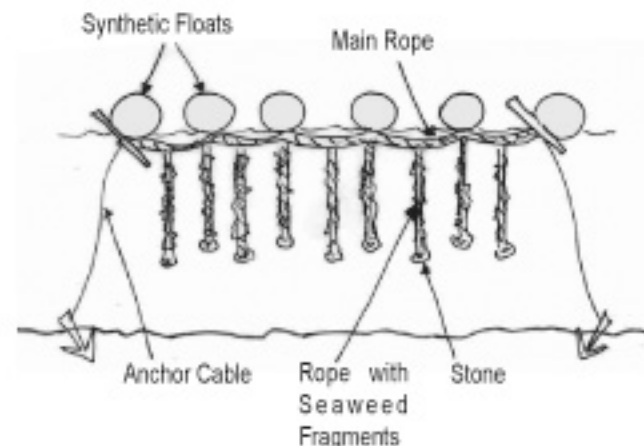
This technology uses electricity to grow limestone rock on artificial reef frames and increase growth rates of corals and other reef organisms. Living corals are carefully collected and transplanted onto the structures by attaching with wires or wedged between steel bars. These corals are quickly cemented into place by the growing minerals forming all over the structure's surface.



social

### Seaweed Propagation:

Seaweed can be propagated at sustainable levels as an alternative income. Drawing to the right shows a simple structure that can be made to grow seaweed.



physical

### Resources:

#### Cora reef info:

<http://www.reefbase.org>

[http://www.reefbase.org/resources/res\\_overview.asp?changearea=true&Region=0&country=IDN](http://www.reefbase.org/resources/res_overview.asp?changearea=true&Region=0&country=IDN)

<http://www.coral.org>

**EcoReef:** [www.ecoreefs.com](http://www.ecoreefs.com)

**Reef Ball:** <http://www.reefball.org/pastproj.htm>

**BioRock:** <http://www.globalcoral.org> photo taken by Wolf Hilbertz

natural