



PHAROS4MPAs

SAFEGUARDING MARINE PROTECTED AREAS IN THE GROWING MEDITERRANEAN BLUE ECONOMY: AQUACULTURE

**POLICY
BRIEF**
MAY 2019



AQUACULTURE & MEDITERRANEAN MARINE PROTECTED AREAS:

INCREASING INTERACTIONS

Demand for fish for human consumption is rapidly growing. Analysis projects that 62% of fish for human consumption will be produced by aquaculture by 2030.

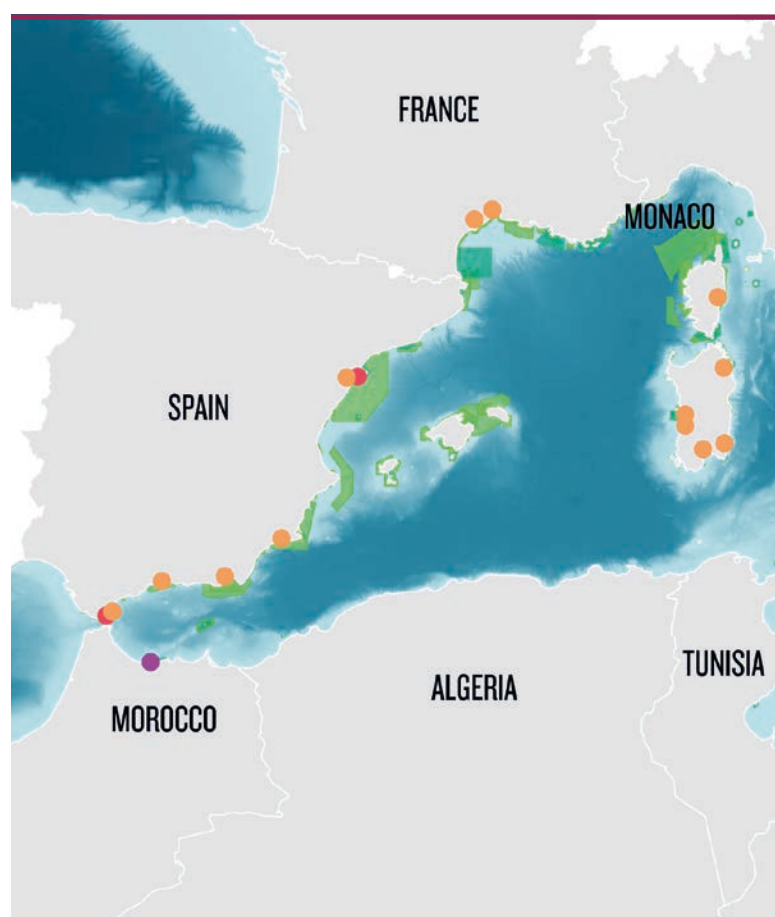
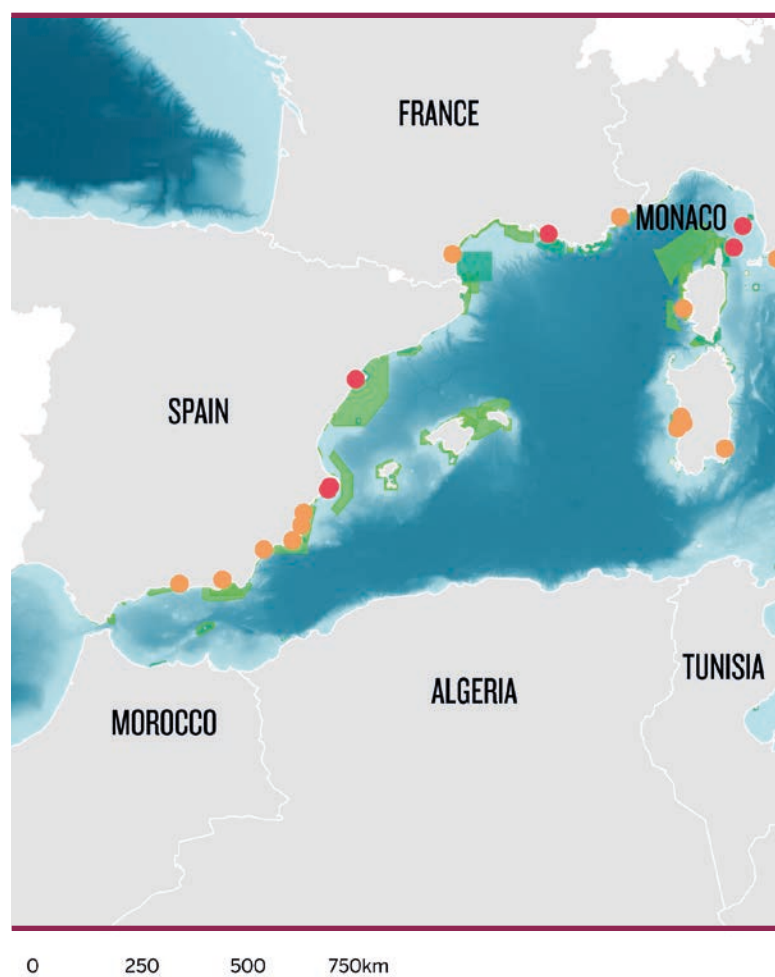
Aquaculture already accounts for more than half of the Mediterranean's total fishery output, and the sector is projected to continue growing. With almost 80% of wild fish stocks in the region at risk of overfishing, aquaculture represents the most effective way of meeting the still-rising demand for fish and shellfish products.

