



# ADAPT ISLAND

## Collection report Summary

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# 1. Report objectives

This report is part of action C1 referring to the first campaigns of biological material sampling. The technical implementation document of the project foresees annual collection campaigns in order to collect propagules and seeds of mangroves, fragments of coral colonies and seeds of seagrass from the environment. The purpose of these collections is to put specimens in a nursery before to be introduced in the identified rehabilitation sites.

The first collection campaign should have taken place 5 months after the launching of the project according to the initial proposal made to the commission. However, the rewriting of the scientific strategy led to the adjustment of the project orientations. Thus the collection objectives, the requirements in terms of biological calendar and the targeted species were revised.

The objectives of this report are to present:

- The progress of the project;
- The reorientation of the collection of biological material;
- The first collection results;
- An inventory of specimens available to the GPMG to carry out active restoration operations.

## 2. New definition of the scientific and technical strategy

The LIFE ADAPT'ISLAND project is divided into several phases of actions. The first actions implemented are called "Preparatory Actions":

- A1 : Preparatory activity for project implementation
- A2 : Finalization of selection of project sites
- A3 : Regulatory permits for the collection of propagules, cuttings and seeds

These actions were identified as essential by the project's technical and scientific team. The unexpected containment induced by the health crisis of COVID-19 allowed the LIFE team to focus on the drafting of framework documents and the implementation of the first project evaluation.

This preparatory phase allowed the scientific reinforcement of the project thanks to the realization of a state of the art of the knowledge and the technical processes of rehabilitation and restoration. This work led to the elaboration of the consolidated scientific and technical strategy (STS) of the project. The project's technical application proposal and the associated planning were reviewed in order to best dimension the operational actions to be implemented. The new orientations retained mainly concern the dimensioning of the operations, the qualification of the chosen rehabilitation methods and the choice of species.

Moreover, the crisis limited or even stopped the launch of certain field operations (i.e. preparation of the mangrove nursery, field surveys, setting up the laboratory, etc.). Moreover, the biological calendars linked to the targeted species imposed the postponement of certain collection campaigns initially planned during the first year of the project.

The planning of the subsequent "Implementation Actions" has thus been modified including Action C1, "Collection of propagules, cuttings and seeds". The following sections present for each natural environment and in a succinct manner the orientations that have been modified

in the framework of the scientific and technical strategy, as well as the resulting impacts on the collection campaigns.

## 3. Coastal forests: mangroves and associated natural wooded areas

### 3.1. New strategic proposals

The entire coastline is subject to the pressures of climate change. This is why, in addition to mangrove which had been previously identified as a target environment, it is proposed in the STS to focus on coastal xerophytic forests, mangrove and swamp forests.

The bibliography reveals that the poor choice of planting areas and the establishment of monospecific plantations are at the root of many restoration failures. To avoid this kind of disappointment, about ten species have been identified and will be used to plant the 3 different tree ecosystems identified.

The removal of environmental pressures is an important field of action that was under-dimensioned in the initial proposal. Indeed, to allow an ecosystem to regain its vitality, it is essential to limit or even eliminate the pressures that are exerted on it, as this alone usually allows the environment to regenerate naturally. To enable the improvement and strengthening of the ecosystem services provided by ecosystems, the STS proposes a mixed strategy between an Assisted Natural Regeneration (ANR) and an Active Strong Restoration (ASR).

It is important to multiply cultivation techniques to ensure the availability and condition of the plant specimens to be reintroduced. The SST therefore proposes to use nurseries in the natural environment and to establish culture contracts with local actors such as tree nurserymen.

Initially, the project proposed to collect a defined quantity of seedlings per year. However, the quantity of seedlings to be planted depends on the characteristics and objectives defined for each of the sites undergoing rehabilitation. In this sense, sampling will be done in a reasoned way, and this, according to the real needs in order not to degrade the sampling sites.

### 3.2. Operations carried out

The culture techniques and itineraries have been defined for all the ten species identified for the project. Two ways of cultivating plant species have been envisaged, through natural nurseries and through cultivation contracts with tree nurserymen.

The natural nursery of “*Morne Savon*” is located in a mangrove area and ideally allows the development of local mangrove species: *Rhizophora mangle*, *Avicenia germinans*, *Laguncularia racemosa*, *Conocarpus erectus*. Furthermore, given the low salinity measured, culture experiments could also be carried out for two other species: *Pterocarpus officinalis* and *Acrostichum aureum*. A reorganisation of the “*Morne savon*” nursery, carried out on 19/06/2020, made it possible to draw up an inventory, list the quantity of plants available, determine the size of the nursery and make the space more accessible and welcoming.

