

TECHNICAL REPORT ON TRANSPLANTATION STATE AND PROGRESS (RNP Coastal Dunes)

Final Version of 31/May/2022

Deliverable Number D.4.2.3.

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Work Package Title	Protecting and restoring marine seagrasses
Activity Number	4.2
Activity Title	Marine seagrasses pilot transplantations and surrounding seabed cleaning
Partner in Charge	PP5 – Kornati National Park Public Institution
Partners involved	PP5 – Kornati National Park Public Institution PP1 - SELC Soc. Coop. PP3 - Regional Natural Park “Coastal Dunes from Torre Canne to Torre San Leonardo” PP4 – SUNCE
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Summary

Abstract.....	3
1. Introduction	4
1.1. Aim and objectives.....	4
1.2. Structure of Work Package 3	6
2. The Regional Natural Park of Coastal Dunes project area	7
3. The marine seagrass transplantation.....	8
3.1.1. Monitoring of seagrass transplantation.....	9
4. CONCLUSIONS.....	13
5. REFERENCES.....	14

Abstract

This document (deliverable D.4.2.3) describes the results of the activities planned in WP 4.2 (Marine seagrasses pilot transplantations and surrounding seabed cleaning) to update the status and progress of the seagrass pilot transplantations in the RNP Coastal Dunes site.

From a technical point of view, the tests carried out with *P. oceanica* showed good results. The supports where the cuttings were fixed suffered significant damage (storm events, amateur fishing and anchoring). However, during controls, excellent vital conditions of the transplanted cuttings were always found.

1. Introduction

1.1. Aim and objectives

SASPAS (Safe Anchoring and Seagrass Protection in the Adriatic Sea) is an INTERREG project that aims to provide a proposal to develop and share actions and advanced policies for the conservation and sustainable use of the territory.

The common challenge of Project SASPAS is to preserve and get a better status of conservation of biodiversity of the Adriatic Sea ecosystem in order to decrease its vulnerability.

The overall objective is to improve the conservation and restoration of seagrasses by installing safe anchoring systems, performing pilot transplantations, carrying out monitoring activities and establishing an integrated management system for seagrasses in the Adriatic area. The change will result in an increase in the level of conservation of habitat types and species in the Natura 2000 sites involved in the Project areas. To achieve the envisaged change the project will adopt a scientific-applicative approach, following the DPSIR (Driving force – Pressure – State – Impact - Response) causal framework, analyzing the interactions between society and the environment - the cause-effect relationships between interacting components of complex social, economic, and environmental systems. By doing so, it is possible to measure the effectiveness of responses put in place.

Since marine seagrasses and especially *Posidonia oceanica* beds (1120*) are widespread along the coastal areas of Interreg Programme and their conservation status is similar in the two Member States, significant results can only be achieved by establishing a good cross-border cooperation between the Italian and Croatian key partners. The cross-border approach ensures coordinated and cooperative actions in planning and performing the protection and restoration activities, as well as in the development of the envisaged Marine Seagrass Safeguard Integrated Management Program (i.e., the proposed guidelines for the management and proper behavior in protected areas). The innovative aspect, which goes beyond the existing common practices, consists in the joint protection and restoration of biodiversity at transboundary level through the development of specifically- tailored innovative solutions, harmonized for the Adriatic area and applicable to other similar realities facing with the same biodiversity protection and restoration issues.

The project activities have been carried out within the three project study sites (Figure 1):

- Monfalcone (Bay of Panzano),
- Kornati National Park – (Nacionalni Park Kornati),
- Regional Natural Park of Coastal Dunes from Torre Canne to Torre San Leonardo.

This proposal is well suited to the Adriatic, in particular to the Apulia (Regional Natural Park of Coastal Dunes from Torre Canne to Torre San Leonardo) and Kornati National Park, characterized by widespread coverage of *P. oceanica*. In both sites, in the summer, there is a significant flow of pleasure boats, and the development of the industry tourism cannot fail to reckon with the need to preserve the quality of the

territory, understood as a whole between land, coast and sea. In Monfalcone (Bay of Panzano), there is an important coverage of marine seagrasses (i.e., *Cymodocea nodosa*) too.

