

POSTERS BOULOGNE SUR MER ET MARSEILLE

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La Pôle Mer Méditerranée.



Posters

*Boulogne sur
Mer*

Marseille

Abstract

A scientific cluster: SIEGMA (Monitoring of impacts of marine aggregate extraction): a tool for regional governance in the Eastern Channel.

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Key words: aggregate extraction, scientific cluster, governance, Eastern Channel.

To answer to the questioning of impacts of aggregate extraction on the ecosystem and to reduce foreseeable user's conflicts (mainly fishers), a scientific cluster SIEGMA (Monitoring of impacts of marine aggregate extraction) has been created in 2003 in the Eastern Channel.

The cluster includes delegates of all main actors of the marine sector, with a Management Committee (users – extraction industry and fishers-, delegates of public state and regional bodies), which propose working guidances to the Scientific Committee (delegates from regional scientific bodies) who is in charge of actions, under the supervision of a coordinator. The multidisciplinary topics involved firstly on the *Dieppe* site, then on the *Baie de Seine* site, had for main objectives: i) to improve international knowledge on the impact of extraction and on ground restoration; ii) to collect original data on the fishery compartment; all of them in connection with ICES WGEXT recommendations.

The results of the cluster are given back each year during the General Meeting to an audience broadened to all marine regional stakeholders, as a contribution to a good governance in the aggregate extraction activity at the Eastern Channel scale.

Abstract

Toward a dynamical approach for systematic conservation planning of Eastern English Channel fisheries

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Keywords: MPAs, systematic conservation planning, fleet dynamics, model coupling, Eastern English Channel.

The Eastern English Channel is an important ecological area submitted to growing human pressure, mainly exerted by bordering countries, France and United Kingdom. Spatialised regulations are plebiscited to regulate these perturbations, and within this context, France and United Kingdom are under the obligation to create a consistent Marine Protected Area (MPA) network.

In the past decade, systematic conservation planning tools have been increasingly and successfully used to reach spatialised conservation plans which meet objective targets (*e.g.* a given protected percentage of each species abundance or habitat surface) while minimising enforcement and socio-economic costs. However, systematic conservation planning applied to fisheries does not take into account neither (*i*) changes in fleet dynamics induced by new conservation constraints and their associated feed-backs on conservation costs, nor (*ii*) their influence on fish population dynamics and distributions, which may in turn alter the achievement of conservation targets. Such a static approach may therefore lead to short- or medium-term misestimates in forecasted costs and target achievements.

This poster present preliminary outcomes and perspectives of a first attempt to couple a conservation planning tool (Marxan with Zones) with a mixed-fisheries dynamics simulation model (ISIS-Fish) to circumvent such limitations. The study notably aims at answering the following issues:

1. What would be the dynamics of the main fleets and fish populations under different conservation scenarios? And how would they influence targets achievement?
2. Is the proposed MPA network suitable to ensure the viability of fleets and of the fish populations they harvest?
3. What would be the influence of the sequence of enforcement measures and how could it be optimized?

Abstract

Modelling the relative impacts of traditional harvesting and habitat degradation on the population dynamics of Dugongs (*Dugong dugon*) in the Moreton Bay (Australia)

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Key words: Dugong dugon, seagrass, coastal management, indigenous traditional harvesting, netlogo modelling

The sustainability of Indigenous traditional harvesting of dugongs is a key issue in coastal Northern Australia, and the impacts of such harvests on dugong conservation and management has not been placed into the context of other potentially cumulative impacts such as the loss of their seagrass habitats due to development and/or climate change threats (e.g. increased freshwater and turbidity events, trawling). Here we are using the individual-based modelling platform “netlogo” to develop a tool incorporating the seagrass component into a spatialised dugong population/harvesting dynamics model, which will help explore hypotheses and scenarios to better inform coastal management. This model is first implemented in the Moreton Bay, a shallow embayment in the south-east Queensland, supporting extensive seagrass meadows and the largest population of dugong in close proximity to a major and rapidly expanding city, Brisbane. This population is geographically isolated from the closest population, situated in Hervey Bay, 200 km to the north.

Abstract

A spatially-explicit MSE framework for the assessment of management measures from the new Common Fisheries Policy: an application to the Eastern Channel mixed fisheries

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Keywords: Management strategy evaluation, bio-economic model, mixed fisheries, harvest control rules, spatial management, Eastern Channel.

