

Some scientists say wind turbine areas are like artificial reefs, creating sanctuaries for marine life. But plenty of questions regarding their environmental impact remain. The global shift to renewable energy is well underway, including large-scale deployment of offshore wind farms. There are already about 3,600 turbines operating along European coasts, with 14 more wind farms under development.

Even more wind energy is needed to meet the goals of the Paris climate agreement — but the push to boost European offshore wind power 40-fold by 2030 will change regional ocean ecosystems in profound and unexpected ways, according to researchers studying how the turbines affect the environment.

Most of the research stems from northern Europe, where offshore turbines have been operating since 1991. Scientists say this research can help shape plans for deploying offshore wind turbines in other parts of the world.

A recent study on the Mediterranean identified wind energy and wildlife hotspots, based partly on lessons learned in northern Europe. The science is also useful in places like Japan and the United States, where a boom in the development of offshore wind energy appears imminent.

De facto ocean sanctuaries?

Offshore wind developers along the US East Coast, for instance, are able to better protect endangered whales because research in the North Sea shows that construction noise temporarily displaces some fish and marine mammals; so they're now timing building to avoid affecting those species when they are in the area, said Greer Ryan, a sustainability researcher with the Arizona-based Center for Biological Diversity.

Off the Scandinavian coast, scientists have watched some of the underwater turbine foundations gradually transform into artificial reefs, attracting mollusks and small fish that feed on plankton. This magnet effect goes right up the food chain to larger fish, seals and dolphins.

Some scientists have described these zones as de facto marine sanctuaries because fishing is often limited directly around the turbines.

Seafloor ecosystems may even be recovering in areas where fishermen have “pulverized” the seabed by dragging heavy nets along the seafloor for 100 years, said Jason Hall-Spencer, a marine biologist at the University of Plymouth.

Unexpected effects

But the long-term consequences of wind turbines on marine life are still unclear.

Targeted monitoring and studying of ecosystems could help minimize unwanted impacts on fish and marine mammals, said United Kingdom-based marine researcher Andrew Gill. He

has advocated a holistic research approach that considers how all the species in an area function together.

Current policy focuses too much on studying single designated species in isolation, he believes. Ecosystem study can help determine for example migratory routes, and involve better planning on location selection.

Some effects may be unexpected. Certain species of sharks and rays, for example, use electromagnetic fields to navigate and hunt for food; and those animals react to electric energy leaking from offshore wind installations, including transmission cables on the seafloor, where the rays scuffle through the sediment in search of prey.

The impact of offshore wind farms should also be considered on the much larger scale of the ocean, said Hall-Spencer.

“The footprint is minimal compared to the vast area of the sea. The impacts are very localized and small, especially compared to the effects of fishing or warming of the oceans,” he said.

#### Displaced dolphins

For marine mammals, it’s the wind turbine construction phase for that has the biggest impact, according to marine biologist and consultant Victoria Todd, who has spent years studying seals, dolphins and whales around wind farms and drilling rigs.

The loud sound pulses during construction affect some species up to 12.5 miles (20 kilometers) distant.

Harbor porpoises, for example, are especially sensitive to the frequencies generated by pile driving — the process of installing poles into the ocean floor for the wind turbine foundations.

For up to six weeks, construction can push out marine mammals from large areas of their habitat, Todd said, explaining that offshore operators are bound to strict measures to try and ensure that marine mammals are not physically hurt.

But once the installations are done, the animals return, she said, adding that scientists are seeing a similar process around some decommissioned oil and gas drilling platforms in the Gulf of Mexico. There, the US government is promoting the growth of productive ecosystems with the Rigs to Reefs program.

Still, the overall regional effects of offshore wind are still unclear; partly because the industry has grown so fast, but also because oceans are — by nature — complex and dynamic ecosystems.

Gill said it’s too early to draw conclusions. Better monitoring is needed to determine whether ocean biomass is actually growing because of the wind farms, or if the ecosystems

are just being shifted around by the turbine fields.

“We need to demonstrate they are good. If these are as good as we think they are, let’s show it. If not, let’s do something about it,” he told DW.

#### Cumulative effects

The impacts of new offshore wind turbines should be considered together with effects from all other human activities, such as fishing, dredging, and oil and gas drilling, points out Bruna Campos, a marine and fisheries policy officer with BirdLife International, which has been watchdogging the wind industry for a while.

“We want renewable energy, and we fully support the commitments that have been made, but we think offshore wind farms need to go through the same review process as any other type of energy project,” she told DW.

“You have to acknowledge that the moment you build wind farms, it can have major consequences for the survivability of species,” she added. Birds in particular are affected by wind farms.

According to Campos, authorities are making progress on large-scale plans that consider wildlife impacts — but the pressure to fast-track offshore wind means that they sometimes fall short of their legal obligations. As a result, conservation advocates have challenged a few wind energy projects in court.

Spatial planning deadlines for offshore development are coming up in 2021. Campos said that if countries don’t use a solid ecosystem-based approach for those plans, the European Union needs to hold them accountable.

“The European Commission needs to go back and say, ‘you are not doing it right, you are failing,’” she said.

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