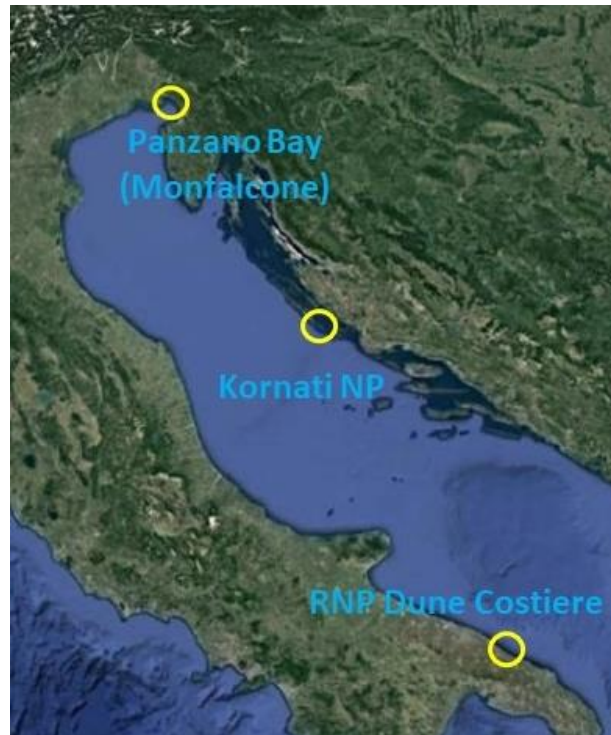


Figure 1. Location of the three project sites.

Both *P. oceanica* and *C. nodosa* play a crucial role in the consolidation of coastal sediments, slowing erosive phenomena, thanks to their rhizomial apparatus with which they anchor to the bottom; with the leaf they promote the capture of suspended sediments, helping to limit turbidity, not to mention a number of benefits for marine and lagoon organisms.

The main project outputs related to the planned activities are:

- monitoring system with data collections/monitoring campaigns,
- placement of environmentally friendly anchoring systems (anchorage and simple signaling buoys) and pilot seagrass transplantations,
- Integrated Management System for seagrasses in the Adriatic area, made by a GIS Digital Information Platform (DIP) and a Marine Seagrass Safeguard Integrated Management Program (MSSIMP).

Protected areas managers, local, regional, and national public bodies, environmental associations, and NGOs, as well as the public will mainly benefit from the project activities.

1.2. Structure of Work Package 3

The objective of the Work Package 3 - *Integrate real-time monitoring system of marine seagrasses (phanerogamae) - in the involved Natura 2000 sites* – is to monitor and gather data on marine seagrasses in the three project sites, to improve the protection and to restore the biodiversity in the cross-border area.

The WP3 package consists of three activities:

- activity 3.1 - Preliminary Environmental Survey,
- activity 3.2 - Driver and Pressure Identification and Assessment,
- activity 3.3 - Monitoring campaigns.

Monitoring campaigns were carried out to control the plants phenological life cycle and the spatial dynamics of marine seagrasses as a response to the concrete actions (activity 3.3). Moreover, they helped to identify the potential impacts that the project could have on seagrass meadows and other valuable habitats and species. They were also monitored the status and progress of the seagrass pilot transplantations planned in WP 4 Activity 2 (Marine seagrasses pilot transplantations and surrounding seabed clearing).

All the activities were conducted adopting up-to-date safety protocols, to reduce risks during underwater operations. Expert marine and transitional water biologists, according to standard operating procedures for the macrophytobenthos, performed laboratory analyses of collected samples.

Pilot transplantation tests of *Posidonia oceanica* and *Cymodocea nodosa* were conducted with the aim of evaluating the effectiveness of some methods in difficult environmental contexts, in relation to the existence of various pressures, such as mainly the anchoring of pleasure boats.