The Common Fisheries Policy is currently in a major reform process which led to proposals for new management measures. These new measures aim at overcoming the shortcomings of the previous management regime especially regarding the issues related to mixed fisheries, spatial dynamics, discarding behaviour and data-limited species. Among others, Harvest Control Rules (HCR) have been proposed to adapt catch quotas (TAC) to the value taken by a range of indicators traditionally used in EU fisheries management plans, but also alternative status/pressure indicators that do not require analytical stock assessments.

Creative tools are central to the Management Strategy Evaluation (MSE) process. These include new spatially-explicit HCRs and bio-economic models, which can account for fish population dynamics and fishing reaction to a variety of management scenarios.

In the Eastern Channel, a diversity of fleets target a large variety of species with various gear and according to spatio-seasonal patterns of exploitation which depend both from fish population dynamics and constraints applied on fishermen (management, costs...). The development of new HCRs is complicated by the mixed nature of the fisheries with risks of increasing discards and effort report from one species to another. To allow the evaluation of new HCRs on fish communities and fleets accounting for these risks, we present a MSE framework, developed using the ISIS-Fish software. The framework embodies a spatialized operational model which simulates the dynamics of the mixed fisheries in the Eastern Channel including the spatial dynamics of the main species targeted (sole, plaice, cod, scallops, whiting...), driven by habitat models and the dynamics of the fleets dictated by a fishing behaviour model.

Abstract

The protection and management of offshore sea-hill fishing ground: the Hachirigase hill case study

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Keywords: seamount, resource management, responsible fisheries, sea hill, fishing grounds, Japan

The importance of seamounts outside the continental shelf as hot spots for a wide range of species (from primary producers such as phytoplankton to top predators like tuna) is currently being discussed globally. Especially it has been pointed out the necessity of managing the resources available in these areas. But because hills situated on the continental shelves are smaller than seamounts, the importance of managing them as a resource has yet to be fully recognized.

The depletion of fishery resources all over the world and the fast increase of the price of crude oil used by vessels could result in a high pressure on fishing grounds that are close to fishery harbors, like these offshore hills. The devastation of these fishing grounds may not be able to be prevented only through managing the resources of the nearby areas, so, under the circumstances where the “responsible fisheries” and resource management are demanded for each country, we will present our vision of the desirable methods for protection and management of these fishing grounds in harmony with the environment.

Abstract

Measurements of bedload transport in the English Channel using DySPI system.

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Keywords: Bedload transport, In-situ measurements, English Channel

In the macrotidal inner shelf English Channel, sandy-gravel sediments is a well developed sediment habitats due to tidal currents and wave influence. The mobility of this heterogeneous sediment is hard to be demonstrated and to be understand.

Two oceanographic campaigns named « Sedhete » (2007) and « Mesflux » (2011) were led to deploy the DySPI (Dynamic Sediment Profile Imaging), an instrument dedicated to the estimation of bedload fluxes. Once placed on the bottom, its pendulum enters into the sediment on 8 to 15 cm depth after the triggering of a motorized arm. Composed of a camera oriented towards the seabed, it provides videos which field of view is separated in two parts. The first half points perpendicularly to the seabed and the second half is intercepted by an inverted periscope, giving a top and a profile view of the sediment layer.

By using VirtualDub, the interesting parts of videos are converted into sequences of two seconds representing 50 images of 1080*700 pixels resolution. With the ImageJ software, the first image is considered as a reference to which is subtracted each one of the following pictures of the sequence. Thereby, we can obtain an image of the total area in motion (in pixels²) between our reference image and the subsequent ones.

The analysis of DySPI videos provides the following results and work perspectives:

- 1) An estimation of total sediment fluxes along a tidal cycle to compare to commonly used formulas.
- 2) An evaluation of fractional sediment fluxes on a study site presenting for example an armoring layer. A low transport stage allows a higher precision in fractional calculations.
- 3) A visualization of the in-situ sediment mobility and the evolution of the seabed granulometry and morphology along a tidal cycle.

