



Restoring Marine Life at Scale

By integrating regenerative technologies, digital tools and advanced reporting systems, Ocean Ecostructures is helping businesses harness their underwater infrastructure to offset their impact on marine life.

Executive Summary

To restore the health of the oceans, a Barcelona-based start-up has developed a sophisticated system to boost marine life and monitor its ongoing health and vitality. To date, Ocean Ecostructures has installed more than 190 “life boosting units” on artificial underwater structures, such as marinas, ports, oil rigs and wind turbines, and has secured 600 more orders. Its moonshot goal is to install 20,000 of these units by 2030.

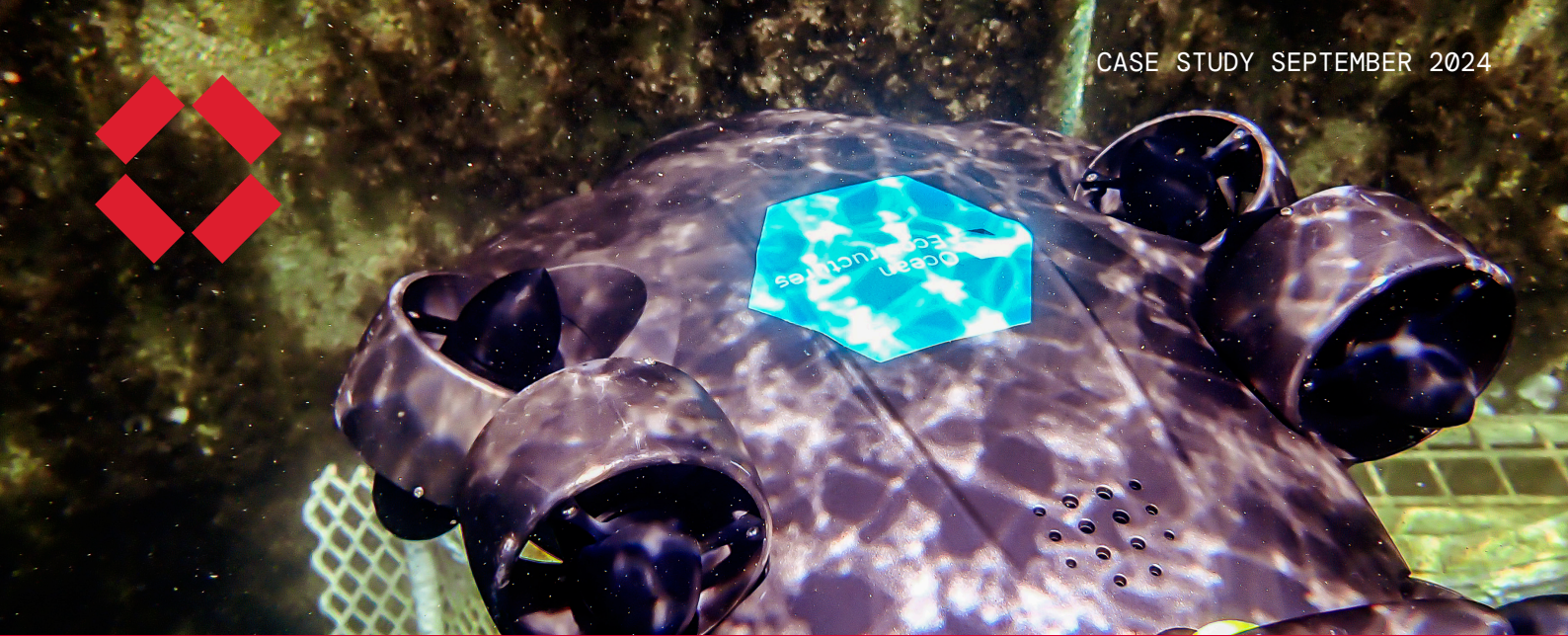
Its regenerative technology combines a “microfauna attraction system, a natural substrate to maximise life colonisation and a nursery/shelter space”. Whereas a bare concrete structure can only support a handful of microfauna species, Ocean Ecostructures’ life boosting units can support almost 112 different species, which can then attract a wider variety of fish and other marine life. The company says these portable units can be attached and detached without harming the natural environment.

Once installed, the units’ impact on natural ecosystems is monitored using underwater drones with high-definition cameras and multiple sensors. The resulting data can then be analysed via the company’s iOceans® digital platform, which uses artificial intelligence to identify the species, and models to calculate key trends and make predictions,

as well as producing reports and images in a variety of formats. Its customers can then use this collateral to help meet their ESG compliance requirements and demonstrate to both regulators and investors that they are taking robust steps to offset their impact on the marine environment. By providing ongoing monitoring and reporting, Ocean Ecostructures aims to deliver much more rigorous and informative data than periodic assessments by biologists.

Having decentralised its logistics and production system so that its units can be produced locally with off-the-shelf components, Ocean Ecostructures either provides the full solution as-a-service or sells the units outright and then charges a subscription for the monitoring and reporting service. It estimates the total addressable market is worth about €5 billion per annum.