The controls carried out on the transplantation plots were aimed at quantifying, among other parameters, the percentage of development of the shoots of the relocated plants.

This document (deliverable D.4.2.3) describes the results of the activities planned in WP 4.2 (Marine seagrasses pilot transplantations and surrounding seabed cleaning) to update the status and progress of the *Posidonia oceanica* pilot transplantations in the RNP Coastal Dunes site

2. The Regional Natural Park of Coastal Dunes project area

The “Regional Nature Park Dune Costiere from Torre Canne to Torre San Leonado” extends for 1.100 ha, along 8 km of coastline, and includes the inland agricultural areas occupied by centuries-old olive groves and ancient “masserie” (typical Apulian farms) (Figure 2). The perimeter follows the long course of the “lame” (55 km of erosion), which characterizes the Park’s territorial morphology. They are linear clefts of the land perpendicular to the coastline, with flat bottom and slightly sloping sides originated by the erosive action of surface waters.

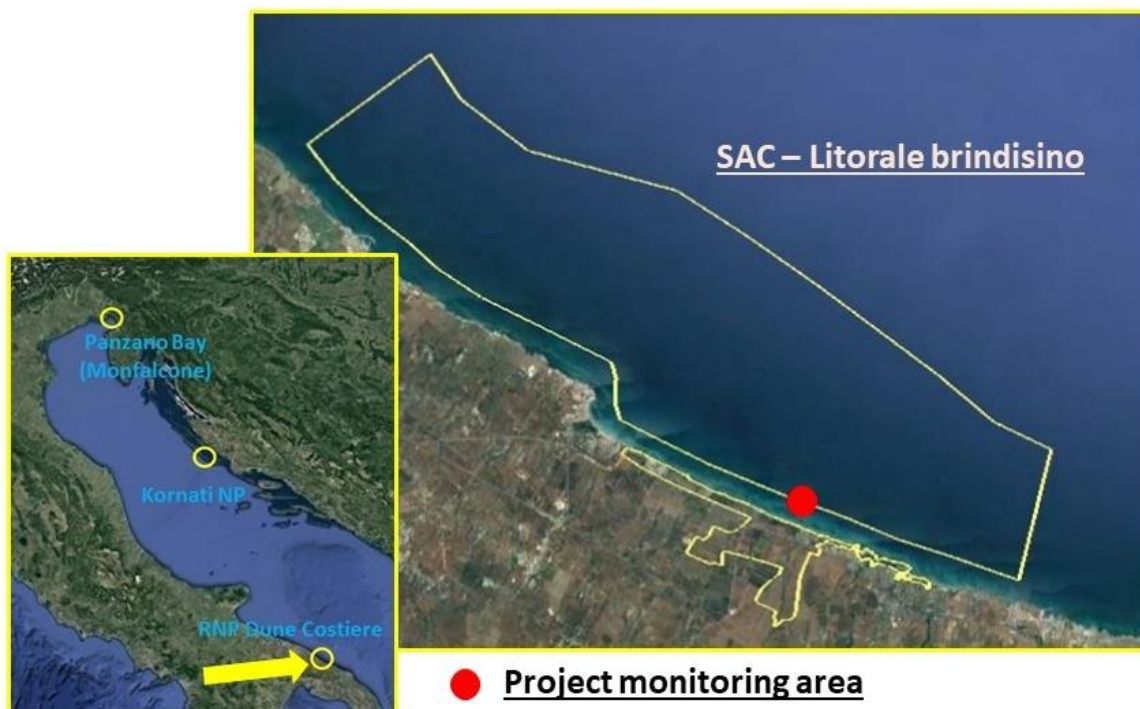


Figure 2. Location of the study area in the RNP Dune Costiere, positioned in a Natura 2000 site.

In the protected area, many habitats are present. Each habitat is a result of the geological, morphological and climatic features of the site that determines the presence of plant and animal species. Some of them are considered priority habitats, such as that colonized by *Posidonia oceanica*. Starting at a depth of 10-12 m, *P. oceanica* meadows are present on sandy bottoms.