Abstract

Morphosedimentary mobility in sandy habitats on inner macrotidal continental shelf (Eastern English Channel)

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Keywords: Bedform, sediment dynamics, Bedload transport, benthic fauna

The seabed of inner macrotidal continental shelves regularly corresponds to a mobile sandy cover moulded by tidal currents and waves in these relatively shallow regions. In outer estuaries and areas of currents convergence, fine-to coarse-sand sediments cover is driving throughout a grain-size gradient associated to various submarine bedforms (ripples, dunes, sandbank). These mobile sedimentary features potentially increase navigation hazards as well as risk of damage to offshore human structures (submarine cables, offshore wind turbines, ...). Moreover, this sedimentary pattern induces a zonation of the benthic fauna due to: (i) the physical characteristics of the environment (depth, grain-size, roughness,...), and also (ii) the bedform mobility (sediment reworking, grain-size variability at the dune scale, ...).

This study deals with the dynamics of bedforms covering the sedimentary wedge of Picardy (off the Normandy coast, Eastern English Channel). The seabed in the subtidal zone is covered by a multitude of large to very large dunes (2-10m high and wavelengths between 250 and 1800m). Based on repeated bathymetric surveys, dune migration rates have been estimated around 0.8 to $5 \pm 0.25 \text{ m.yr}^{-1}$ and up to $6.6 \pm 0.7 \text{ m.yr}^{-1}$ (respectively from multi-decennial and decennial observation periods). Dune movements are directed toward the North-East, which is consistent with the direction of tidal residual currents. Dune dynamics has been also measured during tidal periods. The influence of waves on sediment fluxes has been quantified by calculating bedload fluxes under different combined-flow conditions (currents only, currents and waves). Results have been used to interpret the dune internal architecture as a resultant of the time-integration of sediment transport processes. It has been noted that bedform dynamics is strongly influenced by storm events with multi-decadal return periods.

Thus, it is necessary to accurately assess the natural sediment dynamics, and especially the dune dynamics, in order to contribute to an accurate knowledge of these sandy environments, and consequently to better manage them. In this context, the sand mobility could be considered as well as a possible and natural way of sediment restoration (i.e. gravel extraction).

Abstract

Offshore/coastline sedimentary transfers in a macrotidal area (Eastern English Channel). Case of the Baie de Somme.

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Keywords : sediment flux, intertidal sandy zone, estuarine infilling, macrotidal, Eastern Channel

Like many estuaries in the Eastern English Channel, the Baie de Somme is currently infilling (natural and anthropogenic phenomena), mainly by marine sands. Sedimentary transfers between the open sea and the bay are poorly understood and badly quantified, while they are determinant to understand the morpho-sedimentary evolution of the bay in order to be able to predict its future evolution.

Sedimentary transfers between the subtidal sandy-gravelly wedge of Picardy, characterized by large sandbanks and dunes, and the Baie de Somme are studied in the framework of a PhD thesis (supported by DGA and Région Haute Normandie) which aims at defining and quantifying: (i) available sedimentary stocks, (ii) the pathways and modalities for the transfer of sediment, (iii) the fluxes, sedimentary processes and forcing involved. A particular attention will be given to the small dunes that cover the seabed of the shallow waters and intertidal zones.

The approach is based on *in situ* measurements conducted at the scale of the Baie de Somme and on small sites (fluxes quantification). Different tools will be used to investigate both sub- and intertidal zones of the Baie de Somme and to characterize the morphology, sediments and the sedimentary fluxes: topographic LiDAR data (founded by Region Picardie-FEDER and INSU-CNRS, acquired by the operational team CLAREC), terrestrial laser scanner, bathymetry and acoustic imagery, VHR seismics, sediment sampling, currents measurements, altimetry.

Results have been obtained on: (i) the sedimentary evolution of the bay over the last 30 years (updating of the sedimentary cover), (ii) the morphodynamic evolution of the bay over the last 2 years, and (iii) the quantities of sediment transported during spring tidal cycles.

Abstract

Contamination of seabed sediments and organisms by radioactive cesium in the coastal area of southern Fukushima.

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Key words: Fukushima Dai-ichi nuclear power plant accident, radioactive cesium, seabed sediments particle size

Introduction Tohoku Earthquake and a large Tsunami occurred on the east coast of Japan March 2011 which cause the Fukushima Dai-ichi nuclear power plant (1FNPP) meltdown and release a huge amount of radioactive substances (including ¹³⁴Cs and ¹³⁷Cs) were released into the surrounding sea area. Then high concentrations of radioactive substances were detected in seawater, sediments and some organisms in coastal waters of Fukushima. Now, the fishing in Fukushima Prefecture is forbidden. To examine how these polluted marine organisms should be managed, we investigated the change of radioactive cesium concentration in seabed sediments and marine organisms.

