Restoration of coralligenous reefs – RESCOR project

Project leader(s) : Andromède Océanologie
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Technical and financial partners :
Agence de l'eau Rhône Méditerranée Corse (AERMC)
Métropole Nice Côte d'Azur

Budget : 275 000 € (cleaning and scientific monitoring for 5 years)

Period : 2018 - 2022
Target species/habitat : coralligenous reefs
Location : St-Jean-Cap-Ferrat, France
Web site :
https://medtrix.fr/portfolio_page/restau-med/

Project's objectives

Sediment **removal and cleaning** of a coralligenous reef buried by the formation of a sedimentary slope resulting from drilling operations.

Scientific monitoring

Three methods were used for the temporal monitoring of the coralligenous reef communities before and after the cleaning and land removal operations (monitoring duration = five years) :

- **Photographic quadrats** on three station (30/station) : positioning of 64 random points per quadrat and identification, for precise monitoring of living groups.
- **14 permanent quadrats of 1 m²** : monitoring of the surface evolution of the colonization of the substrate by species.
- **Models produced by photogrammetry** : production of visuals to communicate on the project, compare the evolution of the area and extract ecological indices.

Description of the operation

The RESCOR project took place in three stages :

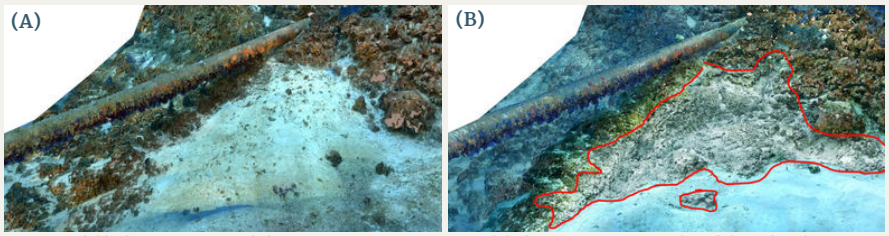
- **Characterization of the project area (-32 to -42 m) : mapping** of the biocenoses of the sediment deposit zone, granulometric and physico-chemical analysis of coastal sediments in the project and deposit zone.
- **Sediment removal and cleaning** of the coralligenous reef using an innovative **water jet (blowing) method**. This stage required **320 hours** of intervention and **20 days** of mission.
- **Temporal monitoring** of coralligenous reef communities before and after land removal operations (**eight monitoring** : twice a year for three years then once a year for two years).

Water jet method for cleaning the reef © Andromède Océanologie.

Results

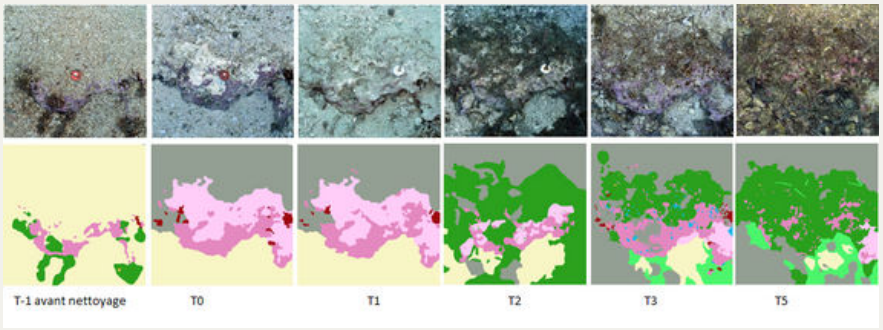
The characterization of the project area did not show any contraindication to the carrying out the land removal and cleaning operations. An area of 500 m² between -45 and -50 m, with low ecological sensitivity, was chosen to be the sediment deposit area (unpolluted).

The innovative water jet system enabled the **removal of 50 m3 of sediment**, **the updating of 150 m² of hard substrate** and the **cleaning of 500 m² of coralligenous reef.**



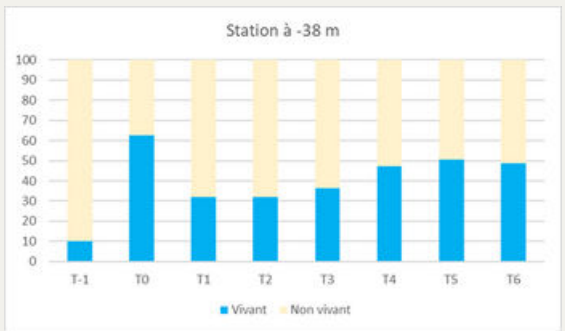
(A) 3D model before stripping and cleaning operations; (B) 3D model after operations © Andromède Océanologie.

The three methods (photographic quadrats, permanent quadrats, photogrammetry) are complementary and make it possible to follow the process of recolonization of the cleared reef. The pioneer species that colonize the necrotic coralligenous exposed by the cleaning operations are encrusting red algae, bryozoans, ascidians, hydroids, sedentary worms and other algae.



Surface evolution of coralligenous reef communities at the level of a permanent quadrat between T - 1 before cleaning actions and T - 5 monitoring (november 2021). Each color corresponds to a living category.

After five years, we observe a **greater number of species** among the living **more erect species** and **preservation of tall species** during cleaning actions. The duration of **five years** allows an almost complete follow-up of the recolonization : the rate of living is equivalent and high **(75 %)** between the cleaned zones *vs* the cleared and cleaned zones. In addition, there is little or more "naked" necrotic coralligenous visible at last monitoring.



Evolution of the percentage of living organisms on the station cleared and cleaned at -38 m showing the natural recolonization of the substrate by living organisms at each monitoring.

This innovative method for restoring coralligenous reefs is effective since it has made it possible to **restore the biodiversity, structure and dynamics of the pre-existing ecosystem before destruction.**