The park includes the Special Areas of Conservation (SAC) “Litorale brindisino”.

Natura 2000 site: SAC IT9140002 - Litorale brindisino

The SAC “Litorale brindisino” covers an area of 7,256 ha, 95% of which is marine. The priority habitat 1120* (*P. oceanica*) covers 50% of the total area. It is also characterized by the presence of coastal wetlands, where rare or endangered species of migratory birds stop or reproduce.

3. The marine seagrass transplantation

In the RNP Coastal Dunes site, the pilot *Posidonia oceanica* transplantation was carried out in February 2021, in an area located near the SIC Area “Litorale Brindisino” (and the monitoring Zone 1) where anchoring pressures occur (Figure 3).



Figure 3. Sampling scheme applied to the monitoring Zones (1-2-3) in the Regional Natural Park of Coastal Dunes and *Posidonia oceanica* pilot transplantation area.

The transplantation site was located inside a discontinuous meadow, characterized by the presence of patches of *P. oceanica*, dead matte and sand. The donor meadow was located near the receiving site.

The transplantation was carried out in two contiguous parcels, in relation to the area's bathymetry, each of which represented approximately an area of about 100 square meters, for a total of about 200 square meters of transplanted area.

As for Kornati NP, the *P. oceanica* transplantation were carried out using biodegradable supports consisting of a patented star-shaped anchoring system with 5 arms to which fasten the seagrass rhizomes (Scannavino *et al.*, 2014). Altogether, 14 patches composed each of 6 supports (in each one at least 30 rhizomes fixed) were arranged in the area, for a total of 84 anchoring modules and about 2,500 rhizomes (Figure 4). During the first monitoring campaign (May 2021), a total of 6 supports randomly distributed along the transplant patches was identified and labelled.

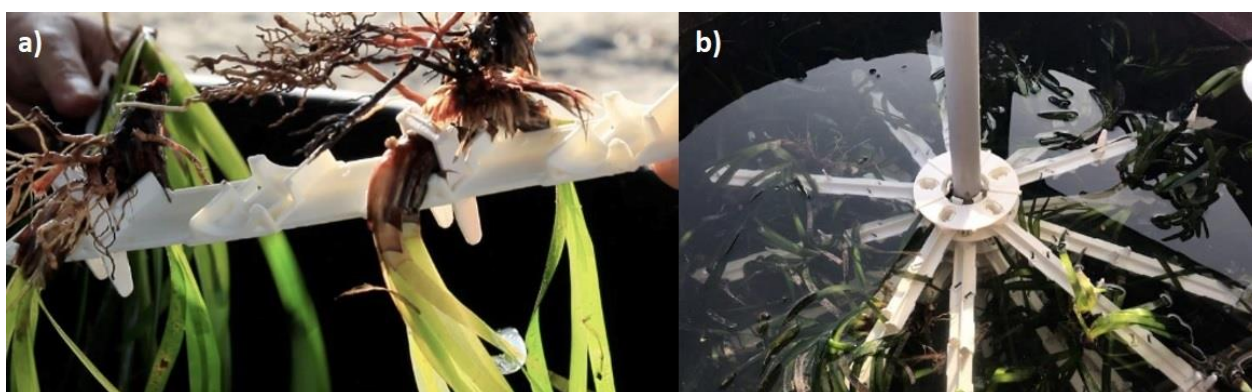


Figure 4. Fixing of cuttings to the arms (a), temporary storage of anchoring modules with cuttings/rhizomes.

3.1.1. Monitoring of seagrass transplantation

Monitoring campaigns were carried out in May 2021 and May 2022; in May 2021, 6 supports randomly distributed along the transplant patches were identified and labelled. Shoot density, height of the longest leaf and increase length of the rhizome were measured.

Physical loss of some anchoring system or some arms and *Posidonia* shoots was found due to multiple causes that cannot be identified with certainty (i.e., fishing, anchoring, wave erosion) (Figure 7 and Figure 8). In particular, in May 2022, only two of the six biodegradable supports were found (support 2 and support 4).

