



## Checklist devised to diagnose seafloor health

Scientists have produced a list of seafloor characteristics to determine the health status of the ecosystem it supports. These indicators could improve the quality and consistency of marine conservation efforts across Europe, particularly where the impact of human activities is high.

The health of the seafloor in response to human-induced pressures is known as 'seafloor integrity' and is one of 11 descriptors that EU Member States are required to monitor under the European Marine Strategy Framework Directive (MSFD)<sup>1</sup>. Other descriptors include exploited fish and shellfish, marine litter and biodiversity. The MSFD requires Member States to maintain good environmental status for each of these 11 components. However, there has been some uncertainty about the scientific basis behind benthic (seafloor) ecosystems and what constitutes good ecological health. Benthic organisms play an important role in maintaining the health and productivity of marine ecosystems, but are vulnerable to human pressures.

The study summarises the main conclusions of an international group of experts. They recommend a range of indicators, which together allow a thorough assessment of how successfully a benthic ecosystem is able to carry out its intended function and maintain natural levels of diversity and productivity.

Dredging, offshore gas and oil exploration, pollution and fishing all affect which species inhabit the seafloor by changing the seafloor substratum (i.e. from fine sand to gravel and rock). Replacing a community that is specially adapted to an area can reduce the overall productivity. The scientists recommend indicators to estimate this impact, including: size of the fishing fleet, depth of dredge tracks and surface area licensed for mineral extraction. Seafloor imaging using multi-beam echo sounders may also provide a complementary tool to assess the impact of human activity on the seabed.

The study also recommends potential indicators to assess species composition (species diversity, abundance and richness), size composition (indicative of productivity and mortality rates) and life history traits (including growth rate and reproduction).

Low oxygen concentrations can also indicate that marine ecosystems are under pressure from eutrophication and should be monitored closely in high-risk areas. The researchers also recommend that special attention is paid to the importance of benthic organisms with specific functions, such as those that recycle nutrients in the sediment by churning it up (bioturbators) or provide shelter for young fish.

Seafloor integrity assessments should start in areas of highest risk, say the researchers, and each indicator should be compared to an environmental standard that allows for some degree of human impact as long as it is sustainable, i.e. does not cause long-lasting harm. Based on all of these recommendations, the European Commission published a set of indicators for all the descriptors, including sea floor integrity, in 2010. For each type of indicator, Member States will select which specific indicators are most suited to a particular set of local conditions, which can then be integrated to allow for regional and subregional assessments.

1. See: [http://ec.europa.eu/environment/water/marine/directive\\_en.htm](http://ec.europa.eu/environment/water/marine/directive_en.htm)

**Source:** Rice, J., Arvanitidis, C., Borja, A. *et al.* 2012. Indicators for sea-floor integrity under the European Marine Strategy Framework Directive. *Ecological Indicators*. 12: 174-184.

**Contact:** [Jake.Rice@df0-mpo.gc.ca](mailto:Jake.Rice@df0-mpo.gc.ca)

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