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Protecting the Deep Sea

Thousands of feet below the ocean's surface lies a hidden world of undiscovered species and unique seabed habitats — as well as a vast untapped store of natural resources that includes valuable metals and rare-earth minerals. Technology and infrastructure development worldwide is dramatically increasing demand for these resources, which are key components in everything from cars and modern buildings to computers and smartphones. This demand has catalyzed interest in mining huge areas of the deep-sea floor.

In a paper co-authored by Steven Gaines, dean of UC Santa Barbara's Bren School of Environmental Science & Management, researchers from the Center for Ocean Solutions and co-authors from leading institutions around the world propose a strategy for balancing commercial extraction of deep-sea resources with protection of diverse seabed habitats. The paper is intended to inform upcoming discussions by the International Seabed Authority (ISA) that will set the groundwork for future deep-sea environmental protection and mining regulations. The study is published in this week's edition of Science.

"Our purpose is to point out that the ISA has an important opportunity to create networks of no-mining Marine Protected Areas (MPAs) as part of the regulatory framework they are considering at their July meeting," said lead author Lisa Wedding, an early-career science fellow at the Center for Ocean Solutions. "The establishment of regional MPA networks in the deep sea could potentially benefit both mining and biodiversity interests by providing more economic certainty and ecosystem protection."

The ISA is charged with managing the seabed and its resources outside of national jurisdictions for the benefit of humankind. According to the United Nations Convention on the Law of the Sea (UNCLOS), the deep seabed is legally a part of the "common heritage of mankind," meaning that it belongs to each and every human on the planet.

"The ISA is the only body with the legal standing and responsibility to manage mining beyond national jurisdiction," said Kristina Gjerde, an international high-seas lawyer and co-author on the Science paper.

Since 2001, the ISA has granted 26 mining exploration contracts covering more than one million square kilometers of seabed, with 18 of these contracts granted in the past four years. Researchers recommend that the ISA, as part of its strategic plans to protect deep-seabed habitats and manage mining impacts, take a precautionary approach and set up networks of MPAs *before* additional large claim areas are granted for deep seabed mining.

"Given our paltry understanding of deep-sea environments, regional networks of MPAs that designate significant portions of the deep seabed as off-limits to mining would provide key insurance against unanticipated environmental impacts," said Gaines.

Mining impacts could affect important environmental benefits that the deep sea provides to human beings. For example, the deep sea is a key player in our planet's carbon cycle, capturing a substantial amount of human-emitted carbon that impacts both weather and climate. Mining activities could disturb these deep-sea carbon sinks, releasing excess carbon back into the atmosphere. The deep sea also sustains economically important fisheries and harbors microorganisms that have proven valuable in a number of pharmaceutical, medical, and industrial applications.

"Deep-sea areas targeted by mining claims frequently harbor high biodiversity and fragile habitats, and may have very slow rates of recovery from physical disturbance," said Craig Smith, a co-author and professor of oceanography at the University of Hawaii at Manoa. Smith and a team of scientists helped the ISA pioneer the deep sea's first regional environmental management plan in 2012, for an area of the Pacific Ocean known as the Clarion-Clipperton Zone (CCZ). The plan honored existing mining exploration claims but also resulted in a network of MPAs to

protect delicate habitats. The CCZ serves as a model for how future deep-sea ecosystem management could unfold.

“This kind of precautionary approach achieves a balance of economic interests and conservation benefits,” said co-author Sarah Reiter, an ocean policy analyst at the Monterey Bay Aquarium.

The upcoming ISA session on July 15 represents a critical juncture for defining the future of deep-sea mining and protection.

“The time is now to protect this important part of the planet for current and future generations,” said co-author Larry Crowder, a science director at the Center for Ocean Solutions and senior fellow at the Stanford Woods Institute for the Environment. “Decisions that affect us all will be made by the ISA this summer.”

About UC Santa Barbara

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