

# THE LIVING PORTS PROJECT



## NATURE-INCLUSIVE PORT INFRASTRUCTURE

Newly released monitoring data, reveals thriving ecosystems on the nature inclusive marine infrastructures at the Port of Vigo.

This achievement is part of the Living Ports Project, an initiative of four organizations from three different countries. Over 30,000 visitors in the first year to the 'Nautilus,' an underwater observation deck at the Port of Vigo—one of Spain's foremost ports renowned for its dedication to sustainability—have observed these results firsthand. There, the local flora and fauna are coming back to life, thriving on a section of the dock where ECONcrete's seawall panels were installed, fulfilling the project's objective: to promote biodiversity in marine infrastructures.

The ports dock is one of the two measures carried out in this project, funded by the European Commission under the Fast Track to Innovation program of Horizon



March 2024



### APPLICATION

Waterfront Infrastructure,  
Shoreline Protection



### PRODUCT

Coastalock & Seawall Panels



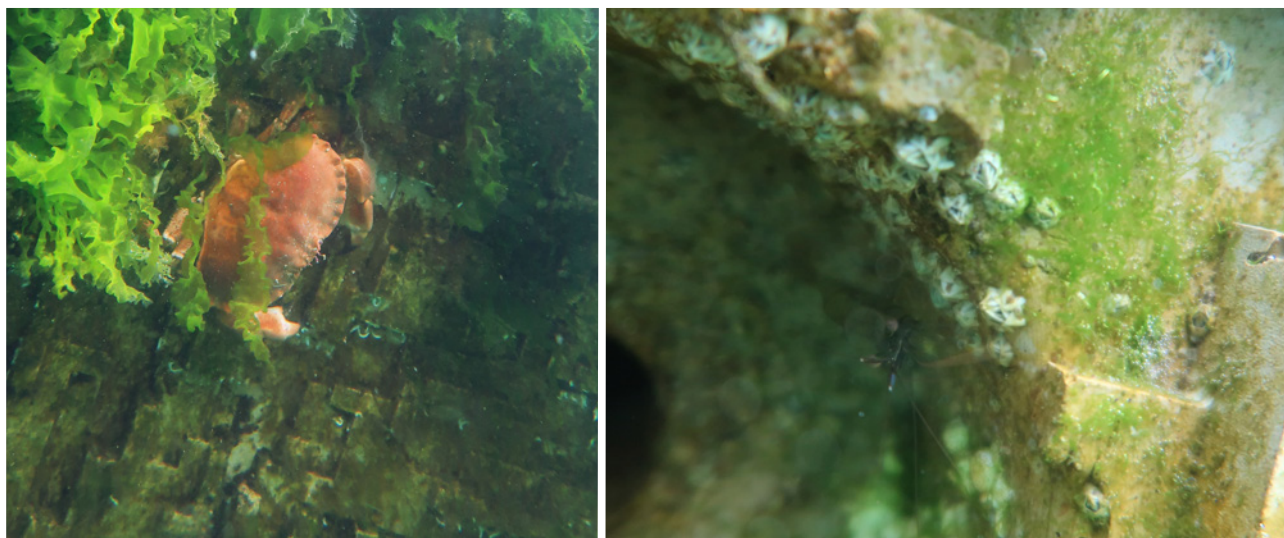
Port of Vigo



This project has received funding from the European Union's Horizon 2020 Research and innovation programme under grant agreement No. GA 970972

2020, which is complemented by the installation of 100 ECONcrete ecological armor units in the Port's breakwater that provide improved coastal stabilization, while simultaneously creating new habitats and promoting biodiversity uplift in the area.

According to Carlos Botana, now President of the Port Authority of Vigo and at that time Director of Sustainability, *"the idea behind this project was born after a conference on ports in which ECONcrete presented its initiatives. At that moment, we found great points of collaboration between both entities, as the Port of Vigo had been establishing its own green port and environmental compensation strategy for years"*.



**The diverse habitats on ECONcrete's installation provide shelter for mobile species and allow vast settlement of sessile species, such as algae and calcium carbonate secreting organisms, which in turn create a natural carbon sink**

Meanwhile, ECONcrete, a company that opened its European offices in Barcelona, Spain, considered that *"the Port of Vigo was the best possible ally to carry out the project due to its positioning and sensitivity to these issues"*, comments Ido Sella, CEO and co-founder of this eco-engineering company created in 2012 by two marine biologists.

After some initial conversations, the Living Ports project was consolidated in 2019, during a meeting in Vigo between Shimrit Perkol-Finkel and Ido Sella, CEOs and co-founders of ECONcrete, and Enrique López Veiga, former President of the Port of Vigo, and Carlos Botana. Four biologists gathered around the table was something that certainly facilitated the agreement. *"Indeed"* – Botana points out – *"the fact that they had specific training in oceanography and marine biology supported the awareness that ports could be built with infrastructures integrated into the marine ecosystem, green infrastructures that can contribute to ports in terms of improving biodiversity, CO<sub>2</sub> absorption or noise reduction, among others"*.

