	<p>The Cote Bleue Marine Park (France, NW Mediterranean): a success story in co-construction with small scale fisheries since 38 years</p>
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The Cote Bleue Marine Park (PMCB) was created 38 years ago in 1983. It's based on an experimental cooperation between local public authorities and professional small scale fisheries in order to implement a program for sustainable development of fishing activity, marine environment protection, experimental research and public awareness.

PMCB is located in Mediterranean Sea, in the south of France, close to the city of Marseilles. The territory represent 9.873 ha on 42 km of rocky coastline including 2 no-takes reserves of 295 ha, where all kind of fishing, mooring and scuba diving are prohibited. The originality is the use of no-takes reserves and artificial reefs as a complementary tools for conservation of resources and habitats. There is about 4.884 m³ of artificial reefs, both for production purposes and protection from illegal trawling inside the 3NM, around 17.5 km of barriers of protection reefs (Figure 1).



Figure 1 : Location of Côte Bleue Marine Park territory (9.873 ha), including 2 no-take reserves (Carron and Couronne) and artificial reefs of protection and production.

The Park is a local initiative and was founded with a “bottom-up” approach. This co-construction is based on strong dialog process with local professional fishermen organizations,

That's one of the main benefits that the PMCB offers. The association of local fishers within the PMCB's decision body is truly effective, but the joint association, which is also composed of local (mayors of the 5 villages), regional and departmental elected representatives, deals primarily with the formal obligations to manage a local public institution (budgetary decisions, public procurement, territorial public service, etc.).

The Côte Bleue Marine Park is a “sea-life size laboratory” and conduct several programs of applied research and scientific studies. It’ permittes to have strong references in scientific litterature, particularly on the “reserve effect”, with around forty five scientific monitoring, like fish visual census, sea-urchins, red coral, Posidonia meadow, frequentation, *etc.* Since its origin, the Park also created awareness and educational programs for scholars, with the implementation of one week of field training course. More than 28 000 children made aware about the marine environment. There is an underwater pathway in the no-take reserve of Carry for public and tourists. since 1994 PMCB organize free visits by snorkeling 3 days per week during every summer. Visitores can see the reserve effect with really more bigger fishes.



UW visual census on fishes conducted every 3 years in the reserve of Couronne. Photo: J.G. Harmelin/PMCB.

Finally, the Côte Bleue Marine Park get an international recognition for well MPA management efficiency with the label “Green List” of Protected Areas delivered by IUCN, and the SPAMI (Specially Protected Area of Mediterranean Importance) label in 2012 and inclusion in European Natura 2000 network since 2009 (site “Côte Bleue Marine” of 18 928 ha). A real success for this small team (8 employees) and local initiative.

Bulding block n°1: An accepted MPA with shared governance

The Côte Bleue Marine Park is a local initiative and was founded with a “bottom-up” approach with shared governance. This co-construction is based on strong dialog process since the beginning with professional fishermen in particular with the local fishermen organizations (“Prud'homies” of Marseille and Martigues), which share the Côte Bleue fishing territory. These is around 30-35 small scale fishing boats operating along the coastline, using mainly gillnets and trammel nets. Artisanal fishermen are at the origin of the creation of the 2 no-takes reserves of PMCB (Carry 85 ha since 1982 and Couronne 210 ha since 1996) A real success was the re-conduction of the 2 protected reserves in 2014, obtained for an unlimited time. These no-takes zones have a legal status of fisheries reserves and the renewal was asked by fishermen themselves.



Small scale fishermen in the Côte Bleue Marine Park. Photo: E. Charbonnel/PMCB.

The Marine Park has daily contacts with individual fishermen in 5 ports through patrol at sea, interviews and monitoring on landing, effort, catches, *etc.* These monitoring are conducted every

month. We have also formal but irregular meetings, depending of programs (*eg.* Natura2000 process, PhD study on fisheries). The social acceptance of the Park is an important factor, which has conditioned its success. Professional fishermen feel integrated in the decision mechanism and the relationship is based on trust and mutual exchange.

