Replant to connect: when energy allies with the posidonia meadows

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Under the transparent waters of the Balearic Islands hides a plant whose existence is vital to the fight against climate change: the oceanic Posidonia. Underwater meadows that shelter and provide food for seahorses, sawfish, sponges and countless aquatic animals while they are organic carbon stores and guardians of the dune systems. Now, a project of Redeia and IMEDEA is fighting for their regeneration.

"Posidonia oceanica is endemic to the Mediterranean. Posidonia meadows are the equivalent of an underwater forest: they add biodiversity, generate a large amount of oxygen, fix carbon... It is a nursery habitat: the fish breed inside the meadow until they are big enough to leave the refuge of the meadow and fight for a territory", explains Inés Castejón, researcher at the Mediterranean Institute for Advanced Studies (IMEDEA) -a joint research center between the Spanish National Research Council (CSIC) and the University of the Balearic Islands- located in Esporles, a small town in the heart of Mallorca.

Specializing in marine ecology, this researcher has spent years dedicating to the study of this plant. Among the more than 700 species that live linked to this iconic marine ecosystem, she highlights the syngnathids, a family of fish that includes the seahorse. "Its life strategy is mimicry, it is exactly the same as a posidonia leaf. When it is in a living meadow it has an intense green and when it is among dead leaves it turns brown."

A great diversity of snails, crustaceans and sponges, among other animals invertebrates, complete this treasure trove of biodiversity. "What happens is that it is less known because for our eye it is more difficult to see. Most of the population does not dive or does not go snorkeling and when you go to see it, the fauna is much smaller compared to that of terrestrial forests regrets.

Unique marine forests that have no shortage of enemies. “We are losing surface covered by meadows, the forecasts are not encouraging and is necessary to learn how we can do to recover the areas that we have already lost,” says Castejón, who assures that “we have many degraded meadows that are susceptible to restoration”. The causes of these impacts are diverse: “in certain areas of Ibiza we have many problems due to pressure from boats, while in areas of Mallorca there are water quality problems”.

Acting to care for the seabed

Inés, who began her career studying the ecology of the plant, has specialized in recent years in its conservation and has been part of a pioneering project for the recovery of posidonia meadows in the Balearic Islands promoted by Redeia through Red Eléctrica, its main subsidiary. Borja Álvarez, Environment technician for this company in the Balearic Islands, became interested in the subject a decade ago. “We saw some articles on posidonia replanting and wanted to see if it was possible to replant after of our intervention,” he explains. Red Eléctrica is the company in charge of building, maintaining and operating the country's electricity transmission grid, and that includes creating the necessary electrical connections to bring power there where it is needed, and in the case of the Balearic Islands, interconnecting the islands with each other and with the mainland electricity system via submarine cables.

Since 2012, the company, in order to avoid possible impacts of the laying of submarine power cables on the meadows and to act in favor of the conservation of biodiversity, promoted a research, development and innovation project focused on the study of the use of seeds and fragments for the restoration of degraded seagrass meadows. Together with IMEDEA, the project focused on the two ends of the underwater electrical connection Mallorca-Ibiza, specifically in the bays of Santa Ponça (Mallorca) and Talamanca (Ibiza). Seeds and fragments of Posidonia were collected for their cultivation in laboratory conditions, which were later replanted in the two bays.

An absolutely pioneering work of which there was no precedent and from which was born the Practical Guide to Posidonia planting, the first document that exists in the scientific community to carry out this process of cultivation and transplantation of Posidonia and facilitate the restoration of meadows in other places. “It has been quite successful”, emphasizes Álvarez, pointing out the recommendation made by the Balearic government itself, and that the Junta de Andalucía and the Comunitat Valenciana are taking into account . “It is a basic document, which can be used by anyone”.

Due to the good results obtained from the survival of the experimental plantations, it was decided to take a step forward for the project to make the leap from research to action. Thus, in 2017 Red Eléctrica signed agreements with CSIC and the Balearic Government for the creation of an “underwater forest” of two hectares of posidonia. A year later planted 12,800 fragments of this plant in the bay of Pollença, northeast of Mallorca. The result was a milestone: the first planting of an underwater forest of this size in the Mediterranean.

The first long-term global evaluation of the project at the end of 2020 revealed a survival rate of more than 90% of the planted material. As adds Jorge Terrados, IMEDEA researcher and head of the project together with Castejón, "the Redeia marine forest continues to show encouraging results. The monitoring of the plantation corresponding to 2022 and the survival rate of the fragments of Posidonia oceanica planted, some of them more than three years ago, remains above 95.75%". The project, , which has received numerous awards and recognitions, is in line with the principles of the “Decade of Ecosystem Restoration” promoted by United Nations for the period 2021-2030 and whose objective is the recovery of degraded natural spaces within the strategy against global warming and the defense of biodiversity.

