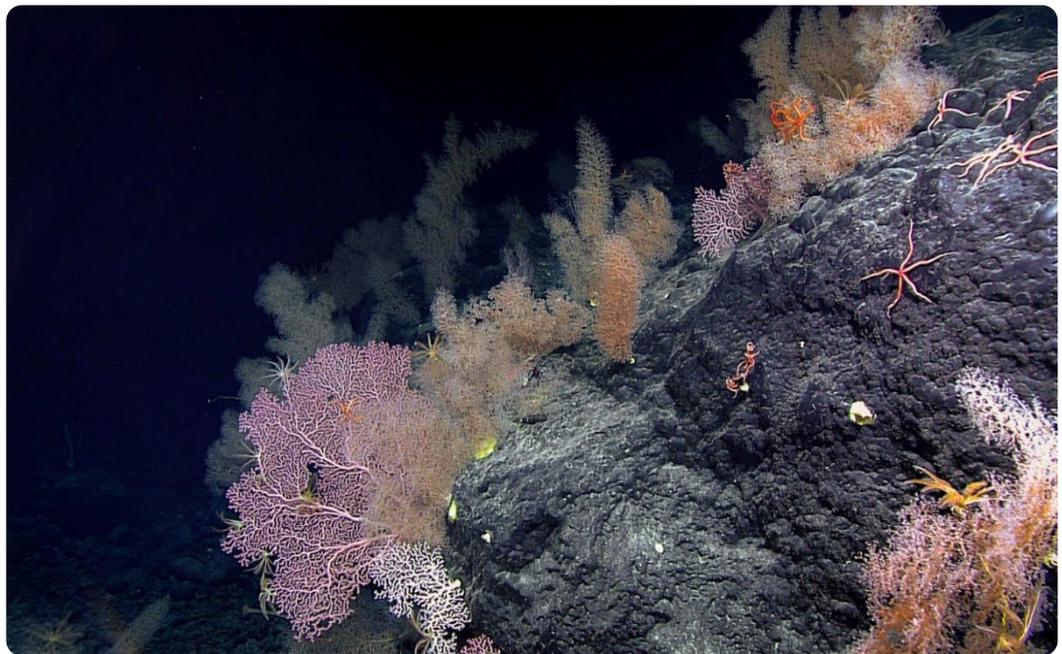


What Does the Deep Ocean Do for You?

The Seamount Ecosystem

Key Messages

- Seamounts are underwater mountains found throughout the ocean and are typically formed by volcanic activity.
- Seamounts support abundant and diverse communities above and below the water. For example, their steep rocky sides and shallow peaks offer attachment sites for corals and sponges which in turn provide habitat and food to other animals.
- Seamounts provide numerous ecosystem services, including climate regulation, fishery resources, nutrient cycling and cultural resources.
- Threats to seamounts include pollution, bottom-contact fisheries, potential deep-sea mining and climate change impacts such as ocean acidification, deoxygenation and temperature anomalies.
- Most seamounts are in Areas Beyond National Jurisdiction. This creates challenges for protecting them and the ecosystem services they provide.



A steep-sided coral garden on Sibelius Seamount at a depth of 2,465 meters.

Image courtesy of NOAA Ocean Exploration, Deep-Sea Symphony: Exploring the Musicians Seamounts.

The Seamount Ecosystem

Seamounts are steep-sided underwater mountains typically formed by volcanic activity. As they tower above the ocean floor – some isolated, some as part of vast underwater mountain ranges – they are an obstacle to ocean currents, creating their own circulation patterns and eddies. Like water provides habitat in oases in the desert, seamounts provide rare solid habitat in the vastness of the ocean for organisms in need of attachment sites. Seamounts can support diverse and abundant coral and sponge grounds, themselves creating further habitat and opportunities for other organisms such as invertebrates, reef fish, sea turtles, forage fish and their predators, like sharks, tunas, dolphins, whales and seabirds. These communities take centuries or more to grow and are home to long-lived animals with complex interdependent relationships.

The ability of seamounts to support so much diverse life is mainly due to the stability they provide to their inhabitants. However, this stability can be compromised by human activities like fishing and potential deep-sea mining. For example, some seamounts in the northwest Pacific and other regions feature cobalt-rich ferromanganese crusts, a rock-hard layer that forms gradually over millions of years. Damaging such crusts and the centuries-old communities that inhabit them could compromise the integrity and function of those seamount communities.

What Ecosystem Services Are Provided by Seamounts?

Seamounts provide many important ecosystem services from which humans benefit, including habitat and trophic support, genetic and mineral resources, climate regulation and cultural services. All ecosystem services provided by seamounts are depicted in Figure 1 (page 3).