Method Sampling of marine organisms and seabed sediments has been carried out from May 2012 to May 2013 by SCUBA diving. Sampling locations were set at a rocky shore and a sandy beach in Yotsukura (35km south from 1FNPP, depth:0.5-1m) and Nagasaki (50km south from 1F, depth:5-6m). Sample species were 8 seaweeds and sea urchin. Seabed sediments were divided in 4 size classes (~125,125~250,250~500,500~2000μm) by sieve. These samples were measured concentrations of radioactive cesium by germanium semiconductor detector (GEM20-70).

Result Concentration of ¹³⁷Cs was highest at Nagasaki at rocky shore area. However, there is no clearly decrease trend the ¹³⁷Cs concentration of the sediments. ¹³⁷Cs concentration of sediments was highest in 250-500μm particle size class in rocky shore at Nagasaki. The ¹³⁷Cs concentration of seaweeds and sea urchin decreased with time. More than two years have passed since the accident; however surveillance of coastal benthic organisms is still required.

Abstract

Coral observation by the boat-based fluorescence imaging lidar

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Keywords: coral, monitoring, fluorescence, lidar

Reef-building corals are threatened by global climate change and other risks. It becomes of increasing importance for monitoring regional coral distribution.

A glass-bottom-boat based coral observation system has been developed using lidar (light detection and ranging) techniques for large area coral monitoring. The lidar system consisting of an ultraviolet (UV) pulsed laser with a wavelength of 355 nm and a gated ICCD camera has been designed and tested.

Most reef-building corals have fluorescent proteins that emit blue-green fluorescence on UV excitation. Seabed images are recorded by emitting UV pulsed laser and receiving fluorescence by the gated ICCD camera synchronized with the laser. Because the exposure time is very short, the sunlight background effect for the lidar image is suppressed, and this makes it possible to detect weak UV excited fluorescence even in the daytime. Coral viability check can be achieved by verifying the coral image pattern and fluorescence intensity.

Coral observations were conducted using a glass-bottom-boat at Taketomi Island, Okinawa, Japan. The information of live coral distribution along the boat track was obtained successfully around Taketomi island, in depth from 2 to 12 m.

Abstract

Development of an analysis system for matter contributing to turbidity using a three wavelength in situ beam transmissometer

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Keywords: turbidity, beam attenuation coefficient, dissolved organic matter, particulate organic matter

Introduction

In coastal areas, it is known that turbid water influences the feeding behavior of marine resources. The turbidity of seawater (beam attenuation coefficient, m^{-1} : C' in situ(λ)) is attributed to three groups of matter: dissolved organic matter (DOM), particulate organic matter (POM) and particulate inorganic matter (PIM), and turbidity is expressed as the sum of the turbidity with each matter: C' in situ(λ) = $C_{DOM}(\lambda) + C_{POM}(\lambda) + C_{PIM}(\lambda)$. A system we developed a system to calculate these turbidities respectively from in situ turbidities measured at three wavelengths, which used the coefficients of DOM and POM at wavelengths of 370, 488 and 660nm. For precision improvement of the system, we examined the effect of changes in ratio of kinds of POM (phytoplankton). And then the wavelength for measurement of the turbidity was changed 488nm to 470nm.

Theory and methods

$C_{DOM}(470)$, $C_{POM}(470)$, $C_{PIM}(470)$, and coefficients were determined as follows;

$$C_{DOM}(470) = [P \times C' \text{ in situ}(370) - C' \text{ in situ}(470) + (1 - P) \times C' \text{ in situ}(660)] \times [(K_{DOM} - L_{DOM}) \times P - (1 - L_{DOM})]^{-1},$$

$$C_{POM}(470) = [D \times C' \text{ in situ}(370) - C' \text{ in situ}(470) + (1 - D) \times C' \text{ in situ}(660)] \times [(M_{POM} - N_{POM}) \times D - (1 - N_{POM})]^{-1},$$

$$C_{PIM}(488) = C' \text{ in situ}(488) - [C_{DOM}(488) + C_{POM}(488)]$$

$$K_{DOM} = a_{DOM}(470)/a_{DOM}(370), L_{DOM} = a_{DOM}(660)/a_{DOM}(370), D = (1 - L_{DOM}) \times (K_{DOM} - L_{DOM})^{-1},$$

$$M_{POM} = a_{DOM}(470)/a_{DOM}(370), N_{POM} = a_{DOM}(660)/a_{DOM}(370), \text{ and } P = (1 - N_{POM}) \times (M_{POM} - N_{POM})^{-1}.$$