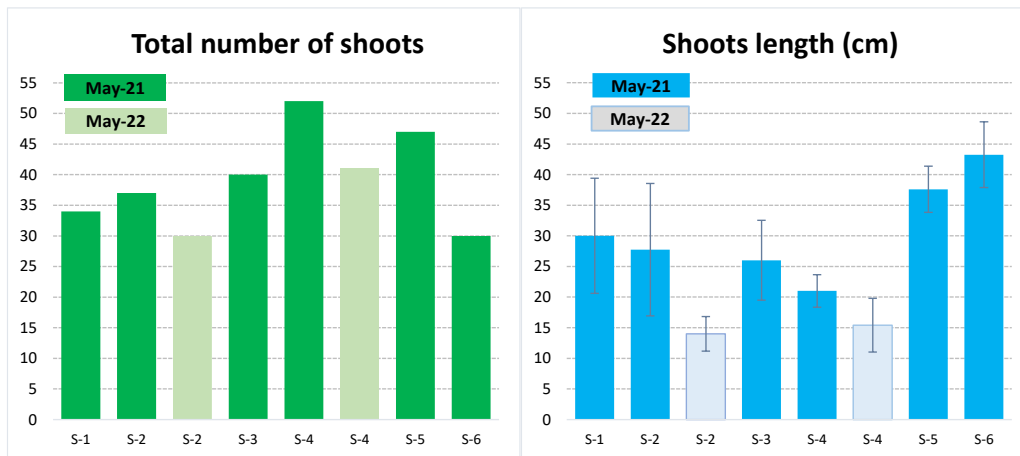


Figure 5. Total number of shoots and average values of shoot length of the 6 monitored support (S-1, S-2, S-3, S-4, S-5 and S-6) in May 2021 and in May 2022 (only for S-2 and S-4).

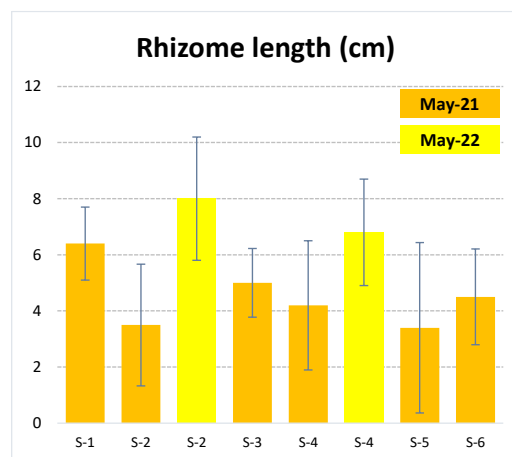


Figure 6. Average values of rhizome length increase of the 6 monitored support (S-1, S-2, S-3, S-4, S-5 and S-6) in May 2021 and in May 2022 (only for S-2 and S-4)

The total number of shoots and the leaf length showed a decrease in support S-2 and S-4 (Figure 5 and Figure 6); however, in general, shoot density and length showed good leaf conditions. The rhizomes length showed an increase in the supports S-2 and S-4 from May 2021 to May 2022.