### 3.3. Future operations

The creation of partnerships is an essential part of project implementation. This axis will make it possible to generate a shared vision between the different environmental actors of the territory, to create synergies and to mobilise the actors and skills to carry out the actions. As an example, an agreement with the “*Conservatoire du Littoral*” is planned which will bring together two major managers of natural areas. Following the agreement with the “*Conservatoire du Littoral*”, the nursery of “*Morne Savon*” will have to undergo a number of improvements in order to increase its storage area, improve its accessibility and materialise its presence. The improvements will be light and reversible. Following the development of the tree nursery, campaigns for the collection of biological material will be carried out in order to cultivate several species of mangroves and to start cultivation experiments on *Pterocarpus officinalis*.

At the same time and in order to create a sector and strengthen the skills of local players in the cultivation of local plant species, it will be necessary to work with nurserymen who master the cultivation techniques of certain species of interest such as *Coccoloba uvifera*, *Thespesia populnea*, *Hippomane mancinella*. This option will make it possible to have mature plants available very quickly (and in quantity) without the constraints linked to the creation of a nursery. This expertise will also be of invaluable help for cultivation experiments on other species such as *Ipomoea pes-caprae* and *Acrostichum aureum*.

Authorisations must be granted by the Director General of the GPMG to begin operations on identified sites in the port area. Field operations, including the implementation of corrective measures to prepare the site prior to planting operations, will then commence. The corresponding public contracts are already being drafted.

## 4. Coral reefs

### 4.1. New strategic proposals

The coral species initially targeted for coral reef restoration operations under the LIFE ADAPT'ISLAND project are the endangered species *Acropora cervicornis* and *Acropora palmata*. For *Acropora* species that are threatened and protected by a ministerial order, the taking of opportunity cuttings is authorised by a derogatory order of which the GPMG is the holder but governed by the consent of a Scientific Committee. At present, it is first necessary to demonstrate that the method of transplanting *Acropora* coral cuttings has been mastered before hoping to collect new cuttings. The fragmentation of specimens held within the coral farm is therefore favoured for the moment.

In order to reduce certain pressure factors such as predation or disease on the restored plots, other coral species will be integrated into the project such as *Porites* branch species: *Porites porites*, *Porites furcata*, *Porites divaricata* or the species *Madracis auretenra*. For these species, the removal from the natural environment of naturally broken coral fragments also called "fragments of opportunity" will be favoured so that they can be installed in a coral farm to grow, and then transplanted into the natural environment.

Within the framework of the project, the planned collection of coral spawning eggs consists of taking gametes during a mass reproduction event and carrying out the fertilisation of these gametes to obtain larvae. Two strategies can then be adopted:

1. The first, which was the only one initially retained in the project, consists of rearing the larvae, then the coral juveniles resulting from fertilisation under controlled conditions (e.g. in the laboratory) in order to obtain new coral colonies for coral restoration purposes.
2. The second was identified during the rewriting of the project's scientific and technical strategy and corresponds to a release of coral larvae directly resulting from fertilization on the natural site that is to be restored in closed devices for a few days, the time for the planula larvae to settle on the identified substrate.

The initial budget envisaged renting infrastructures from the "Aquarium de la Guadeloupe", however, these arrangements could not be realised. Therefore, the creation of an ex situ coral rearing farm in the form of a laboratory owned by the LIFE project team and belonging to the GPMG is envisaged.

#### 4.2. Operations carried out

The coral farm located at the "Caye à Dupont" in the marine area of the port consists of 16 coral trees to hold specimens of the critically endangered species *Acropora cervicornis*, 5 coral domes, one of which serves as a support for 30 specimens of the critically endangered species *Acropora palmata* and 5 coral tables which can be used as a support for future coral specimens. The above-mentioned structures that support the coral specimens are maintained 3 times a month in order to limit the biological fouling that accelerates the wear and tear of the farm structures and limits the development of coral cuttings.

For the species *Acropora cervicornis*, 307 specimens were counted during the last maintenance session of the coral farm on Wednesday 16 September 2020. Indeed, the presence of a disease within the coral farm has induced a high mortality rate for this species from June 2020. To deal with the coral disease, several operations were set up by the GPMG from June 2020 onwards:

- A formal identification of the disease by consulting an expert in marine ecology;
- The definition of a strict protocol for the management of the disease;
- The launch of a specific operation to implement the above-mentioned protocol, which has been ratified and validated by a scientific committee.

