Research Open

Aquaculture and Fisheries Studies
Volume 2 Issue 1

Case Study

Climate Change and Fisheries: The Case Study of Corsica, an Ideal Reference Station in the Mediterranean Sea

Gobert S*[1,2], Fullgrabe L[1,2], Lejeune P[1] and Marengo M[1,2]

[1]Station de Recherche Sous-marines et Océanographiques, France
[2]Université de Liège, Centre MARE, Laboratoire d'Océanologie, Sart-Tilman, B6c, 4000 Liège, (Belgique)

Corresponding Author: Gobert S, STAtion de REcherche Sous-marines et Océanographiques (STARESO), 20260 Calvi, **E-mail:** sylvie.gobert@uliege.be

Received: February 24, 2020; **Accepted:** March 08, 2020; **Published:** March 13, 2020;

Case Study

Climate change is one of the main factors influencing the structure and functioning of marine ecosystems, mainly because of the rise in water temperature [1]. Its effects are expected to increase in the near future, especially in the Mediterranean region which has been defined as a primary « hot-spot » regarding future climate change projections [2]. From 1950 to 2009, the average temperature of Mediterranean surface waters increased more (+ 0.50˚C) than those of oceanic waters (e.g. + 0.42˚C for the Atlantic Ocean and + 0.30˚C for the Pacific Ocean) [3]. In addition, based on the different GHG (Greenhouse Gas) emission scenarios proposed by the IPCC (Intergovernmental Panel on Climate Change), models predict an increase in Mediterranean surface temperatures ranging from + 1.73˚C to + 2.97˚C Ocean warming for the period 2070–2090 compared to the period 1961–1990 [4]. Ocean warming can exert a direct influence on marine organisms, for example, leading to mass mortality events of benthic invertebrates [5] or affecting many life history traits of fish [6]. Such influence has also lead to the upheaval in the geography of the climate in the Mediterranean basin impacting ultimately on the distribution range of species. Indeed, the Mediterranean Sea is not exempted from « tropicalization » phenomena via the arrival of exotic species, neither from « meridionalization » via the extension of the distribution area of species with affinity to warm-waters [7]. Exotic species can be invasive and thus, can seriously disrupt the existing ecosystems [8]. On the island of Corsica, this is the case of the bluespotted cornetfish (*Fistularia commersonii)*, a Atlantic lessepsian the Atlantic crab Percnon gibbesi fish species observed in the Lavezzi islands since 2008, the Atlantic crab *Percnon gibbesi* crab spotted in the Bonifacio Strait for the first time in 2010 or the famous algae *Caulerpa cylindracea* [9]. Although the effects of these changes on a global scale are currently under discussion, on a local scale, they bring about significant changes in terms of structure and functioning of marine ecosystems [1]. Furthermore, climate change is considered as responsible for a decline of more than 4% in global marine fisheries production from 1930 to 2010, with up to 35% in particularly productive regions, although some species appear to be favour [10]. While it is complex to fully discriminate the impacts of fishing from the effects of climate change [11] fishing can strongly amplify negative population fluctuations [12].

Artisanal fisheries or small-scale coastal fisheries are particularly important in the Mediterranean Sea and especially in Corsica. It is the fourth largest island in the Mediterranean Sea located relatively central within the western basin. The island has a surface area of 8722 km^2 and a coastline of 1047 km, representing more than half of the French Mediterranean coast. In 2015, 91% of the 195 active boats of the Corsican fishing fleet corresponded to artisanal fisheries. This region is among the least intensively fished areas in the entire northern Mediterranean Sea; yet, it has received little attention from fishery biologists [13]. Fishermen operate with small boats near the coast (0-200 m depth) and adapt their practices to resource availability: a wide variety of gear is used, targeting a diversity of species that change in space and time [14]. Used fishing gears (trammel nets, fish mesh or longlines) provide a very diversified production estimated at around 1,100 tonnes per year, all species combined [15].