For the Red Eléctrica Environment technician, the triple alliance between the company, IMEDEA and the regional government “has been the key”. The involvement of the Balearic Executive has led to the Balearic Islands being the place of “reference worldwide in terms of posidonia conservation”, according to the Conselleria de Medi Ambient i Territori. Since 2018, the Balearic Islands have had a decree for the conservation of posidonia, as well as the Posidonia Committee, a body of participation in which all sectors involved in the conservation of posidonia are represented. According to data published in the Official Bulletin of the Balearic Islands, this is the autonomous community that hosts the largest surface area of posidonia meadows in Spain, with 50% of the total, of which 75% are under the protection of the Natura 2000 Network. “The meadows of Ibiza and Formentera are iconic and in the Balearic Islands are the best mapped in Spain,” says the IMEDEA researcher.

To the private, academic and public alliance to conserve Posidonia meadows, it is essential to add the collaboration of society in the conservation of this iconic ecosystem. The educational project “Posidonia in the classroom”, developed by IMEDEA and Redeia, aims to raise the awareness of the local population in schools.

The potential of environmental education

Ferran and Xavier Morell are brothers and teachers at the elementary school Gabriel Comas i Ribas in the Mallorcan municipality of Esporles. The proximity with the IMEDEA, located in the same town, facilitated synergies. "We always do projects and community work, and we met with them to see how we could make an educational intervention. That's when we learned about the underwater forest project," explains Ferran.

From that conversation between teachers and researchers was born in 2015 the first pilot project to bring the school's students closer to the underwater world of posidonia meadows. The classrooms of two classes were presided by aquariums full of adult posidonia to follow up its evolution throughout a course, opening to the students a window to this world so close but hidden under the waters.

“We took a small piece of meadow where we had plants that we do not use to replant, because they do not meet the standards, and we left them in an aquarium, in the classroom,” explains researcher Inés Castejón. “The idea is to bring a underwater forest, a miniature forest, to the classroom and see what is there from January to June,” Ferran adds.

“From the educational point of view, it has a lot of potential because nowadays students have very urban habits, even though we are in a town of 5,000 inhabitants, surrounded by nature, which makes that the reality around you is a great unknown”. The objective is that students learn about their natural heritage, make it their own and become involved in its conservation. This first phase led to a second phase with a European environmental education project in which five more centers on the island participated, to which Morell's teachers shared the initiative, and which, has subsequently been extended to a dozen centers on all the islands, that can apply to participate through a public call.

“It is very motivating to have this response from the educational community because we have hit the nail on the head”, considers the IMEDEA researcher, who goes to each one of the centers participating in the project to give the initial talk. "The meadow that we are planting in Pollença and the plantations that we are doing in Ibiza will not be seen by me or my children, but my grandchildren or great-grandchildren will start to see them. We are doing a job for the generations to come ", she shares with hope.

From the Mediterranean to the Atlantic

As in the Balearic Islands, in the Canary archipelago the submarine electrical connections are also necessary to guarantee the energy supply, and Red Eléctrica is also responsible for building them and transporting the energy through them.

Last year the company carried out works to put into operation a new submarine cable between Lanzarote and Fuerteventura whose objective is, in words of Roberto Cabria, marine biologist and Environment technician of the company, “to give greater strength to the energy system between the islands and to promote the integration of renewable energies in the archipelago”. An action that Red Eléctrica is committed to develop with the least possible impact, something it applies in the implementation of all its infrastructures.

“During the construction work we came across a rocky area through where the cable ran and we had to look for an alternative to see how we could protect both the cable and the ecosystem of the place”, explains this marine biologist involved in all the marine projects of the company. Looking for possible solutions they relied on ECOncrete, an innovation company

that provides bio-powered concrete designed to protect infrastructures with the least environmental impact. “It is a concrete that has a specific additive that improves the qualities of conventional concrete and favors that marine biota grow, that marine life gives it a greater use and that in the end is better integrated into the environment.”

For this purpose, part of the route of the submarine cable laying in the rocky area near the coast of Fuerteventura was covered with this type of concrete. "In May last year we placed the blocks and after six months we saw that this system really works, making the blocks of concrete mimic the environment to such an extent that practically we are not able to see them. In one action we have managed to leave absolutely no trace in the area," he explains, pleasantly surprised by the settlement of native species such as the sea ribbon, the common duster, the painted cabrilla, the pejeverde or the spider crab, which have made that area their habitat, according to data from Tecnoambiente, the company that carries out monitoring.

In this sense, the good results obtained have led Red Eléctrica to consider using this innovative construction material in new infrastructures, such as the current works for the new cable between Tenerife and La Gomera, as well as in the works for the electrical interconnection of the peninsula with Ceuta and a future interconnection with France through the Bay of Biscay. “We have several cables that are going to be interconnected and within these projects we are already assessing the possibility of, where necessary, making a trench in rock and assessing this same technique because we have seen that it works”, comments the marine biologist.

It was in the oceans and seas that life originated, and millions of years later our survival continues to depend on them. Therefore, to ensure that those who come after us continue to enjoy such a vital and vibrant natural environment as the Posidonia meadows, we must act from now on. Future generations demand it of us.