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(Mínim 1 i màxim 4, podeu veure els codis a http://doctorat.upc.edu/gestio-academica/impresos/tesi-matricula-i-diposit/codis-unesco)

Resum de la tesi de 4000 caràcters màxim (si supera els 4000 es tallarà automàticament)

Intensive fish culture in floating cages is one of aquaculture activities that has grown fastest in recent years. However, this activity produces impacts ranging from alterations in the natural environment to social and cultural changes at the local level. The major negative impacts on the system associated with marine aquaculture are eutrophication, oxygen depletion and the disruption of local biodiversity (due to the input of organic matter and nutrients from uneaten food, feces and fish excreta), as well as other harmful effects in the medium and long term related to the various chemicals and therapeutic products normally used in aquaculture.

Since the early 1990s, several models have been developed to investigate and assess the environmental impact of fish farming, and are used, together with field measurements, as production management tools. However, most of these use very simplified approaches, primarily in the physical aspects of the problem (bathymetry and hydrodynamics of the study area), and have been generally used to determine the benthic impact of particulate matter near the cages, ignoring the environmental impact associated with the discharge of dissolved nutrients and other substances from farms on the aquatic environment in general.

In this thesis, two advanced models (the 3D hydrodynamic model ROMS and the Lagrangian dispersión code LIMMIX) have been adapted and applied to model the patterns of dispersion and concentration oforganic matter (carbon), nutrients (nitrogen and phosphorus) and copper from the antifouling products that coat fishpen nets, from two farms located in the Valencian Community(Spanish Mediterranean coast), dedicated to the intensive cultivation of gilthead seabream (Sparus aurata). A complete fish rearing cycle (17 months) has been simulated, taking into account the natural variations in food demand and biomass throughout the cycle. Specifically, the simulations have included the dispersion and concentration on the sea bed of organic carbon (C), nitrogen (N) and phosphorus (P), in the form of particles, in the vicinity of the farms, and the dispersal and concentration of dissolved N, P and copper (Cu) in the column of water close to and away from the farms.

The results obtained for the dispersion of particulate matter (C, N, and P) from uneaten fed and feces indicate that the model (ROMS-LIMMIX) has adequately simulated the pattern of deposition of particles on the bottom. The qualitative comparison of these results with the works of various authors shows a great match in the shape and in the extension of the affected benthic zone.

On the other hand, the results of the modelling of dissolved substances (N, P, and Cu), show that 90% of particles representing such substances exit the studied domain during the simulation. Within the study area, most of the particles (in average, 50% of those representing N and P, and 34% of those describing Cu) remain in the surface layer of the column of water - the first 10 m – throughout the simulation, whereas the rest of the particles are distributed randomly at greater depths. In addition, dissolved matter discharged from the cages of both farms extends over a large area, affecting places that are tens of kilometers from the sources.

In general, it can be concluded that the joint application of ROMS and LIMMIX constitutes a powerful and versatile tool that can be perfectly applicable to the modelling of the dispersion of waste from fish farms sea, especially for the advancement in the ecosystemic knowledge of the interactions between aquaculture and the environment. The undertaking of long-term and large-scale modelling using this combination of models allows improve the knowledge about the local and global impacts of aquaculture wastes.

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