In this context, Corsica appears as an ideal area in the Mediterranean to follow the modification of the population structures. Moreover, within the framework of various scientific projects, the STARESO marine station has been monitoring the Calvi Bay for several decades, collecting a large panel of biological and physicochemical parameters. The study of small-scale fisheries coupled with the analysis of such long-term environmental data could help to better understand current fish population dynamics and to better discriminate anthropogenic pressures from climate change-induced impacts at local and global scales. Given the current situation, it seems essential to closely monitor both fisheries landings and environmental aspects in order to assess the vulnerability of the exploitation of resources and their potential risks of overexploitation and extinction in this context of climate change.

Acknowledgment

This research was funded by the "Agence de l'eau Rhône Méditerranée Corse" and the "Collectivité de Corse" (CdC), as part of the STARE CAPMED project research.

References

1. Adloff F, Somot S, Sevault F, Jordà G, Aznar R, et al. (2015) Mediterranean sea response to climate change in an ensemble of twenty first century scenarios. *Climate Dynamics* 45: 2775–2802.
2. Bianchi CN, Caroli F, Guidetti P, Morri C (2018) Seawater warming at the northern reach for southern species: Gulf of Genoa, NW Mediterranean. *Journal of the Marine Biological Association of the United Kingdom* 98: 1–12.

3. Bodilis P, Arceo H, Francour P (2011) Further evidence of the establishment of Fistularia commersonii (Osteichthyes: Fistulariidae) in the north-western Mediterranean Sea. *Marine Biodiversity Records 4*.
4. Drinkwater KF, Beaugrand G, Kaeriyama M, Kim S, Ottersen G, et al. (2010) On the processes linking climate to ecosystem changes. *Journal of Marine Systems* 79: 374–388.
5. Essington TE, Moriarty PE, Froehlich HE, Hodgson EE, Koehn LE, et al. (2015) Fishing amplifies forage fish population collapses. *Proceedings of the National Academy of Sciences* 112: 6648–6652. [Crossref]
6. Garrabou J, Coma R, Bensoussan N, Bally, M, Chevaldonné P, et al. (2009) Mass mortality in Northwestern Mediterranean rocky benthic communities: effects of the 2003 heat wave. *Global Change Biology* 15, 1090–1103.
7. Giorgi F (2006) Climate change hot-spots. *Geophys Res Lett* 33, L08707.
8. Hollowed AB, Barange M, Beamish RJ, Brander K, Cochrane K, et al. (2013) Projected impacts of climate change on marine fish and fisheries. *ICES Journal of Marine Science* 70: 1023–1037.
9. Le Manach F, Dura D, Pere A, Riutort JJ, Lejeune P, et al. (2011) Preliminary estimate of total marine fisheries catches in Corsica. *Fisheries Centre Research Reports*.
10. Mannino AM, Balistreri P, Deidun A (2017) The marine biodiversity of the Mediterranean Sea in a changing climate: the impact of biological invasions. *Mediterranean Identities-Environment, Society, Culture*.
11. Marengo M, Culioli JM, Santoni MC, Marchand B, Durieux, EDH (2015) Comparative analysis of artisanal and recreational fisheries for Dentex dentex in a Marine Protected Area. *Fisheries Management and Ecology* 22: 249–260.
12. Petitgas P, Poulard JC, Biseau A (2003) Comparing commercial and research survey catch per unit of effort: megrim in the Celtic Sea. *ICES Journal of Marine Science: Journal du Conseil* 60: 66–76.
13. Plagányi É (2019) Climate change impacts on fisheries. *Science* 363: 930–931.
14. Relini G, Bertrand J, Zamboni A (1999) Synthesis of the knowledge on bottom fishery resources in central Mediterranean (Italy and Corsica). *Biologia Marina Mediterranea* 6: 314–322.
15. Stocker TF, Qin D, Plattner GK, Tignor MMB, Allen SK (2013) Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change 14.

Citation:
Gobert S, Fullgrabe L, Lejeune P and Marengo M (2020) Climate Change and Fisheries: The Case Study of Corsica, an Ideal Reference Station in the Mediterranean Sea. *Aquac Fish Stud* Volume 2(1): 1–2.