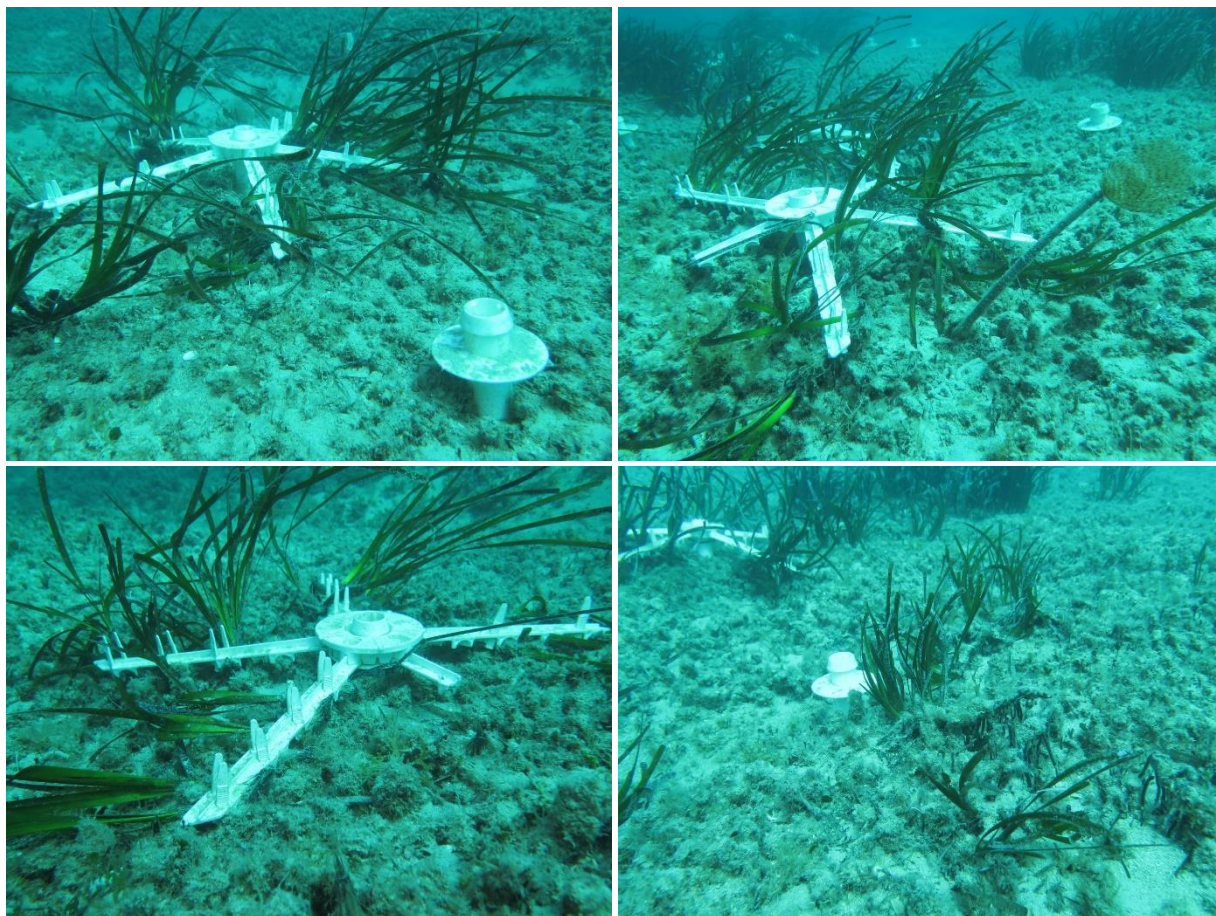


Figure 7. May 2021: seagrass transplantation in the RNP Coastal Dunes.



Figure 8. May 2021: seagrass transplantation in the RNP Coastal Dunes.

4. CONCLUSIONS

From a technical point of view, the tests carried out with *P. oceanica* showed good results. The plots created are still in good condition and about 65% of the installed cuttings are growing, while the remaining 35% has different degrees of degradation or completely disappeared.

At the Coastal Dune Park, the supports where the cuttings were fixed suffered significant damage. These can be explained both by the effects of significant storm events, which are able to affect the sea-bottom despite the 8-meter head, and by impacts related to amateur fishing and anchoring. However, during controls, excellent vital conditions of the transplanted cuttings were always found. Here the problem can be traced back, as mentioned, to physical impacts of another kind.

5. REFERENCES

Scannavino A., Pirrotta M., Tomasello A., Di Maida G., Luzzu F., Bellavia C., Bellissimo G., Costantini C., Orestano C., Sclafani G., Calvo S., 2014. Biodegradable anchor modular system for transplanting Posidonia oceanica cuttings. Conference Paper. 5th Mediterranean Symposium on Marine Vegetation (Portorož, Slovenia).