MedDialogues +2030

FOCUS n. 20 January 2024

CHANGING SEAS: Adaptation of the Fisheries in the Mediterranean Basin

Prof. Jason M Hall-Spencer[1]

Surface temperature in the Mediterranean region is now 1.5°C above the pre-industrial level, with a corresponding increase in high-temperature extreme events such as more frequent and intense droughts, lethal heatwaves, and destructive wildfires (Ali et al. 2022). The sea surface has warmed by 0.29°C–0.44°C per decade since the early 1980s with marine heat waves causing mass mortalities of long-lived fisheries habitat forming organisms such as corals and sponges. This heating of the surface of the sea is also aiding the spread of invasive warm-water species. For example, the blue crabs Callinectes sapidus and Portunus segnis are both spreading rapidly. They have the same very aggressive behaviour, are both highly opportunistic, have severe impacts on local fisheries and grow better and produce more planktonic larvae as the Mediterranean Sea warms (Marchessaux et al. 2023). They are also tasty and so a fishery has been set up for them in Tunisia with help from the Food and Agriculture Organization (FAO) and investment in processing facilities from Asian seafood companies. The people that now make a living from these invasive crabs are calling for minimum landing sizes and the return of egg carrying females to the sea to help build up numbers of the crabs. This adaptation by Tunisian fishermen is concerning vongole clam fishermen in Italy however, as the blue crabs could easily decimate important shellfish populations such as those of the northern Adriatic.

Climate warming and a recent widening and deepening of the Suez Canal is causing a rapid influx of non-indigenous species into the Mediterranean. Silver-cheeked toadfish (Lagocephalus sceleratus) are one example, they cause a nuisance by damaging fishing nets and catches and are themselves toxic to eat. Venomous lionfish (Pterois miles) have been described as one of the most aggressively invasive species on the planet. They are now spreading through the Mediterranean in the fastest fish invasion ever reported, disrupting ecosystems and impacting livelihoods (Kleitou et al. 2022). This highlights the Suez Canal biosecurity hazard: there used to be high salinity areas known as the 'bitter lakes' that helped prevent the spread of organisms from the Red Sea into the Mediterranean, but ongoing canal expansion since 2016 has removed the high salinity part. A high salinity area in the canal needs to be reinstated, and this could be done using waste brine from desalination plants that

[1] Universities of Plymouth (UK) and Tsukuba (Japan)

IEMed.

now operate in the region. The revenues from the Suez Canal for Egypt in 2023 are around $13.5bn and the route benefits people throughout Europe as a more economic way of transporting goods, so an international solution to this crisis is required.

Based on a four-year project in Cyprus (an EU-LIFE project called RELIONMED) we have produced a guide to lionfish management in the Mediterranean. To prevent their spread in France or Spain, for example, there would need to be monitoring at sentinel locations and if found the lionfish would need to be targeted quickly to reduce the potential for ecological and socio-economic impacts. Legal changes would be needed to allow lionfish removals from marine protected areas using SCUBA equipment or traps trialled to perfect capture of the fish from deeper waters. Greece, Turkey and Tunisia do not yet allow scuba diving and culling, although it is permitted in Libya and Palestine and informally tolerated in Lebanon. Special permits for lionfish removals have been given in Israel, Egypt and Cyprus. In Cyprus we created opportunities for the public to see, eat and take part in activities to manage lionfish and developed opportunities for commercial and recreational fishers with a supply chain to restaurants and fishmongers. The project was able to reduce lionfish numbers in marine protected areas and resulted in an increased price at market for the fish which have high quality meat that is delicious as ceviche, in soups or grilled.

The combination of rapid climate change and a recent lack of biosecurity in the Suez Canal is completely reshaping the ecology of the Mediterranean Sea. It is virtually impossible to eradicate non-indigenous marine species once they arrive. The fishing industry is clearly having to adapt to rapid warming, but this comes with risks of perverse incentives that encourage invasive species rather than attempting to crash their populations through overexploitation as has happened to so many native Mediterranean fish. The management of marine protected areas also needs a rethink as they can become breeding grounds for invasive species if all forms of fishing inside their boundaries is banned. Not all non-native species become a problem, for example the yellow stripe barracuda (Sphyraena chrysotaenia) has been present in the Mediterranean for decades with no reported negative impacts and a popular source of income for local fisheries. The Manila Clam (Ruditapes phillipinarum) has outcompeted native clams in many parts of the Mediterranean, but it supports lucrative fisheries and helps clean coastal waters through filtration. However, the fact that some non-native species can cause a great deal of harm means that it is common sense and important to all nations with a Mediterranean coast that biosecurity measures are reinstated in the Suez Canal. How to galvanize international collaboration and garner collective action to engineer a high salinity stretch of the Suez Canal is as a perplexing challenge. Despite its profound and accelerating effects on the region's fisheries and marine life, this issue remains conspicuously absent from mainstream discourse. Therefore, this call to action extends to policymakers, environmentalists, and concerned citizens alike, urging a collective exploration of solutions to reinstate biosecurity control in the Suez Canal.

References

Ali, E. et al. (2022) Cross-Chapter Paper 4: Mediterranean Region. In: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 2233–2272, doi:10.1017/9781009325844.021.

Kleitou, P. et al. (2021) Fishery reforms for the management of non-indigenous species. Journal of Environmental Management 111690.

Kleitou, P. et al. (2022). Guide to Lionfish Management in the Mediterranean. University of Plymouth https://doi.org/10.24382/KYCK-J558

Marchessaux, G. et al. (2023) Larval connectivity of the invasive blue crabs Callinectes sapidus and Portunus segnis in the Mediterranean Sea: A step toward improved cross border management. Mar Pollut Bull DOI: 10.1016/j.marpolbul.2023.115272