Enquiries of social acceptance done in 2010 during a PhD on fisheries showed that there is no negative perception of PMCB. The majority of local fishers (88%) feels they are involved in decisions processes of the Park, 69% of fishers sense a positive effect on marine environment and 88% of the fishers perceived a positive effect on the local artisanal fishery.

In 2018, under the frame of an EU scientific program called "FishMPABlue2", the PMCB conducted interviews of fishers on their perception of the management of marine protected areas and social acceptance. This Marine Park is an accepted MPA. The level of trust with PMCB team is very high (82%), same as the level of support (77%) ; while in the others MPA case studies (11 in Mediterranean, belonged to 6 countries); there is only 40% of fishers were satisfied with MPA management.

Since 1994, small scale fishers collaborate with the Park staff on several activities, like monitoring of landings, scientific studies, meetings, working with local sea school. They also give information about poaching on the reserves, abnormal or exceptional phenomena (invasive species like rabbit fish), taking into account sensitive and protected species like the releasing of groupers, signalization of lost nets, *etc.*



Exchanges between fishermen and staff of PMCB during the green list process in 2017. Photo: J.F. Sys/IUCN.

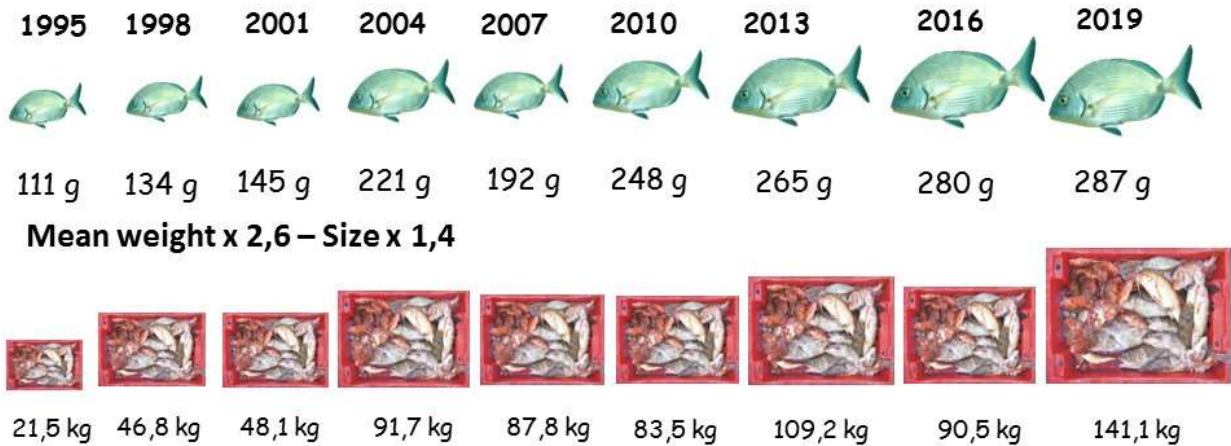
Bulding block n°2: Better knowledge for better management

The protection and surveillance within the 2 no-take reserves -where all kind of fishing, mooring and scuba diving are prohibited- is effective, with more than 2.400 hours of enforcement per year, mostly at sea, There is a great increase in fish biomass with an increase of abundance, more bigger fishes, and come back of rare/sensitive species like groupers, brown meagre, seabass, *etc.* Experimental controlled fishing operations are conducted every 3 years within the reserve and showed that in 24 years, the mean weight of a fish increased by a factor of 2.6 (287 g in 2019 *vs.* 111 g in 1995). During this time, fishing captures have been multiplied by a factor of 7, with a catch rate per CPUE effort unit increasing from 1.1 kg / 100 m of net in 1995 to a maximum of 7.1 kg / 100 m in 2019 (Figure 2).

These spectacular results not only concern fishes, but also the invertebrates like spiny lobsters: catches were multiplied per 8 since the creation of the reserve. These results is important for artisanal fishers who benefits to biomass exportation process: in the borders of marine reserves, the fishing yield can reach 2.5 kg/100 m of net; while in the rest of MPA, the mean CPUE is 1kg/100 m.



