In Hot Waters: How Can Fisheries Adapt to a Warming Mediterranean?

By editor • 16 Feb 2024

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In the Mediterranean Sea, climate change is exerting additional pressure on marine resources already depleted by overfishing. Warming waters — along with reduced dissolved oxygen levels and acidification (also known as low pH) — are exacerbating the stress on species already grappling with overexploitation, pollution and other disturbances caused by humans. All this also has cascading

effects on those people whose livelihood depends on fisheries.

Last December, Nathalie Hilmi, environmental economist from the Monaco Scientific Center, talked about the challenges of adapting Mediterranean fisheries to this changing scenario at a conference held in Barcelona focusing on "A Changing Mediterranean Climate: When Adaptation Becomes a Priority." Drawing on her presentation, we spoke with her about the Mediterranean fisheries and how they can adapt to the effects of climate change and be managed to allow marine life to replenish and even, to some extent, contribute to mitigating the climate crisis.

For a long time, overfishing has been the most significant threat linked to human activities across the Mediterranean. Although the percentage of overexploited fish stocks decreased to 58 percent in 2021, most Mediterranean fish stocks are still being fished beyond their biologically sustainable thresholds. In addition, over the past few decades, fish populations have also been subject to myriad pressures due to human activities: pollution, reduced dissolved oxygen levels, habitat degradation and warming caused by emissions from burning fossil fuels. Some fish species are relocating in search of their ideal temperature range. Others are expected to shrink their size to adapt to the changing environment or decline in numbers. According to this study in *Ecological Economics*, important commercial species, such as the European sprat and the common sole, might be the species most affected by a warming Mediterranean. At the same time, species that better tolerate higher temperatures have started to appear in areas where they were not previously found. With Nathalie Hilmi we've tried to understand what's at stake for Mediterranean fisheries.

NATHALIE HILMI: As a macroeconomics and international finance expert, Hilmi has been leading the Monaco Scientific Center's environmental economics department since 2010. Her work, at the intersection of environmental sciences and economics, has mostly focused on the socioeconomic impacts and costs of action versus inaction with regard to carbon emissions. Hilmi has been a lead author for the Intergovernmental Panel on Climate Change (IPCC) Special Report on "The Ocean and Cryosphere in a Changing Climate" and the "Impacts, Adaptation and Vulnerability" part of the latest IPCC report assessing the state of climate change science.

This interview has been edited for length and clarity. Most of the interview was conducted via Google Meet. The last four questions were answered over email.

How does climate change affect the fisheries in the Mediterranean and what can be done to adapt?

We have three most important threats: warming waters, deoxygenation and acidification. Warming is particularly important, as fish species [that are typically found in southern waters] are moving northward in the Mediterranean. Some species are disappearing because of warming. So, maybe, one way to adapt is to change the species that we fish and eat. And this is related to the lionfish [and other exotic species that are expanding their presence in the Mediterranean].

I read that small pelagic fisheries — those targeting fishes typically living in open waters, like sardines — which constitute a large portion of Mediterranean landings, are expected to be among the most affected by climate change. How can these fisheries cope with climate change?

If we don't fish [small pelagics], if we leave them in the sea, [these fishes] capture carbon. This is what we call "fish carbon." We talk a lot about whales or other big cetaceans capturing carbon — a whale is capturing 33 metric tons of carbon during its lifetime. But other fishes — like pelagic or mesopelagic fishes — [while feeding on phytoplankton] also capture carbonwhich then goes into the deep sea and stays there for thousands of years. So it's very important for mitigation.

We need fish for our diet, for our protein intake, and it is important for people's livelihood. But when we overfish, it's not for our health or our well-being. And if we catch the fish, [the fish] does not capture carbon in the ocean. This is a sort of trade off: Should we fish and eat or should we leave the fish in the sea because it's capturing

carbon? Carbon has value, which is really important, especially in Europe where the price of carbon is €100 ($106.57) per metric ton, meaning that the fish may have more value in the sea than on our plate.

You said that shifting the target of the fisheries could be one way of adapting to climate change impacts. So do you see the expansion of exotic species more like a threat for commercial species or as a resource to divert fishing pressures elsewhere?

For Europe, the fisheries is not a very important sector. If you look at the gross domestic product (GDP), the fisheries sector represents a very small percentage. So if we fish less, it's not really a problem. But, in Europe, we are importing most of our fish. And this is a problem because of the CO2 emissions from transportation. So maybe we can fish the species that are expanding in European waters because of [global] warming and import less.

