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MEDVEG

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

The Challenge

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. However there are signs of nutrient enrichment in some areas i.e. fast-growing macro-algae on frequently visited beaches. Investigations of seagrass beds along the east coast of Spain have shown that the seagrasses are declining. Loss of seagrasses can have a significant impact on the coastal ecosystem due to an increase in erosion and loss of habitat. It is likely that increased discharge of nutrients due to urbanisation and expansion of the fish farming industry are likely contributors in the degradation of the coastal ecosystems.

Project Objective

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.

Key Points

- 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.

Output Highlights

Field Trials

Field trials were held at four different fish farms throughout the Mediterranean (Cyprus, Sicily, Greece and Spain). Trials focussed on spatial changes in environmental parameters along transects from the net cages. 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 including increased nutrient availability, sediment degradation (anoxia¹, sulphide accumulation), plant anoxia,

EATiP Thematic Area of Relevance

TA1: Product Quality, Consumer Safety and Health

TA2: Technology and Systems

TA3: Managing the Biological Lifecycle

TA4: Sustainable Feed Production

TA5: Integration with the Environment

TA6: Knowledge Management

TA7: Aquatic Animal Health and Welfare

TA8: Socio-Economics and Management

Key Words

Fish, Aquaculture-environment interactions

Project Information

Contract number:

2456

Duration:

36 months (01/12/2001 – 30/11/2004)

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grazing by sea urchins, epiphytic cover² and blooms of macroalgae. The seagrasses were affected by the farming activities on a physiological and an individual level as well as on community level. The associated macrofauna however did not show changes relating to the farming activities, and so cannot be used as an early warning indicator.

Guidelines

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

- Concessions for the siting of fish farms in the vicinity of seagrass beds 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 observed;
- Where fish farms are established at this minimum distance, these farms should be positioned downstream, along the dominant current direction, from the seagrass meadow;
- Whenever fish farms exist in the vicinity of seagrass meadows, an assessment technique should be undertaken, 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 reversion to previous conditions; alternatively, cages should be moved to other sites.

Next Steps – Suggested Actions/Follow On



Environment

- Results do not mean that fish farming activity should be excluded at distances less than 800m from any one *Posidonia oceanica* plant in the Mediterranean. However, adopting this distance is an appropriate precautionary measure in the vicinity of important and well-established *Posidonia* meadows that environmental authorities have set as priority areas for conservation. Adopting this measure should allow for the sustainable operation and development of the marine aquaculture industry in the Mediterranean.

Related Publications/Projects

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