**Long term monitoring of fish assemblages in marine reserve of Cap-Couronne.
Results of experimental fishing (4x500 m trammel net)**



Landing Biomass, yields x 7

CPUE Catch Per Unit Effort:
1.1 kg in 1995
7.1 kg in 2019

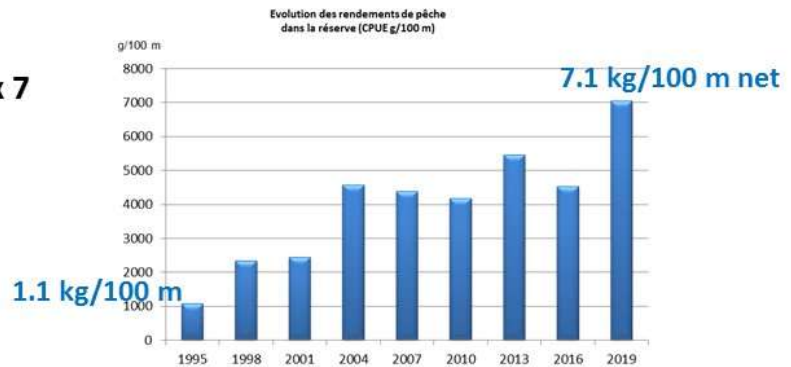


Figure 2: main results of experimental fishing monitoring conducted by PMCB and artisanal fishers every 3 years in Couronne no-take reserve.

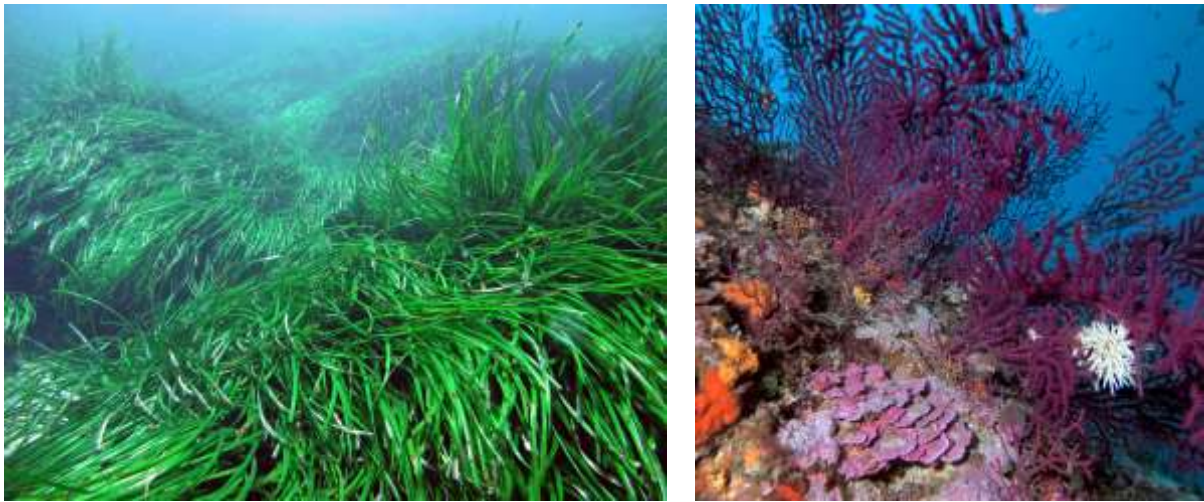
Bulding block n°3

Back to some successful management

The creation of 2 no-take reserves allowed the integral protection of 7.5% of marine habitats of the PMCB, up to -50 m depth (the most productive part of the sea). Two main habitats are well developed, with a major ecological interest:

- (i) the *Posidonia oceanica* meadows, it is the largest seagrass bed of the area (1050 ha) at the scale of the department of Bouches-du-rhône, and the latest up to the Spanish border;
- (ii) coralligenous reefs, it is a biotic construction host a rich biodiversity (700 species censused in Côte Bleue).