The first three campaigns to observe and collect *Acropora* eggs were carried out in August and September 2020. These campaigns have shown that the spatio-temporal, scientific and technical framework for the observation and collection of *Acropora palmata* eggs has been mastered. Indeed, for *Acropora palmata*, several spawning events were observed. Some eggs have been collected and an experiment of direct seeding of young colonies on the reefs has been carried out. It will be possible to renew such operations for this species next year and on a larger scale in order to raise juveniles under controlled conditions in the laboratory that will be installed and also to renew the experiment of direct seeding of young colonies on the reefs that seems promising. On the other hand, for the species *Acropora cervicornis*, uncertainties remain and exchanges will have to be made with entities that carry out similar spawning observation operations in the West Indies in order to determine more precisely the spatio-temporal framework.

### 4.3. Future operations

In order to fulfil the quantitative objectives defined by the project in terms of transplanted cuttings and rehabilitated coral reef area, it is necessary to increase the production capacity of coral cuttings relative to the current coral farm. In order to do so, several future operations are planned:

- Coral fragmentation operations equivalent to a cumulative number of 500 to 1500 cuttings are planned for 2021;
- Two operations for the collection of opportunity coral fragments are planned in 2021: between 200 and 600 fragments of branch coral species *Acropora* sp., *Porites* sp. and *Madracis auretenra* will be collected and integrated into the coral farm;
- A redevelopment of the coral farm planned for 2021 includes the installation of new structures to increase the coral production capacity.

In addition, the installation of a new coral farm will be prepared from 2021. Indeed, the installation of a new coral farm is relevant for two reasons:

1. To increase the production capacity of cuttings within the framework of the project.
2. To reduce the risks induced by some aleas (cyclones, coral diseases, coral bleaching episodes, etc.) inherent in maintaining a coral farm in a single location.

Finally, the LIFE ADAPT'ISLAND project team would like to set up an *ex situ* coral rearing farm in the form of an equipped laboratory to raise young corals from such spawning collections in order to increase the number of genetic individuals held for coral species of the genus *Acropora* and thus induce the implementation of more resilient and relevant reef rehabilitation projects.

## 5. Seagrass beds

### 5.1. New strategic proposals

Initially, the regeneration of seagrass beds within the LIFE ADAPT'ISLAND project had to be approached by setting up direct operations via the establishment of plant species that constitute the endemic seagrass beds of the Caribbean region. However, whether within the GPMG or even more widely at the international level, the majority of similar previous projects that sought to restore seagrass beds through the direct implantation of suitable marine plant species have failed. A new paradigm has thus been accepted in terms of preserving marine meadows, and it seems that the strategy to be adopted is to give priority essentially to the potential for natural regeneration of these environments. That is why the new strategic axis in terms of the restoration of seagrass beds would be based on the definition of a new "C5" action specific to the restoration of seagrass beds, entitled "Creation of eco-mooring zones to preserve seagrass beds".

### 5.2. Operations carried out

Initially, the LIFE ADAPT'ISLAND project team sought to determine the main pressure factors that apply to the seagrass beds in Guadeloupe. Some of the pressures to which the seagrass beds are subjected are of natural origin and correspond to intense meteorological events that cannot be influenced, such as cyclones, or turbidity and hypersedimentation induced by heavy rainfall. On the other hand, other threats are of anthropogenic origin (dredging, trampling, mooring, etc.) and can be more easily apprehended. It seems, for example, that

the impact of anchorages and boat propellers on seagrass beds in sectors where pleasure boating is highly developed, such as in the West Indies, should not be neglected.

The installation of an eco-responsible mooring area should therefore be favoured in order to minimise the impact of the fairground moorings to which the seagrass beds are subjected and thus encourage their natural regeneration. The new C5 action entitled "Creation of eco-mooring zones to preserve seagrass beds" has therefore been defined and will be submitted to the European Commission for evaluation and validation in January.

### 5.3. Future operations

If the new action C5 is validated, then a pilot project relating to the establishment of an eco-mooring area respectful of the biocenoses of Caribbean seagrass beds would be integrated into the LIFE ADAPT'ISLAND project and the budget initially identified for the restoration of seagrass beds by planting would be allocated to it, *i.e.* € 622,600.00.