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Ocean mining’s energy potential could put global fisheries at risk

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By Emily De Sousa

A recent statement signed by more than 500 scientists calls for a moratorium due to potential impacts on fisheries, ecosystems

A manganese nodule found in the sea bed. Hundreds of scientists are warning that impacts from ocean mining to gather such rare earth minerals may devastate existing marine industries, including fisheries. Shutterstock image.

With the planet in a climate crisis, the race to find renewable energy solutions is on. Recently, ocean mining has been introduced as an opportunity to extract rare earth metals to support renewable energy infrastructure, such as wind turbines and solar panels.

Ocean mining or seabed mining operations target metals like nickel, cobalt and copper, which have previously not been exploited because of their isolated locations in the deep sea, as well as technological and financial restraints. However, increasing demand for these metals and significant innovations in technology have removed many the obstacles previously associated with acquiring them. As a result, the interest in deep-sea mining is growing.

Proponents of ocean mining say it is necessary to produce the minerals needed for renewable energy in a way that is less destructive than land mining. Opponents counter that these minerals can indeed be generated with minimal environmental impact, such as through recycling electronics. The *Advocate* takes a closer look at the potential impacts on fisheries and ecosystems.

A potentially risky proposition

While ocean mining has not officially begun yet, **22 international mining companies have received approval** (https://isa.org.jm/exploration-contracts) to begin exploration operations in the Eastern Pacific Ocean, Indian Ocean and Western Pacific Ocean.

Notably, these areas being explored for ocean mining are also fishing grounds for some of the world's most economically important deep-water fisheries, including billfish and tuna. Many scientists are cautioning that ocean mining has the potential for far-ranging and severe impacts on high-seas fisheries, which could have negative consequences for the catches of many countries.

"We expect to see different impacts," says Dr. Jesse van der Grient, a post-doctoral researcher from the University of Hawaii. "It can come via seafood contamination and it also come via a potential reduction in biomass of tuna billfish, if their prey are being reduced because to the suspended sediments."

This is one reason why van der Grient and more than 500 other scientists have signed a statement calling for a deep-sea mining moratorium, saying there isn't enough understanding about the potential impacts.

A blue paper commissioned by the **High Level Panel for a Sustainable Ocean Economy** (https://oceanpanel.org/blue-papers/ocean-energy-and-mineral-sources) found that ocean mining is a potentially risky proposition. Additionally, studies on benthic organisms like corals, sea urchins, bivalves and crabs, have shown irrecoverable decreases in biomass and species diversity as a result of small mining-like disturbances.

The practice of ocean mining involves excavating the ocean floor and collecting metals, like manganese nodules, from the seabed. These metals are pumped from the seabed to the surface through a pipe, while wastewater and debris are dumped into the ocean, forming large sediment clouds underwater.

As a result of these practices, there is potential for ocean mining to release sediment and toxins into the water which could cause contamination and loss of productivity in deep-water fisheries. Dr. Jesse van der Grient and Dr. J.C. Drazen recently explored the potential **impacts of deep-sea mining on pelagic fisheries** (https://doi-org.subzero.lib.uoguelph.ca/10.1016/j.marpol.2021.104564), including tuna and billfish.

"This paper is the first to explore the impacts on deep sea mining on fisheries on a commercial scale," van der Grient told the *Advocate*. "We expect to see different impacts, but we'll most likely see economic reduction due to lower catches."

The study found three main impacts of ocean mining on deep-water fisheries: (1) species like tuna may face food shortages if midwater ecosystems, which tuna rely on for forage, are impacted by sediment plumes; (2) water discharged from ocean mining operations may have higher concentrations of metals, including toxic elements like mercury, which can contaminate seafood resources; and (3) the noise and sediment plumes created by ocean mining might result in an avoidance by commercial species like tuna, altering migration patterns.

These impacts could cause seafood contamination or a reduction in biomass of tuna and billfish. However, van der Grient's biggest concern is the spatial scale of mining impacts, which she says is currently unknown. As water naturally moves and flows, it is impossible that the impacts of mining operations will remain isolated to only the area where mining is taking place. However, the impacts, including the discharge of unwanted sediments, could enter the marine ecosystem, stretching for kilometers and remaining in the water for weeks or months.

Due to the locations of the proposed ocean mining sites, van der Grient also worries that negative impacts from ocean mining will further contribute to inequality.

"Countries that fish [in these areas] don't fish there in equal quantities. It could lead to unequal effects in different countries," she said. "That's really the conversation we wanted to start."

While most countries' catches have limited intersection with proposed mining areas, there are several nations, including many developing or small island nations, which could see larger parts of their catches affected. Van der Grient's study finds that in some areas, as much as 10 percent of the catch

may be impacted, resulting in significant declines to these countries' economies and food security. Reporting these impacts on fisheries may also pose an additional risk.

"Local fishermen who see impacts on their livelihoods can go to their governments," she said. "But if it's in international waters, where most mining projects will occur, fishermen need to go to the International Seabed Authority."

It becomes more difficult to report impacts on fisheries in the high seas due to limited monitoring and no existing process for reporting mining impacts.

Growing a blue economy

As more exploration contracts are granted, the threat of ocean mining to fisheries is becoming more significant. Some researchers, like Dr. Douglas McCauley, an associate professor in the Marine Science Institute at the University of Santa Barbara, is surprised that fisheries stakeholders are not discussing ocean mining more seriously. He started his career as a fisherman, but his current work focuses on trying to understand big-picture questions about how new industries impact traditional industries, particularly fisheries and seafood. And when it comes to ocean mining, he's not confident that the two are a good match.

"We should be thinking about growing a blue economy, but we need to think about what kind of overlap there might be with industries and what new industries might be dangerous to other industries in our blue economic portfolio," he said.

The development of the blue economy, which refers to the sustainable use of ocean resources for economic growth, improved livelihoods and marine ecosystem health, has become a bit of a buzzword in recent years. However, the development of ocean space and resources is something that the fisheries industry should be getting more involved in, McCauley said. He urges fisheries industry stakeholders to get involved in conversations about ocean mining to ensure their interests are protected and fisheries remain productive through this stage of blue growth.

And to policymakers already at the table, he cautions: "We need to make some hard decisions that some industries are not compatible with our blue economy. Ocean mining might be one of those hard-to-fit new industries."

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Author

EMILY DE SOUSA

Emily is a fisheries scientist and a social media influencer based in Niagara, ON. She is the founder of Seaside with Emily, an online travel and seafood blog. She works in the Coastal Routes lab, where her research focuses on alternative seafood networks in North America.

Seaside with Emily

https://seasidewithemily.com/
(Instagram: @seasidewithemily, Twitter: @emilyseaside, Linkedin: Emily De Sousa)
IG: https://www.instagram.com/seasidewithemily/
Twitter: https://twitter.com/emilyseaside
Linkedin: https://www.linkedin.com/company/34688936/admin/
https://coastalroutes.org/