After raising seed funding from three venture capitalists in November 2023, Ocean Ecostructures has plans to conduct another funding round in 2025 to accelerate the renaturalization of infrastructures in different regions, turning them in blue oases. It also plans to develop new formats and technologies, as well as further enhance the versatility and effectiveness of its solution. For example, it plans to pre-seed its units with “high environmental value species” to speed up the regeneration process.



The oceans are in crisis. Like the rest of the planet, they are struggling with the impact of human activities, which range from rising temperatures and acidity to a major loss of biodiversity. This ongoing damage could have huge ramifications – marine life captures CO₂, and is a vital source of food, medicines and happiness for billions of people.

“We have lost something like 50% of marine biodiversity in the last 50 years,” notes Ignasi Ferrer, CEO of Ocean Ecostructures, a Barcelona-based start-up that is developing technologies to restore the health of underwater ecosystems. “And we’re still having something like 16,000 marine species endangered, so this is serious. We have lost something like 80 per cent of kelp in the North Sea and 30 per cent of the *Posidonia* seagrass in the Mediterranean, which is the number one CO₂ remover. This is an unbalance and we are in trouble.”

To make matters worse, human beings are stepping up their efforts to exploit the oceans, resulting in a phenomenon known as the Blue Acceleration. “Cruise lines, transportation, fishing, oil. Any figure you find, any statistic, you can see that it is growing exponentially,” says Ignasi Ferrer.

He argues that establishing protected areas of the ocean is not enough: businesses operating in the ocean also need to be more sustainable and offset their impact on marine ecosystems. To that end, Ocean Ecostructures is developing solutions to help companies with underwater infrastructure to restore marine life at large scale. Its aim is to make artificial structures, such as ports, marinas, wind turbines, oil pipelines and cabling, more receptive to life. “We cannot suspend the economic activities,” Ignasi Ferrer says. “But we can turn those grey spaces into blue spaces. If we were able to restore all the marine life we have destroyed, we would absorb 40% of the CO₂ in the atmosphere.”

Ocean Ecostructures’ approach is to adapt artificial infrastructure to become nurseries for a wide range of marine life. “The ocean is a big soup of microfauna looking for a place to stop. But concrete is too harsh

and acid, with no biogenic capacity,” explains Ignasi Ferrer. “Only a few species can grow on it. Those few species occupy all the surface and they don’t allow many fish to live because there is little options of food for them. So only certain fish can grow in the area.”

To change that dynamic, Ocean Ecostructures works with the owners of underwater structures to install “life boosting units” that can nurture up to 112 different species of microfauna, creating a complex ecosystem that can, in turn, support a much wider range of fish. “All of a sudden what happened is that, for example, we now have groupers in the ports,” says Ignasi Ferrer. “Now, we have sea horses in the ports. Now we have trigger fish in a port. All of that creates a complex ecosystem. These fish can spawn and grow. Then they will leave the port and occupy the surrounding areas and that would benefit fishing. The same happens with an oil rig, with an offshore wind turbine. If you put in our units, then it all becomes a macro coral reef.”

The business is growing fast. Formed in July 2020, Ocean Ecostructures launched its first prototype in October 2021. By June 2023, the Barcelona company’s four-strong team had deployed 40 units. One year later, Ocean Ecostructures employed 18 people and had deployed 165 units, with 600 more units more in the pipeline. Its “moonshot goal” is to install 20,000 units by 2030. Existing customers include major energy companies, such as the Elia Group, and leading ports, including Barcelona and Tarragona.

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Ignasi Ferrer - CEO of Ocean Ecostructures

Replicating the magic of the natural world

Ocean Ecostructures' "biomimetic micro reefs" are designed to replicate the way a natural reef works in terms of aesthetics, shape and texture. They combine a "microfauna attraction system, a natural substrate to maximise life anchoring and a nursery/shelter space". The life boosting units are "coated with calcium carbonate, the same surface as corals," explains Ignasi Ferrer. "Our scientists have put everything together that makes a natural reef so magical and successful from an environmental perspective into a box-shaped structure that can be installed on any marine structure." These life boosting units are designed to be attached and detached without damaging the environment and affecting the company's operations.

At the same time, Ocean Ecostructures has developed technology to monitor the impact of each of the units. It has built underwater drones equipped with high-definition cameras and sensors that can measure biodiversity, biomass, CO2 removed, oxygen generated, temperature, acidity and other physico-chemical parameters. All of this data is transmitted to a cloud-based storage system using Wi-Fi.

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Ignasi Ferrer - CEO of Ocean Ecostructures

Ocean Ecostructures then makes this data, curated using artificial intelligence, available to customers through its purpose-built iOceans® digital platform. Accessible via an app, the platform shows trends in the data and predicts how various parameters are likely to evolve. It can be used to assess new activities in the marine environment and the future management of these, as well as to analyse clusters of units and compare them with the performance of units installed by other customers. "It can indicate types of species, identify the presence of allochthonous species, and identify their functionality and value on the ecosystem," adds Ignasi Ferrer. "So customers have all this information, which is extremely valuable for them."

