

Deep-sea ecosystem goods and services: A challenge to natural and social sciences

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Abstract (www.pik-potsdam.de/alter-net)

The deep sea includes the waters and seabed areas below a depth of 200 metres. It constitutes 64 per cent of the surface of the Earth and 90 per cent of our planet's ocean area. Our deep oceans are teeming with an amazing diversity of organisms of all size and types, assembled in a wide variety of ecosystems. Deep oceans are believed to host the highest biodiversity on Earth. Deep-sea processes and ecosystems are not only crucial for the marine web of life, they also fundamentally contribute to global biogeochemical cycles that support all life on Earth. In addition, they provide direct goods and services that are of growing direct economic significance.

This presentation will review the goods and services provided by deep-sea ecosystems and the rising impacts from human activities on deep-sea habitats and ecosystems. It will highlight the specific challenges posed by the valuation of our deep marine environment and reflect on the role of valuation at the interface between science and policy. It will address some ethical issues related to the concept of ecosystem services.

Review of Discussion

Q. Why is acidification greater at higher latitudes?

A. Colder water has an increased capacity to uptake CO₂ than warmer waters. However the full reasons are not entirely clear. The overall impacts of increased acidification are as yet unclear.

Q. Historically were the seas ever as acidic as they are now?

A. This is a distinct possibility in geological history, however the impacts remain unknown. The biggest problem may not lie in the actual pH of the oceans but in the high rate of acidification. Organisms of the ocean may not be able to adapt to increased acidification fast enough.

Q. What targets exist to control acidification?

A. The damage expected by a pH change of 0.2pH is still unknown. Current acceptable limits are not yet set, although modelling is currently taking place to try to establish pH limits and thresholds. Some research has taken place on the uptake of calcium from the water column by corals, which showed uptake was dependant on temperature.

Q. Why are organisms of the deep-sea sensitive to anthropogenic influences (over-fishing)?

A. Larger organisms are slow to reproduce due to low food availability in the deep-sea. Most food sources are based around organic material drifting down from above (marine snow). Whether the reduced number of carcasses sinking to the bottom due to over-fishing (and whaling) has an impact is unknown. Some bottom-up ecosystems do exist such as bacteria living on methane from vents; these are capable of rapid growth.

Q. What obstacles exist to multi-disciplinary socio-ecological research?

A. Difficulties in communication and academia are the main obstacles. An over reliance on publications in journals rather than other modes of knowledge dissemination added to problems. Hotspot Ecosystems Research on the Margins of European Seas (HERMES) was a large step in mixing ecologists with geologists in deep-sea research.

Q. Is there too much focus on NGO protection of marine reserves where threats still exist?

A. Reserves are a valuable part of many approaches to tackle current threats to marine ecosystems. Although a fishing ban in reserve areas allow fish stocks and ecosystems to thrive, the threat of pollution from outside the reserves is much more difficult to control. There is also no protection in reserves from ocean acidification or temperature increases.

Q. What agreements regulate marine users?

A. There is a variety of agreements regulating what can and cannot happen in the marine environment. The large number of individual legislative agreements is a result of the reactive rather than proactive nature of marine management.

Q. What movements exist to change consumer behaviour about marine food sources (fish)?

A. NGO's are active in attempting to change collective behaviour, although changing global activity is much harder. Changing opinions in countries such as Spain would be hugely beneficial as they are responsible for +/- 40% of global deep sea trawling. Schemes exist such as the Marine Stewardship Council in California, which labels fish products as sustainable or not. Similar schemes also exist in both the UK and Australia.

Q. What is the future of fisheries from economy of scales? Is it easier to monitor fewer larger boats than smaller scale fisheries?

A. Problems exist due lack of reliable data. Some nations (e.g. China) are known for falsifying data to maintain fishing quotas. From a theoretical view, then monitoring fewer larger vessels is technically the easier option, but due to data deficiencies it is better to have smaller fisheries as they generally have a smaller impact on fish stocks.

Q. What science is available to policy makers?

A. Science is available within the system for policy makers, but it is generally not enough and not accepted. This was highlighted when it was calculated that globally there are 42'000km of drift nets fishing daily. Numbers exist and are available but rarely make it through to become consumer information.

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