These sensitive and priority natural habitats are preserved and well conserved in the Marine Park; thanks to the use of 2 complementary tools: no-takes reserves and artificial reefs, with the deployment of 4.884 m³ of artificial reefs, both for production purposes and protection against illegal trawling within the 5.5 km offshore limit, by creating 17.5 km of barriers of protection reefs perpendicular to the coast.



Main marine habitats of PMCB: *Posidonia oceanica* meadows (left), coralligenous reefs (right) Photo: J.G. Harmelin/PMCB.

Anti Trawling reefs were deployed at the beginning of the no take reserve of Couronne. Since these 326 heavy obstacles (2 200 m³) designed to protect against illegal trawling have been installed, a significant decrease in illegal trawling has been observed. The most characteristic example of success of protection reefs is showed on Figure 3, with the road of illegal trawling plotted before (1995) and after reef deployment and creation of the no-take reserve in Cap-Couronne (1997). The results are the decreasing of fishing pressure on the coastal band, by removal illegal trawling activities. This fishing method is not selective (a lot of juveniles are caught) and mortality by fishing juveniles is the principal factor of the falling of catches. The efficiency of anti-trawling reefs allowed a better sharing of space and resources between local fishermen. It help traditional small scale fisheries (bottom gillnet and trammel net, hook on line) who have selective techniques (catch only adults and thus facilitating conservation of fishing resources)

The other essential effect of protection reefs is to preserve the most productive and fragile natural habitats (*Posidonia* meadows and coralligenous banks) from mechanical destruction by trawlers. These damages have important ecological and economical repercussions, because these habitats serving for spawning, nurseries, recruitment and feeding areas for the most part of the exploited resources.

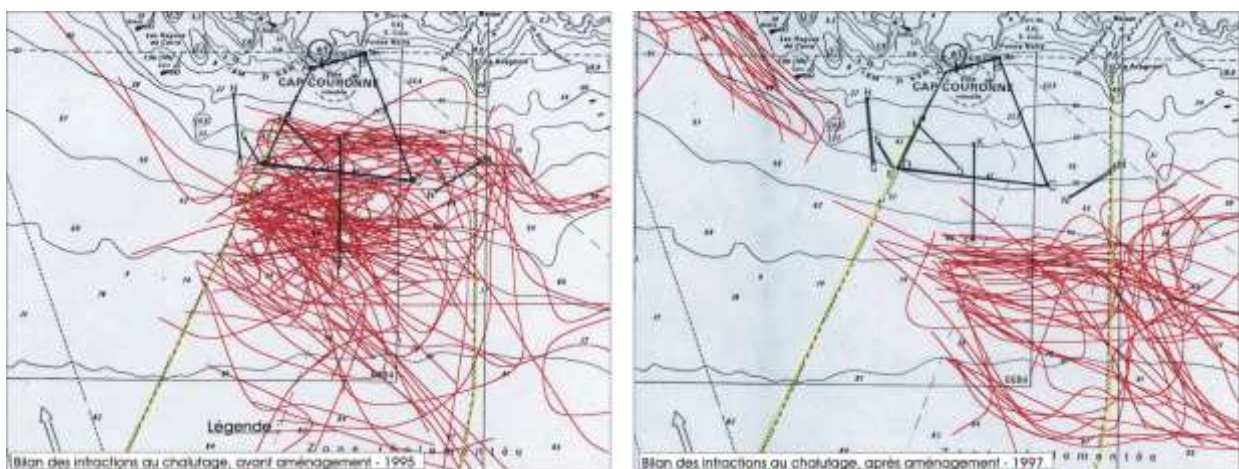


Figure 3: Results of protection reef efficiency, before (left) and after (right) reef deployment in the Côte Bleue Marine Park around the vicinity of Couronne no-takes reserve (red lines corresponds to illegal trawling roads within the 5.5 km area; black lines correspond to the limits of reserve and anti-trawling reefs around).

In the Côte Bleue Marine Park, the two categories of artificial reefs (production and protection reefs) are not dissociable of the two no-takes reserves. These management tools worked in an additional way and contributed to the preservation of the traditional small scale fisheries on the Côte Bleue territory, while these fishing activities are decreasing in the nearby zones.