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Trawling threatens to destroy deep-sea ecosystems

Intensive trawling could turn seafloor ecosystems into 'deserts of the sea', new research warns. The study found that continuous bottom trawling for shrimp in a deep-sea Spanish canyon has damaged the foundations of marine ecosystems by dramatically reducing seafloor biodiversity and nutrients in sediment.

Increasingly, fishers around the world are taking bottom trawling further, and deeper, out to sea, as the number of fish near the shore has fallen greatly in the past 50 years. This fishing method, dragging nets across the seabed, is particularly destructive. This is of concern, as research in recent decades has revealed that the deep sea is home to valuable – but also vulnerable – ecosystems.

This study, conducted under the EU HERMIONE project[1], explored bottom trawling's effects in the La Fonera canyon in the north western Mediterranean. Here, fishers trawl daily for red shrimp (*Aristeus antennatus*) at depths of 200-800 m using 'otter trawl' gear. Two heavy boards, attached to the front of each net to weigh it down, stir up clouds of sediment as they are pulled along the seabed.

The researchers compared samples of sediment taken from five trawled sites in the canyon with samples taken from eight untrawled sites, also within the canyon.

Because the fishing gear continually resuspends sediment in water, trawled sites contained much less organic matter – particles that normally sink to the bottom of the sea. This is a vital source of energy and nutrients for the marine life that live there. Organic matter derived from algae is the most important food source for seabed creatures, but the amount was 74% lower in trawled sites than in untrawled sites at 500 m deep, and 61% lower at 800 m.

Biodiversity was also highly affected in trawled sites. Here, abundance of meiofauna (tiny marine organisms) was around 80% lower at depths of 500-800 m, than in untrawled sites. Larger species dominated meiofauna communities in trawled areas, probably because only heavier individuals can remain on the seabed when the sediment is stirred up into the water.

Samples from the untrawled sites were soft on the surface and became firmer deeper down. However, sediment from trawled sites was much denser and firm even at the surface, as a result of trawling gear disturbance.

The amount of total organic carbon was 28-36% lower in the top layer of trawled sediment samples than in untrawled sediment. The carbon cycle was also 37% slower on average in trawled sites, which would limit the availability of food in deep-sea sediment.

The researchers compare trawling's impacts on deep-sea sediment to the effects of soil erosion on land caused by humans. Intensive, chronic bottom trawling will transform large sections of the seabed into 'deserts' and highly degraded seascapes, they warn. The study's findings therefore support action for more sustainable management of deep-sea fisheries.

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1.HERMIONE (Hotspot Ecosystem Research and Man's Impact On European seas) was supported by the European Commission under the Seventh Framework Programme. See: www.eu-hermione.net