Measurements of turbidities were made in the laboratory and in the field using C-Star transmissometer (WET Labs, measured wavelengths: 370nm, 470nm and 660nm). In the laboratory, we used phytoplankton as POM, which were *Skeletonema costatum*, *Chaetoceros gracilis* and *Tetraselmis tetrathele*. The field observations were carried out in May and Oct. 2010 in Tokyo Bay.

Results

1. The coefficients (P , M_{POM} , N_{POM}) were found to be (0.44, 1.50, 0.60) for *Skeletonema costatum*, (0.66, 1.09, 0.81) for *Chaetoceros gracilis* and (0.49, 1.20, 0.81) for *Tetraselmis tetrathele*.
2. The correlations of C_p in situ (470) and $C_p(470)$ are shown as follows:
 C_p in situ (470) = 0.76 $C_p(470)$ ($R^2 = 0.87$) for *Skeletonema costatum*,
 C_p in situ (470) = 0.80 $C_p(470)$ ($R^2 = 0.90$) for *Chaetoceros gracilis* and
 C_p in situ (470) = 0.77 $C_p(470)$ ($R^2 = 0.88$) for *Tetraselmis tetrathele*.

Abstract

Three-dimensional monitoring of Pacific blue fin tuna cultured in an off-shore net cage using a digital stereo camera system.

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Keywords: three-dimensional monitoring, Pacific bluefin tuna, stereo-camera, aquaculture, direct linear transformation (DLT) method

A digital stereo-video camera system was used for three-dimensional monitoring of cultured Pacific blue fin tuna, *Thunnus orientalis*, swimming freely in a off shore net cage. We estimated the fork length and length frequency distribution of fish individuals using the direct linear transformation (DLT) method. Information obtained from stereo images is useful for managing the growth of tuna during cultivation. So that, we tried to develop a simple method for fish size monitoring that can be operated by the staff of aquaculture industries. In this study, we used a stereo-video camera system to evaluate the precision and validity of the fish size estimates determined from repeated measurements. Of the total assessed individuals swimming within a distance of <5.5 m from the camera system, the estimates for over 95% were found to be valid, with an error ratio (standard error/mean) of <5%. Therefore, we believe that our proposed simple method for monitoring free-swimming fish in an off shore net cage could be very useful for aquaculture management.

Abstract

Satellite tagging of blue sharks (*Prionace glauca*) in the Gulf of Lions: depth behaviour, temperature experience and movements: Preliminary results.

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Keywords : Biology *Prionace glauca*, management of shark populations, Mediterranean Sea

The lack of reliable fishery-dependent data and fundamental understanding of the biology of most shark species causes concern for the Sustainable management of shark populations in the Mediterranean Sea. The study aims at investigating on habitat occupancy, residency times and migratory pathways as well as providing behavioural data on temperature experience and swimming depth of the blue shark (*Prionace glauca*). This study strives to identify habitats and regions that are essential for the survival of sharks, while also determining when and where sharks are most vulnerable and will assist in the conservation of the species. The use of different types of satellite tags is proposed to investigate the ecology of the large pelagic sharks. The preliminary results of the first "Smart tags" deployed on eight individuals are presented.

Abstract

Effect of moderate or severe acute stressor on expressions of growth-related genes in cultured fish

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Keywords: acute stressor; growth hormone; growth hormone receptor; insulin-like growth factor-I; gene expression; cultured fish; coho salmon.