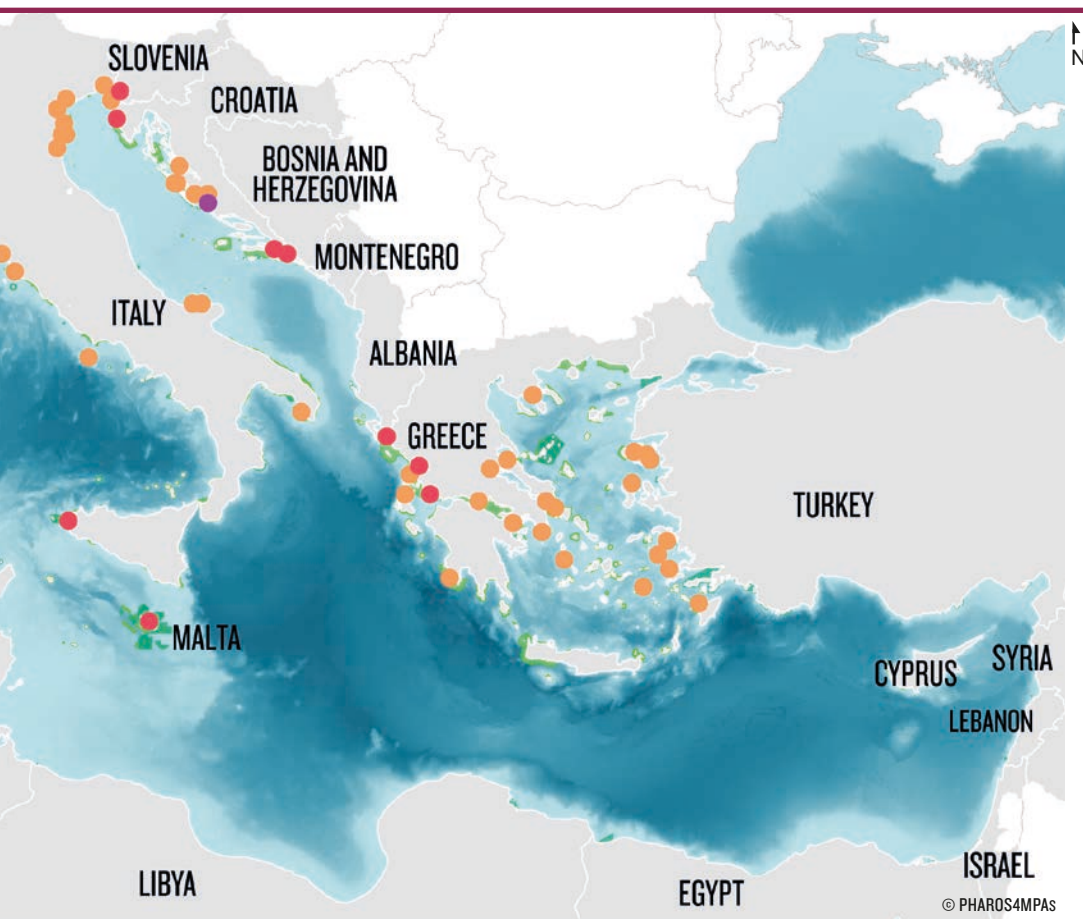
The best sites for marine aquaculture tend to be in coastal and shallow areas of the Mediterranean, with good water quality – and this means that in recent years aquaculture operations have increasingly been overlapping with ecologically significant areas, including marine protected areas (MPAs) and marine Natura 2000 sites.

