



ICRI
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CORAL REEF INITIATIVE



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Government Offices of Sweden
Ministry of the Environment and Energy



ECO-DESIGNED MOORING FOR CORAL REEF RESTORATION

FUNDED WITH THE SUPPORT OF THE GOVERNMENT OF SWEDEN
IN PARTNERSHIP WITH THE FRB



HIGHLIGHTS

- STOP CORAL DESTRUCTION AND UNREGULATED ANCHORING
- ENABLE CORAL AND SEAGRASS RESTORATION
- FINANCIAL INCOME WITH BOATING TOURISM

CONTEXT

The **prohibition of anchoring** is recommended in order to protect and manage the fragile ecosystems of coral and seagrass sites. To meet this requirement, communities that base their livelihoods upon yachting, cruising and blue tourism will install more mooring systems. These facilities will therefore grow through eco-tourism and the development of marine protected areas. Eco-designed mooring is an **eco-friendly approach**, to reconcile humans and nature.



WHAT IS IT?

It is a mooring system, designed with ecological considerations.



Eco-designed mooring system in Caribbean coral ecosystem, Deshaies, France (Pioch)

The idea is to associate mooring concrete blocks with:

- **Biomimicry of local habitats** (cavities, roughness, etc.) through an eco-designed anchor;
- Taking advantage of these hard and protected substrates to **restore and accelerate the restoration of coral reef ecosystems** that have been destroyed by past «unorganized» anchorages.

This type of mooring allows an **acceleration of recolonization**, thus associating an engineering project with an ecological restoration project.

It is an eco-engineering approach, where the mooring design is aimed to be aligned with the concept of "building with nature".

OBJECTIVES

Two main objectives:

- 1) A **mooring buoy programme** to prevent any future damage to corals from anchoring.
- 2) A unique coral reproduction technique that **helps to restore** damage from past anchoring, by using the mooring block as an ecological support.

MUTUAL BENEFITS HUMAN & NATURE

Eco-designed mooring intended to **enhance both its technical and ecological** aspects; creating mutual benefits for both humans and nature. In turn, **biota colonization will occur on the concrete block**, which will enhance weight and stability. This is hugely beneficial as fauna and flora development **ensure better durability** of marine concrete construction.

COST EFFECTIVENESS



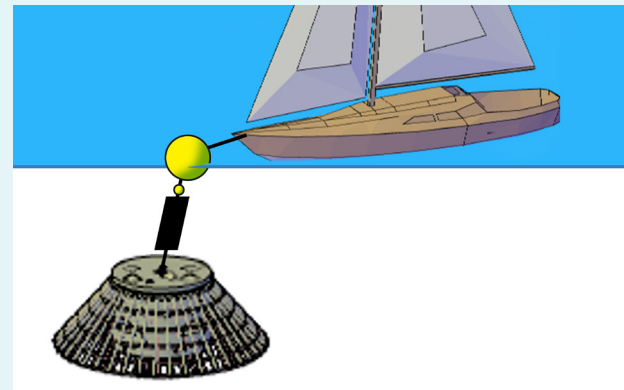
Eco-designed mooring with habitat for juveniles on the block (Pioch)

DESIGN & CONSTRUCTION

Eco-designed moorings are **designed for each specific context**, considering hydrodynamics, yacht size (block weight), as well as local biodiversity.

It is **not a classic system identical in all situations**. Individual cases of local habitat mimicking, endangered species, and functional targets have to be specified to guide the design of the concrete blocks, in order to achieve optimum ecological performance.

From a technical aspect, the **material durability, stability** and the mooring system itself has to be adapted to the boat size and the hydrodynamic parameters. Finally, **aesthetic considerations** for landscape integration have to be developed.



Eco-designed mooring adapted for large sailing boats (S. Pioch & J.C. Ascione)



Intermediary buoy to pre-tension anchor chain upper the block (SEMSAMAR)

Ecological assessments show that eco-designed mooring **cultivates 5 to 10 times more species** diversity in comparison to a classical concrete block (cubic). Young corals grow on adapted rough parts. The additional construction costs are between 1% and 20%, depending upon the design.

Mooring fees in French overseas territories average between \$9 and \$60 per day, depending on boat-size. The eco-mooring of Saint-Martin take part to finance its marine protected area. The life expectancy of the eco-designed block in concrete is approximately 50 yrs.

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