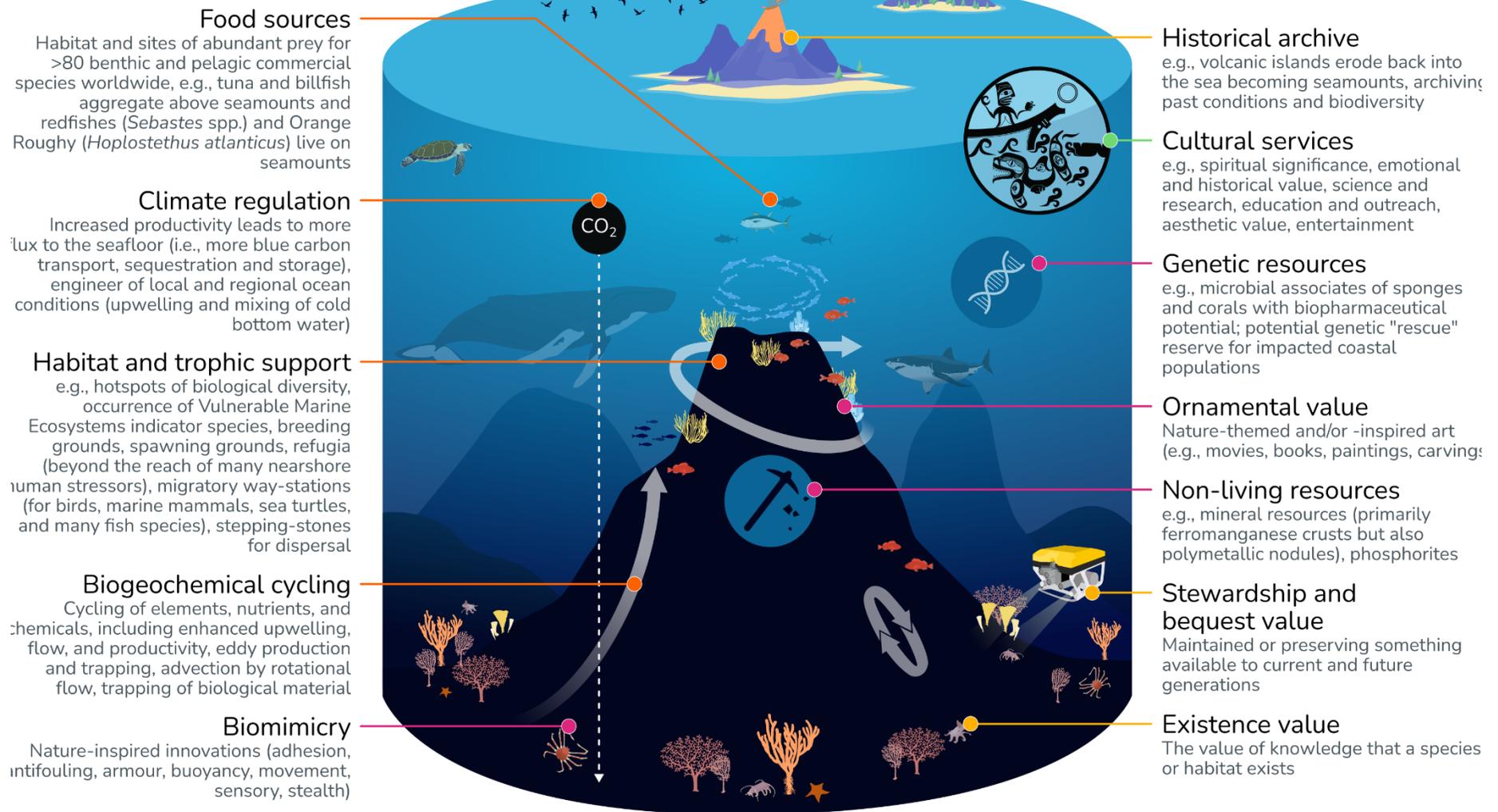
Human Impacts on Seamount Ecosystem Services

Various human activities impact seamounts and the ecosystem services they provide. Some fishing practices (e.g., trawling) can destroy long-lived, slow-growing coral and sponge species, as well as the habitat they create for others. Limited recovery from such damage can take decades, if it happens at all. Species inhabiting seamounts are relatively isolated, which makes them vulnerable to local extinction from overfishing. Lost or abandoned fishing gears on seamounts can perpetuate fishing impacts indefinitely by trapping animals and damaging their surroundings. The limited dispersal ability of most seamount species also puts them at risk from changes in their surroundings, like water deoxygenation and ocean acidification driven by climate change. Pollution and debris trapped by eddies around seamounts can further threaten the seamount community and the provision of ecosystem services. Finally, potential deep-sea mining of cobalt-rich crusts is predicted to cause significant long-term harm to seamounts and surrounding habitats if it is permitted. Mining would involve crushing and removing the surface crust along with all its inhabitants, creating noise and light pollution, and smothering adjacent areas with sediment. Potentially toxic sediment plumes could disperse over a wide area of ocean, significantly impacting the pelagic ecosystem.

Protection of Seamount Ecosystem Services

Seamounts can be protected using a range of area-based management tools in national and territorial waters. In Areas Beyond National Jurisdiction, the situation is more complex. While the recently agreed “Biodiversity Beyond National Jurisdiction” Treaty is an important step towards an overarching framework for protection of biodiversity, seamounts in these areas are currently overseen by organisations managing only a single type of activity (fishing, mining, conservation). Such organisations rarely take a holistic view of seamount ecosystem services, which is crucial for their protection. Maintaining the services seamounts provide for humans will require ecosystem-based management tools that consider the cumulative impacts of all the activities that threaten seamounts.

Figure 1: Seamount Ecosystem Services



KEY

- Provisioning services: result in tangible goods and/or products
- Regulating services: contribute to the natural production and resilience of habitats and ecosystem processes
- Supporting services: underlying ecosystem functions that are essential to produce other services
- Cultural services: non-material benefits deriving from nature
- Biodiversity values: biodiversity has intrinsic value, but is also the source of most ecosystem services

About DOSI:

The Deep-Ocean Stewardship Initiative is a global network of experts that integrates science, technology, policy, law and economics to advise on ecosystem-based management of resource use in the deep ocean and strategies to maintain the integrity of deep-ocean ecosystems within and beyond national jurisdiction.

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