This has focused attention on the environmental impacts of fish and shellfish farming, and raised the question of whether and how far aquaculture should be allowed to take place in such vulnerable locations. **As with all human activities, aquaculture generates environmental and social impacts: the extent to which marine aquaculture is compatible with a healthy marine environment is one of the main questions concerning its sustainability.**

It's clear that some ecologically fragile areas should be kept entirely off limits, but in others it may be possible to support a growing sustainable aquaculture sector without causing irreparable harm to vital ecosystems.

The PHAROS4MPAs recommendations illustrate the main trends shaping the aquaculture sector, identifies its projected impacts on Mediterranean MPAs and Natura 2000 sites, and proposes priority policy responses.





MPAS (PURPLE DOTS), NATURA 2000 SITES (ORANGE DOTS) AND AREAS WHERE BOTH DESIGNATIONS OVERLAP (RED DOTS) IN WHICH FISH FARMS ARE LOCATED

CONSERVATION AREA IN WHICH FISH FARMS ARE LOCATED

- National MPA
- National MPA and Natura 2000
- Natura 2000

CONSERVATION AREAS

- National MPA
- Marine Natura 2000 Site

Conservation areas
SOURCES: MAPAMED (2017), EAA (2018), EMODnet (2018)

Conservation area in which shellfish farms are located
SOURCE: WWF (2019)



MPAS (PURPLE DOTS), NATURA 2000 SITES (ORANGE DOTS) AND AREAS WHERE BOTH DESIGNATIONS OVERLAP (RED DOTS) IN WHICH SHELLFISH FARMS ARE LOCATED

CONSERVATION AREA IN WHICH SHELLFISH FARMS ARE LOCATED

- National MPA
- National MPA and Natura 2000
- Natura 2000

CONSERVATION AREAS

- National MPA
- Marine Natura 2000 Site

Conservation areas
SOURCES: MAPAMED (2017), EAA (2018), EMODnet (2018)

Conservation area in which shellfish farms are located
SOURCE: WWF (2019)

MARINE AQUACULTURE:

KEY IMPACTS ON THE MARINE ENVIRONMENT

Aquaculture's environmental effects depend very much on the size of the farms, the production systems and management methods used, and also on the marine habitats in which they're located. Some key impacts are described on the right.

Every operation – whether already established or proposed for the future – needs careful scrutiny, and decisions should be made on a case by case basis in the context of detailed and dynamic management plans.



IMPACTS OF FISH FARMING

Depleted wild fish populations

Fish-farming in the Mediterranean has progressively shifted from producing herbivore fish such as grey mullet to producing predatory species such as sea bass. Such 'farming up' the food chain requires a supply of wild-caught fish to use as feed: this is a major issue, since the stocks targeted to produce fish meal are already fully exploited and will not support any further increase in fishing pressure.

Escapes and introduction of non-indigenous species

Non-indigenous species can be introduced in the marine environment by aquaculture operations. Such species can compete with native species for food and space if accidentally released into the natural environment; and they could also potentially transfer pathogens and/or parasites, disturbing wild fauna and ecosystem functions.

Excessive nutrients in the foodweb

Many studies have also pointed at overfeeding in fish farms (which may drift into surrounding foodwebs and favour some organisms over others) as the cause of changes in benthic community structure.

Effluent discharges

Effluent discharges from aquaculture facilities may contain residues of therapeutic products, antifouling agents or uneaten fish feed. If improperly managed, these discharges can lead to water eutrophication and oxygen depletion.

KEY PRESSURES AND THEIR LINKS TO AQUACULTURE PRODUCTION

(ISPRA, 2011 ADAPTED FROM HUNTINGTON ET AL. 2006)

Environmental Pressures/Category	ECOLOGICAL CLASSIFICATION	
	Traditionnal classification (type and intensity of production)	
	Sedimentation	Organic load
		Turbidity
	Change in geochemical processes	Dissolved O ₂
		Nutrients
	Spread of alien species	
	Interaction with wild species	
	Use of chemical products	
	Collection of wild forms	
	Control of predators	
	Disease spread	
	Use of fishery resources in feeds (fish meal/oil)	



IMPACTS OF SHELLFISH FARMING

In contrast to finfish, shellfish are generally considered as the most environmentally sound animal species to farm. Although they do generate an ecological impact, it appears to be limited.

