

ID: W2783036603

TITLE: An Overview of Seabed Mining Including the Current State of Development, Environmental Impacts, and Knowledge Gaps

AUTHOR: ['Kathryn Miller', 'K. F. Thompson', 'Paul Johnston', 'David Santillo']

ABSTRACT:

Rising demand for minerals and metals, including for use in the technology sector, has led to a resurgence of interest in exploration of mineral resources located on the seabed. Such resources, whether seafloor massive (polymetallic) sulfides around hydrothermal vents, cobalt-rich crusts on the flanks of seamounts or fields of manganese (polymetallic) nodules on the abyssal plains, cannot be considered in isolation of the distinctive, in some cases unique, assemblages of marine species associated with the same habitats and structures. In addition to mineral deposits, there is interest in extracting methane from gas hydrates on continental slopes and rises. Many of the regions identified for future seabed mining are already recognised as vulnerable marine ecosystems. Since its inception in 1982, the International Seabed Authority (ISA), charged with regulating human activities on the deep-sea floor beyond the continental shelf, has issued 27 contracts for mineral exploration, encompassing a combined area of more than 1.4 million km<sup>2</sup>, and continues to develop rules for commercial mining. At the same time, some seabed mining operations are already taking place within continental shelf areas of nation states, generally at relatively shallow depths, and with others at advanced stages of planning. The first commercial enterprise, expected to target mineral-rich sulfides in deeper waters, at depths between 1,500 and 2,000 metres on the continental shelf of Papua New Guinea, is scheduled to begin early in 2019. In this review, we explore three broad aspects relating to the exploration and exploitation of seabed mineral resources: (1) the current state of development of such activities in areas both within and beyond national jurisdictions, (2) possible environmental impacts both close to and more distant from mining activities and (3) the uncertainties and gaps in scientific knowledge and understanding which render baseline and impact assessments particularly difficult for the deep sea. We also consider whether there are alternative approaches to the management of existing mineral reserves and resources, which may reduce incentives for seabed mining.

SOURCE: Frontiers in marine science

PDF URL: <https://www.frontiersin.org/articles/10.3389/fmars.2017.00418/pdf>

CITED BY COUNT: 358

PUBLICATION YEAR: 2018

TYPE: article

CONCEPTS: ['Seabed', 'Geology', 'Continental shelf', 'Seafloor spreading', 'Oceanography', 'Mineral resource classification', 'Seamount', 'Abyssal plain', 'Continental margin', 'Earth science', 'Mineral exploration', 'Geochemistry', 'Tectonics', 'Paleontology', 'Sediment']