Living Ports project aims to become an inspiring example of nature-inclusive port infrastructure. *"It's all about bringing natural capital to its fullest potential,"* Sella points out. *"It is a fundamental change in waterfront infrastructure, replacing the obsolete 'grey' of traditional concrete with solutions that integrate nature, with structural, environmental and socio-economic benefits"*.

**Next: Two Installations Within Existing Port Infrastructures**



## TWO INSTALLATIONS WITHIN EXISTING PORT INFRASTRUCTURES

The project was approved by the European Commission in December 2020 and formally initiated in June 2021. In 2022, as part of the first project's actions, ECONcrete eco-engineered seawall panels were installed by local contractors in a 310 square meter section of the A Laxe dock. Two designs of the seawall panels were installed (Mangrove and Azuri) with the same concrete composition, to test the differences in how the local marine life responds to different textures and shapes and, in this case, to be able to compare them with conventional concrete.



**SITE 1: Installation of ECONcrete eco-engineered seawall panels on the A Laxe dock, adjacent to the 'Nautilus' observation deck.**



**SITE 2: Coastalock units fit together to provide further stabilization of the breakwater and create ecological uplift opportunities through the creation of diverse habitats from inter-tidal to submerged zones depending on the unit orientation.**

The second project measure consisted of the installation of 100 ECONcrete Coastalock ecological armor units in the Bouzas breakwater, providing stabilization and creating diverse habitats which are absent in most urban waterfronts. This was the first European deployment of the Coastalock which is the first fully structural and ecologically engineered armor unit designed to offer an alternative and/or complement traditional infrastructure.

**Next: Scientific Monitoring to Measure Biodiversity Results**

## SCIENTIFIC MONITORING TO MEASURE BIODIVERSITY RESULTS

The project necessitated scientific monitoring and supervision to assess and confirm the anticipated biodiversity outcomes. ECONcrete and the Port of Vigo agreed that a renowned academic institution should undertake this role and selected the Technical University of Denmark (DTU). This institution possesses numerous chairs specializing in the various fields relevant to the project, enabling it to fulfill the task comprehensively in both ecological and structural dimensions.



**DTU scientists will carry out up to six monitoring inspections of the project.**

For this purpose, the researchers faced the challenge of developing new methods to assess the mechanical, physical and chemical properties of concrete covered with biological growth, such as barnacles, mussels and algae. Wolfgang Kunther, Associate Professor in the Department of Environmental and Resource Engineering at DTU explains the process: *“Concrete interacts with its environment, due to its porous microstructure and the many small minerals that glue concrete together. These minerals can interact with seawater and the CO<sub>2</sub> from the air, which very slowly changes concrete and its properties. These processes are likely affected by biological growth, in addition to the possible effect of these organisms.”*

On traditional concrete surfaces, smooth and homogenous, monitoring is performed with standard equipment, but the rough surface of the ECONcrete solution, which is a crucial part of biological colonization, *“makes it almost impossible to use standard equipment for engineering assessments, hence we developed a new strategy for monitoring the interaction between biology and ECONcrete’s material”*, he explains. As part of their monitoring strategy, DTU is employing a camera-based approach allowing them to document the effects of the bio-enhancing concrete on fish abundance and biodiversity.

In the long-term, it is expected that the eco-engineered infrastructures installed in this project will enhance local biodiversity by creating well-defined local ecosystems that mimic natural habitats and important ecological niches.

As exemplified by Jon C. Svendsen, a researcher at DTU, *“prior to the installation of the coastallocks limited – if any – rock pools available. The project needs further time and data to document how the organisms have adapted to the new, bio-enhanced concrete.”* As the months go by, the results of the biodiversity tracking and monitoring will provide further evidence of the ecological value of nature-inclusive port infrastructures. DTU scientists have already completed four monitoring inspections of the project.

**Next: A Community Engagement Space**

The Living Ports Project | [www.livingports.eu](http://www.livingports.eu)



## A COMMUNITY ENGAGEMENT SPACE

This project has also set ambitious dissemination goals, by inviting the public to witness the ecological uplift. An underwater observatory, called Nautilus, has been installed in the A Laxe dock, a window into the waters of the port that allows to closely monitor the process of biodiversity flourishing in the area, both on the panel installed and in the surrounding area.



Since its opening to the public last May, the underwater observation deck has already been visited by thousands of visitors including schools and local citizens.

According to Borja Cardama, head of the R&D Department at Cardama Shipyard, the shipyard that was commissioned to design and build the observatory structure as the fourth entity in the project, *“the integration of this eco-pedagogical space is something completely new, as it is an observatory that offers the project the capacity to really get closer to the public by managing, thanks to the Port Authority of Vigo, its opening to organized visits with educational centers and organizations during the week, and to the general public at weekends, explaining the basis of the project, its objectives and the European funding”*.

But there's even more: *“The research team itself has the possibility to monitor directly what is happening on the panels in front of the observatory window, being able to make decisions regarding the planning of sampling carried out and saving on underwater activities”*.