Well placed and cleverly managed, shellfish farms can provide services to coastal ecosystems such as carbon sequestration, nutrient or phytoplankton biomitigation, and benthic biodiversity restoration. These areas also provide biomass for coastal ecosystems with the spillover of spat, or with longline mussels for wild sea bream predation.

Less positively, there's a growing concern in several areas of the Mediterranean, particularly in the Adriatic and Ionian Seas, over the use and disposal of plastic socks for mussel culture. According to recent data, these plastic nets make up the seventh most common category of litter recorded on beaches and the third most common category on the seafloor.

Compared to other types of marine aquaculture, net pens aquaculture holds the highest potential risks for several sensitive habitats, communities and species. In the Mediterranean, this relates mainly to the farming of seabream, seabass, meager and tuna.

ACTION SYSTEMS: HIGH PRESSURE IS SHOWN IN RED, MODERATE IN ORANGE, LOW IN YELLOW AND NEGLIGIBLE IN WHITE

[illegible]

* Recirculating aquaculture system



PUBLIC AUTHORITIES CAN PLAY A MAJOR ROLE IN MINIMIZING THE AQUACULTURE SECTOR'S IMPACTS ON MPAS

National public authorities are the most influential actors in minimizing the impacts of aquaculture development on the marine environment. **The rapid expansion of aquaculture in the Mediterranean has intensified the competition for the use of coastal zones, and as such there is a pressing need to integrate aquaculture into marine spatial planning processes.** Without coordinated spatial planning, it will be impossible to move towards sustainable development for the sector.

Likewise, taking an ecosystem approach to aquaculture means it's necessary to assess the carrying capacity of the marine environment, to identify suitable boundaries for aquaculture production within ecological limits.

KEY RECOMMENDATIONS FOR PUBLIC AUTHORITIES FOR FUTURE AQUACULTURE DEVELOPMENT IN PROTECTED AREAS

- Only marine aquaculture farms with no detrimental effect on the designated protected areas should be permitted in MPAs, and this should be decided on a case-by-case basis.
- Fish farms with net pens settlements in areas with significant seagrass meadows and coralligenous formations and/or important fish habitats, spawning grounds and nursery areas should not be allowed. In general, habitats sensitive to the discharge of organic matter are not appropriate for fish or shellfish aquaculture.
- In general, fish farms with net pens settlements inside or in the close vicinity of MPAs should be avoided. Buffer zones should be maintained between fish net pens settlements and protected areas.

- The farming of exotic species should be avoided in MPAs.
- Industrialized intensive fish production should be avoided in MPAs.
- For marine Natura 2000 sites, the **EU Commission Guidelines on Aquaculture and Natura 2000 offer clear advice.** Only marine aquaculture farms without a detrimental effect on the habitats and species protected under the Birds and Habitats Directive should be permitted in such areas, and these should be assessed on a case-by-case basis.



Guidance on Aquaculture and Natura 2000

Sustainable aquaculture
activities in the context of the
Natura 2000 Network





OYSTER BEDS IN THE THAU LAGOON
NATURA 2000 SITE, FRANCE

© SHUTTERSTOCK / OLIVIER TABARY

National aquaculture strategies must ensure sustainable development and growth, avoiding potential negative impacts in terms of non-indigenous species, eutrophication, seafloor integrity, concentrations of contaminants (both in the water generally and in seafood specifically), populations of commercial fish, and marine litter.

To provide a solid basis for implementing these recommendations, **public authorities should put in**

place environmental monitoring programmes for marine aquaculture. While such monitoring is usually made mandatory in national regulatory frameworks, in some countries this monitoring is left to the aquaculture producers themselves, without any public oversight – this in itself is clearly not an adequate solution.

Public research on sustainable aquaculture should also be encouraged to support businesses in progressively enhancing production efficiency and sustainability.



The PHAROS4MPAs project explores how Mediterranean MPAs are affected by activities in the growing Blue Economy, and provides a set of practical recommendations for regional stakeholders on how the environmental impacts of key sectors can be prevented or minimized. Encouraging international collaboration across MPA networks and cooperation between state, industry and other actors, PHAROS4MPAs aims to enhance MPA management effectiveness and improve the conservation of marine ecosystems across the whole of the Mediterranean.



Further details, see full report at <https://pharos4mpas.interreg-med.eu>

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FRONT COVER: Floating cages in an aquaculture farm, Calanques National Park, Marseille, France

© LIONEL ASTRUC / BIOSPHOTO

BACK COVER: Aquaculture farms close to Karaburun-Sazan National Park (Albania)

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