Growth in fish is regulated by the growth hormone (GH)-growth hormone receptor (GHR)-insulin-like growth factor-I (IGF-I) axis. However, the effect of acute stressor on GH-IGF-I axis in fish is not well understood. The present study determined the changes in mRNA expression of growth-related genes *gh*, *ghr*, and *igf1* in juvenile coho salmon (*Oncorhynchus kisutch*, an important fish species for aquaculture), in response to moderate or severe acute stress. Moderate stress consisted of simulated handling stress, which was known to be one of typical aquaculture-related stress, in the form of 2 min of chasing followed by using a dip net to gently lift the fish out of water for 0.5 min. Severe stress consisted of exposure to heat shock (adequate rearing temperature +11°C for 2 h).

In response to moderate stress, *ghr* mRNA levels in pituitary, liver, and muscle decreased gradually; pituitary *gh* mRNA levels did not change; and hepatic *igf1* mRNA transiently increased. In response to severe stress, *ghr* mRNA levels in pituitary, liver, and muscle increased; pituitary *gh* mRNA expression increased 2.5 h post stress; and hepatic *igf1* mRNA levels gradually decreased. These results show that expression of *gh*, *ghr*, and *igf1* genes is differently affected according to the type and strength of stress. Prudent control of conditions that can lead to stress should significantly improve both health and production in cultured fish.

Abstract

Embryological development of *Pinna nobilis* Linnaeus 1758 in controlled conditions.

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Keywords : *Pinna nobilis*, hatchery, improvement of artificial production.

In this work the first data on the hatchery of the endemic Mediterranean bivalve *Pinna nobilis* Linnaeus, 1758 are exposed. We have carried out numerous essays to develop the best hatchery protocol for this endangered bivalve. In order to obtain healthy gametes, 22 adult pen shells were collected during summer months (July to September) in 2012 and spawning induced by thermal shock. A reduction of 10 °C in water temperature was sufficient to easily induce spawning in all specimens >44.5 cm and collected in July and August. Those individuals collected in September did not spawn. The egg mass was non-buoyant and larvae started swimming only one day after fertilization, which indicates that females maintain eggs in the body cavity until they are fecundated and larvae start swimming. On average, 725,000 larvae/l were obtained from an adult c. 60 cm length and some specimens were able to spawn repeatedly during several days. Some individuals changed from producing sperm to eggs in a few days. Interestingly, two specimens did spawn simultaneously eggs and sperm, inducing self fertilization. Viable larvae were susceptible to diseases from bacteria that spread and deteriorated the culture after a few days. We were able to maintain the larvae alive for 25 days, but the vellum was destroyed, likely by bacteria, and the offspring stopped swimming and feeding, then dyed. New experiments involve adult gonad maturation in captivity and improving the survival of larvae to arrive to settlement. The selectivity of substrates for settlement from a set of natural and artificial structures will also be tested.

Abstract

Environmental impacts of fish farming in floating cages in coastal seawaters and coral reef lagoons.

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Key words: fish farming, environmental impacts

Today, the fish farming in open sea and coastal bays as well in coral reef lagoons, that blows up since the 1990-years, represents a true alternative to the fish catching in temperate seawaters (Atlantic and Mediterranean coasts, North and South America, Japan) and in the tropical ones (Aqaba gulf, Persian gulf, Mayotte I., Reunion I., Mauritius I., Asian Mediterranean countries, Philippines, Pacific Is.). However, when the farmed fishes are carnivorous that sets another problem. These predators eat large quantities of foods (under granulate balls) made with « foraging » small pelagic fishes that are trawled mainly in the cold waters around the Antarctic seas or in upwelling areas (Chili or Namibia coasts). That moves away the problem of the sea resources over fishing.

As all the types of intensive farming, the fish farms could generate sources of pollution or disturbance of the environmental conditions.

So the positive and negative impacts of fish farming in the Mediterranean Sea (an old tropical sea, 18 My ago) and in tropical seas of the western Indian Ocean area analysed there.

When the farmer well manages his exploitation (floating cages, nets and farm area surroundings), which place was chosen very carefully taking in account to the oceanographic parameters (winds, sea streams, bottom features and eventually coastal pollution inputs) and when the fishes are fed with foods of high quality (even with the “bio” label) having regards to the fish densities in the net cages according to the ages and sizes of them, it is observed that a fish farm becomes equivalent to a “Marine Protected Area”. That with no charges to the taxpayers!

Abstract

Ecosystem-versus species-based approach of the human impact on the Mediterranean seagrass *Posidonia oceanica*

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Abstract

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