

Blue Economy and Marine Mining

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Abstract : The Blue Economy includes all marine-based and marine-related activities. They correspond to established, emerging as well as unborn ocean-based industries. Seabed mining is an emerging marine-based activity; its operations depend particularly on cutting-edge science and technology. The 21st century will face a crisis in resources as a consequence of the world's population growth and the rising standard of living. The natural capital stored in the global ocean is decisive for it to provide a wide range of sustainable ecosystem services. Seabed mineral deposits were identified as having a high potential for critical elements and base metals. They have a crucial role in the fast evolution of green technologies. The major categories of marine mineral deposits are deep-sea deposits, including cobalt-rich ferromanganese crusts, polymetallic nodules, phosphorites, and deep-sea muds, as well as shallow-water deposits including marine placers. Seabed mining operations may take place within continental shelf areas of nation-states. In international waters, the International Seabed Authority (ISA) has entered into 15-year contracts for deep-seabed exploration with 21 contractors. These contracts are for polymetallic nodules (18 contracts), polymetallic sulfides (7 contracts), and cobalt-rich ferromanganese crusts (5 contracts). Exploration areas are located in the Clarion-Clipperton Zone, the Indian Ocean, the Mid Atlantic Ridge, the South Atlantic Ocean, and the Pacific Ocean. Potential environmental impacts of deep-sea mining include habitat alteration, sediment disturbance, plume discharge, toxic compounds release, light and noise generation, and air emissions. They could cause burial and smothering of benthic species, health problems for marine species, biodiversity loss, reduced photosynthetic mechanism, behavior change and masking acoustic communication for mammals and fish, heavy metals bioaccumulation up the food web, decrease of the content of dissolved oxygen, and climate change. An important concern related to deep-sea mining is our knowledge gap regarding deep-sea bio-communities. The ecological consequences that will be caused in the remote, unique, fragile, and little-understood deep-sea ecosystems and inhabitants are still largely unknown. The blue economy conceptualizes oceans as developing spaces supplying socio-economic benefits for current and future generations but also protecting, supporting, and restoring biodiversity and ecological productivity. In that sense, people should apply holistic management and make an assessment of marine mining impacts on ecosystem services, including the categories of provisioning, regulating, supporting, and cultural services. The variety in environmental parameters, the range in sea depth, the diversity in the characteristics of marine species, and the possible proximity to other existing maritime industries cause a span of marine mining impact the ability of ecosystems to support people and nature. In conclusion, the use of the untapped potential of the global ocean demands a liable and sustainable attitude. Moreover, there is a need to change our lifestyle and move beyond the philosophy of single-use. Living in a throw-away society based on a linear approach to resource consumption, humans are putting too much pressure on the natural environment. Applying modern, sustainable and eco-friendly approaches according to the principle of circular economy, a substantial amount of natural resource savings will be achieved. Acknowledgement: This work is part of the MAREE project, financially supported by the Division VI of IUPAC. This work has been partly supported by the University of Piraeus Research Center.

Keywords : blue economy, deep-sea mining, ecosystem services, environmental impacts

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