

“MEDVEG”

Do marine cages affect Mediterranean vegetation?

Marine aquaculture production of fish is a rapidly increasing industry in the Mediterranean where aquaculture is relatively new. The Mediterranean is generally considered as an ecosystem with low nutrient concentrations, clear waters and slow growth of sea grasses at large depths. There are, however, signs of nutrient enrichment in some areas, like fast-growing macro-algae on frequently visited beaches. Investigations of seagrass beds along the east coast of Spain have also shown that the seagrasses are declining. Loss of seagrasses may have significant impact on the coastal ecosystem due to increased erosion and loss of habitat for a variety of marine animals. It is likely that increased discharge of nutrients due to urbanization and expanding numbers of fish farms are potential actors in the degradation of the coastal ecosystems.

The objectives of **MEDVEG** were to examine potential effects of nutrients released during fish farming on macroalgae and the seagrass *Posidonia oceanica* in coastal zones in the Mediterranean. The areas under study were:

- The fate of nutrients released from aquaculture production;
- Effects of release of dissolved and particulate nutrients from aquaculture on seagrasses and associated benthic fauna;
- Shifts in coastal vegetation communities (from seagrass to macroalgae);
- Seagrasses and macrofauna as early warning indicators of aquaculture impacts.

Four field campaigns were held that focussed on spatial changes in environmental parameters along transects from the net cages at four different fish farms throughout the Mediterranean (Cyprus, Sicily, Greece and Spain).

The farming sites were selected based on the presence of seagrasses and macroalgae under the net cages or in their near proximity, and on their location in coastal zones extending from oligotrophic to ultra-oligotrophic conditions. All campaigns were held from June to September, in the growth season of fish and flora, when the production in the farms was high.

A **rapid decline** of seagrasses near the net cages was observed, which was found to be **linked to the farming activities through a complex set of interactions** extending from increased nutrient availability, sediment degradation (anoxia, sulphide accumulation), plant anoxia, grazing by sea urchins, epiphytic cover (i.e. cover of plants that spend their lives on the *Posidonia* plants, competing with them for light and nutrients available in the water column) and blooms of macroalgae. The seagrasses were affected by the farming activities on physiological and individual level as well as on community level. The associated macrofauna however did not show changes relating to the farming activities, and thus cannot be used as an early warning indicator.



THE SEAGRASS *POSIDONIA OCEANICA*. SOURCE: M. HOLMER / UNIVERSITY OF SOUTHERN DENMARK.

Project acronym:

MEDVEG

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Effects of nutrient release from Mediterranean fish farms on benthic vegetation in coastal ecosystems

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**“THE LOSS OF SEAGRASSES
LIKE POSIDONIA OCEANICA
MAY LEAD TO HABITAT
LOSS FOR A VARIETY OF
ANIMALS“**

The MEDVEG project provided new scientific knowledge to define **guidelines** in order to prevent, or at least minimize, fish farming negative impacts on the water quality, the benthic environment and the health of *P. oceanica* meadows growing nearby:

- concessions for fish farms in the vicinity of seagrass are **to be avoided** if suitable localities away from seagrass meadows exist;
- whenever alternative, suitable sites away from any seagrass meadow are not available, a **safety distance of 800m** between net cages and seagrass meadows should be preserved;
- shall fish farms be established at this minimum distance, these farms should be **positioned down-stream**, along the dominant current direction, from the seagrass meadow;
- whenever fish farms exist in the vicinity of seagrass meadows, an **assessment technique** should be conducted, at least **once a year**, to evaluate the health of the seagrass meadow;
- sedimentation of particulate material should not exceed 6 g dry weight/m².d in the seagrass meadows;
- if monitoring studies indicate a decrease in seagrass meadow extension or shoot density, the amount of waste

material (as C, N and P loads) must decrease for an equivalent percentage until recovery of the previous conditions; alternatively, cages should be moved to other sites.

These results do not mean that fish farming activity should be excluded at distances less than 800 m from any *Posidonia oceanica* plant in the Mediterranean. However, adopting this distance is an appropriate precautionary measure in the vicinity of important and well-developed *Posidonia* meadows that environmental authorities have set as priority areas for conservation. From that point of view, the measure should be seen as a way to proceed with the **sustainable** operation and development of the marine aquaculture industry in the Mediterranean.



MEDVEG PROJECT COORDINATOR DURING A FIELD TRIP. SOURCE: S.A. SØRENSEN