



What are the impacts of fish-farming on marine ecosystems?

New EU-supported research in the Mediterranean Sea has assessed the impact of fish-farming on seafloor ecosystems. Results indicate that impacts are only apparent in habitats with no vegetation, but the researchers suggest that habitats with vegetation seagrass could be masking the effects.

The EU Marine Strategy Framework Directive 2008/56¹ aims to achieve good environmental status of the EU's marine waters by 2020. Eutrophication is one of the biggest threats, causing algal blooms and affecting ecosystems, including fish species. Fish-farming is thought to contribute to eutrophication and the worldwide growth of this industry is of concern. **Faeces** and uneaten food pellets from fish farms alter the organic matter in the sediment, which can change the consumption of oxygen and cause local eutrophication.

Research funded as part of the EU MEDVEG project², studied small benthic organisms ('metazoan meiofauna') to assess the impact of fish-farming on seafloor ecosystems. Metazoan meiofauna are multicellular animals ranging from 0.1 to 1.0mm in size that live within the sediments on the seafloor and are sensitive to ecosystem changes.

The research also assessed the level of organic matter in the sediment to investigate its potential impact on meiofauna. Coastal regions with off-shore fish farms were selected in Cyprus, Southern Greece, Italy and Spain. The impact was assessed by comparing fish-farm sites with sites located at least 1000m from the farms in the direction against the current.

The results indicated that the total abundance of meiofauna was greater on the seafloors beneath the fish-farms. The researchers suggested that this result was due to a positive response from certain meiofauna species to an increase in sediment organic matter, which was low before the fish farms were built.

Fish-farming reduced the biodiversity of meiofauna but the impacts depended on region and habitat. The research indicated that fish-farms caused a substantial fall in the number of higher-order groups of meiofauna in three out of four regions without vegetation. The meiofauna groups that had disappeared varied regionally but always included rare groups, such as cumaceans. Cumaceans are crustaceans that disappeared in over one third of all sites beneath fish farms.

Further analysis indicated that the effect of sediment organic matter on meiofauna could be explained by differences in region and environmental factors. For example, organic matter only had an impact on meiofauna in Cyprus and Greece and in areas with low currents. Areas with higher currents dilute the wastes more rapidly and therefore less organic matter accumulates in the sediment.

In seafloors with seagrass meadows, meiofauna showed no consistent response to fish-farming. The researchers suggested that the presence of seagrass and the large number of wildlife it attracts could mask the impacts of fish-farming by providing a buffer against the organic matter from the farms reaching the sediment and therefore affecting the meiofauna. However, seagrass itself is known to be highly sensitive to the impacts of humans and the effects of fish-farming on this habitat may be noticeable in the long-term. The researchers suggest that the impact of fish-farming on vegetated and non-vegetated ecosystems should be assessed differently.

1. See: http://ec.europa.eu/environment/water/marine/index_en.htm

2. MedVeg was supported by the European Commission under the Fifth Framework Programme. See: www.imbc.gr/whats_new/medveg.html

Source: Mirto, S., Bianchelli, S., Gambi, C. *et al.* (2010). Fish-farm impact on metazoan meiofauna in the Mediterranean Sea: Analysis of regional vs. habitat effects. *Marine Environmental Research*. 69: 38-47.

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