Carlos Botana emphasizes the relevance of the scientific and technical research that makes it possible to develop these environmental outreach activities, and assures that *“raising awareness of sustainability and marine biodiversity, as well as the importance of taking care of the oceans, is key, although it is true that such initiatives would be meaningless without a project to support them”*.

**Next: A Step Forward for the Port of Vigo**

## A STEP FORWARD FOR THE PORT OF VIGO

*“Living Ports represents a step forward in the international dissemination of the sustainability activities that we carry out in the Port of Vigo”,* considers its current president, Carlos Botana, who highlights that *“the project has been awarded by the International Association of Ports and Harbors (IAPH) in the category of Sustainable Infrastructures. This award recognizes the importance of the implementation of green infrastructures in ports and makes the Port of Vigo, and the project, the object of the gaze of the international port community”.*



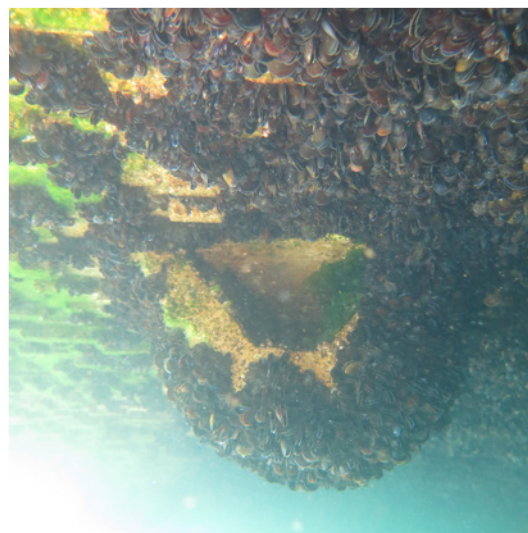
In May 2022 the President of the Port of Vigo, Carlos Botana and the Head of Infrastructures, Gerardo González, received the award for the Living Ports project in the category of Sustainable Infrastructures granted by the International Association of Ports and Harbors.

When it comes to sustainability, it becomes necessary to act. *“A lot of people think that it is a matter of compliance, of mitigation”,* says Ido Sella, *“we have to start considering that needed port infrastructures such as seawalls and breakwaters can also provide ecological enhancement opportunities to achieve biodiversity results at scale. Ports can be a very important factor in the contribution to the ocean’s health”.*

## HIGHLY POSITIVE RESULTS



**Left: photograph from a coastal lock, displaying diverse marine life, 3 months post-installation**



**Right: photograph from a sea wall 'pocket tile' - barely distinguishable due to marine life cover**

The Port of Vigo has progressively come to life since the installation of the two infrastructures. Preliminary data obtained by EConcrete reveals that the new infrastructure is being integrated into the ecosystem and marine life is flourishing along the installed seawalls.





**Captured by DTU:** juvenile fish feeding off algae growth on the seawall in the port installation. The seawall provides shelter during this vulnerable life stage, and creates the conditions for a rich and nutritious diet.

Today, species such as green and brown algae, barnacles, crabs, limpets, worms, sea cucumbers, snails, starfish, and tunicates are thriving on EConcrete Infrastructure.

From the monitoring report:

A total of 30 invertebrates, 24 algae species, two lichens, and two fish species were documented during the first monitoring event, **3 Months Post-deployment (MPD)**, both on EConcrete's structure and control.

**At 6 MPD**, a total of 36 invertebrates, 28 algae species, two lichens, and six fish species were documented.

**At 9 MPD**, a total of 47 invertebrates, 27 algae species, and two fish species were documented. The sessile community was comprised of algae, lichens, bryozoans, sponges, tunicates, cnidarians, polychaetes, crustaceans, and mollusks, while the mobile invertebrate community was comprised of crustaceans, mollusks, echinoderms, and fish.

The images obtained from the monitoring are evidence of an ecological improvement that would not have been possible using a standard marine structure built with traditional concrete. **Full monitoring report available upon request.**

So far, the results obtained by DTU are encouraging: *"Our monitoring process has been successful, with clear detections of rich biodiversity in the Port of Vigo,"* reports Jon C. Svendsen. These findings in the port are already visible to the naked eye.

The conclusion, in Carlos Botana's words, is that we can speak of *"very positive results"*, especially in terms of the colonization of marine life on the infrastructures installed, *"both in the vertical faces, if we compare it with a traditional concrete of a new dock, and those observed in the tests carried out on the breakwater"*.

For his part, Ido Sella points out that *"it is an immense satisfaction that a port infrastructure could foster so much nature and it is a great honor to see that our vision has not only been supported, but also exceeding our goals, providing us with incredible data"* and concludes that *"the reaction of the public when they see this is the best proof of the project's success as people see that responsible construction is possible and that ports can play an active role in contributing to oceans health"*.

**For further details and photo, video and scientific monitoring reports, please reach out to [info@econcretetech.com](mailto:info@econcretetech.com)**

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