Ocean Ecostructures can provide its clients with an annual report, as well as images and video they can use on social media, and a public app that can provide transparency to their customers and citizens. "Students from schools are coming to marinas to see our units, track their performance and see what the figures are. That enables not only transparency, and avoids green washing, but also provides an opportunity to teach, to generate awareness of how wonderful the ocean is," adds Ignasi Ferrer.

This elaborate and sophisticated reporting system is what makes Ocean Ecostructures' system scalable, he stresses. Most marine businesses want to be able to provide regulators and investors with detailed and concrete evidence of what they are doing to restore the oceans, Ignasi Ferrer says, suggesting that only a small minority of business will be motivated solely by the moral and ethical considerations.

"For most of our customers, they pay for the technology because they get extremely valuable data that shows that they are offsetting the impact, they're doing something good, that is being approved by scientists," he explains. "This information is very valuable for the ESG compliance requirements and very valuable for forthcoming legal requirements, such as the Corporate Sustainability Reporting Directive (CSRD), around protecting natural capital. If we want to do this at scale, we need to show the economic value. And to show the economic value



of that, we need to monitor and report in a reliable consistent way.” By providing ongoing monitoring and reporting, Ocean Ecostructures aims to deliver much more rigorous and informative data than periodic assessments by biologists.

The world is its oyster

Ocean Ecostructures’ life boosting units are designed to be installed near the surface (rather than on a deep sea bed), providing marine species with an alternative habitat to coastlines that have been degraded by human activities. As climate change increases the water temperature, some species are struggling to survive on coastlines, but could prosper on artificial structures located in the open sea where the water tends to be cooler.

In some oceans, the oxygen and salinity levels are better suited to life than others, but, in general, Ocean Ecostructures is targeting a global market – any business with underwater infrastructure is a potential customer. One priority is to turn decommissioned oil and gas rigs into nurseries for marine life. Ignasi Ferrer estimates that up to 12,000 such rigs will be decommissioned in the next 10 years. “That’s a great opportunity for us and that’s a great opportunity for the ocean as well,” he says.

Ocean Ecostructures has decentralised and streamlined its logistics and production system so that its units can be produced locally with off-the-shelf components. “This allows us to grow fast because we are not reliant on one single supplier and also that reduces significantly our CO2 impact, because we don’t need to move units from Spain to the Netherlands or to the U.S., for example.” The business also trains local people to operate the monitoring and reporting systems.

Ocean Ecostructures can provide its solution as-a-service – customers pay a monthly fee which includes the unit plus monitoring plus reporting plus maintenance. That proposition mostly appeals to marinas and smaller customers.

Larger businesses tend to buy the units outright and then pay a subscription for the monitoring and reporting service. Ignasi Ferrer estimates the total addressable market is worth about €5 billion per annum.

Having started by serving marinas, Ocean Ecostructures has since expanded to work with commercial ports, oil companies, and now wind turbine operators. The company is also entering into discussions with the fishing industry, which could benefit from turning commercial ports into nurseries for fish.

Although it is relatively straightforward to secure permission to install life boosting units on existing structures, regulations can make it difficult to build artificial coral reefs from scratch, even in areas where natural reefs have been destroyed. “That’s something we should be changing because there are amazing opportunities,” says Ignasi Ferrer. While he would welcome a relaxation of these regulations and directives, Ocean Ecostructures is not looking for public funding or grants. “The only way to do this at scale is making sure that we generate economic value for the customers,” he says.

Having started with funding from friends and family, Ocean Ecostructures raised seed funding from three venture capitalists in November 2023. It has plans to conduct another funding round in 2025. Although Ignasi Ferrer estimates another 20 companies are also developing marine regenerative technologies, he believes Ocean Ecostructures has a two-year technology advantage over these competitors. “We want to keep that, so now we are investing a lot on developing new technologies, improving what we have, developing new functionalities for our customers and new ways of implementing our technology.”

For example, Ocean Ecostructures is developing technologies to pre-seed its units with “high environmental value species” to speed up the whole process of regeneration. “We can provide more value-add by including some species that are extremely valuable,” explains Ignasi Ferrer. “Our fundamentals are – all we do must be science-based and we must have a top-notch product with top technology.”

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About Ocean Ecostructures

Ocean Ecostructures is a cutting-edge technology company dedicated to regenerating biodiversity in marine infrastructures like ports and offshore wind farms. Our pioneering Bio Boosting System seamlessly integrates regeneration, robotics, and AI, transforming these infrastructures into "blue oases" that significantly enhance marine life. Since our founding in 2021 in Barcelona, we've installed over 160 units, restoring 293+ species, sequestering CO2, and accumulating biomass. We collaborate with leading research institutions and have earned recognition through prestigious accelerator programs and international awards, driving a Nature Positive future for our oceans.

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