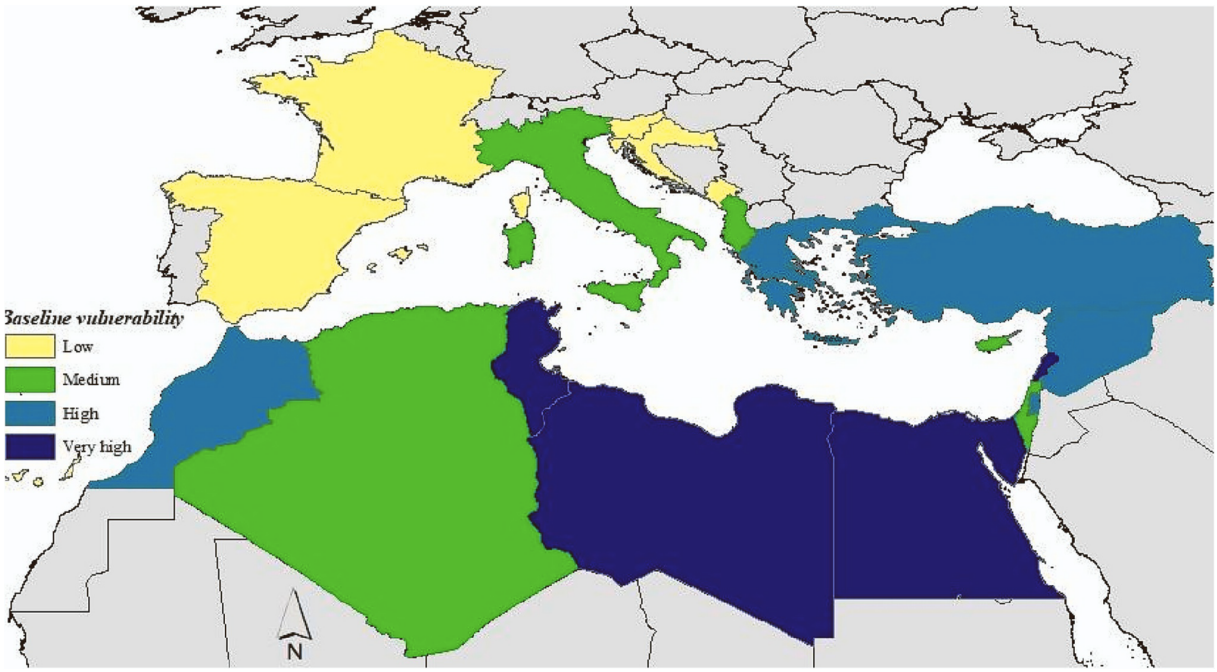
When you presented the results of your work on this topic in Barcelona, you stated that Mediterranean countries have different levels of vulnerability and ability to adapt. Can you give some examples?

The European Mediterranean is less vulnerable because [for Europe] the fisheries is a very small sector compared to others in terms of GDP. But for southern Mediterranean countries [this sector] is much more important, as they rely more on the fisheries for their income. And the problem is that the fish are going north. They are leaving southern Mediterranean countries and moving towards the European ones.

So when you have developing countries talking about adaptation and climate justice, this really needs to be considered because they are losing their food, they are losing their income because of climate change.

So, when at the COP we discuss the loss and damage fund, for example, which is supposed to help developing countries, it is really important to have this money going not only to mitigation — because those countries have polluted less and they are

polluting less — but also to adaptation. This is true for the SIDS, the small island developing states, but it is also true in the Mediterranean.



Vulnerability of Mediterranean economies to climate change impacts on fisheries (Hilmi, N. et al. 2023. Climate change impacts on mediterranean fisheries: A sensitivity and vulnerability analysis for main commercial species. *Ecological Economics*, *211*, 107889).

Are there Mediterranean countries doing particularly well in addressing overfishing and climate change impacts on the fisheries?

Countries like Italy and Greece have taken steps to manage fisheries more sustainably. Italy, for instance, has implemented fishing quotas and regulations to prevent overfishing and promote sustainable practices. It has also been actively promoting marine protected areas (MPAs) to conserve biodiversity and enhance the resilience of marine ecosystems to climate change. Greece, too, has worked toward establishing new MPAs and implementing fisheries management plans. It has also invested in research and monitoring efforts to assess the impacts of climate change on the fisheries and develop adaptation strategies.

But, despite these efforts, challenges persist across the Mediterranean due to the complex socio-economic and environmental factors at play. Overfishing and climate change thus continue to pose significant challenges across the Mediterranean region, requiring continued collaboration and innovation to achieve sustainable fisheries

management.

How do you envision Mediterranean fisheries in 2050?

In a worst-case scenario, if current trends of overfishing and inadequate management persist, Mediterranean fisheries could face collapse, with many fish stocks depleted beyond recovery. This could lead to profound ecological and socio-economic consequences, including loss of biodiversity, decline in fish populations, reduced food security and loss of livelihoods for coastal communities.

Climate change exacerbates these challenges, with rising sea temperatures, ocean acidification and habitat degradation further threatening marine ecosystems and fisheries.

In contrast, in a best-case scenario, proactive and effective fisheries management measures are implemented to prevent overfishing, protect marine habitats and adapt to climate change. Sustainable fishing practices, such as science-based quotas, ecosystem-based management and the establishment of well-enforced MPAs help restore fish stocks and promote ecosystem resilience. Collaboration among Mediterranean countries, stakeholders and international organizations plays a crucial role in achieving these goals.

What can be done to promote the second scenario?

To move towards the best-case scenario by 2050, comprehensive and coordinated actions are needed at local, national, regional and international levels. This may include implementing science-based fisheries management strategies such as: setting sustainable catch limits; reducing bycatch; and protecting critical habitats; strengthening enforcement mechanisms to combat illegal, unreported and unregulated fishing activities; promoting ecosystem-based management approaches that consider the interconnectedness of species and habitats; expanding and effectively managing MPAs to conserve biodiversity and enhance ecosystem resilience. But also: investing in research and monitoring to improve understanding of climate change impacts on fisheries and develop adaptive strategies; enhancing collaboration and cooperation among Mediterranean countries, stakeholders and international

organizations to address shared challenges; supporting sustainable aquaculture practices as a complement to wild fisheries with a focus on minimizing environmental impacts; empowering local communities through participatory approaches and capacity building to ensure the sustainability of fisheries and livelihoods; raising awareness among consumers about the importance of sustainable seafood choices and the role they play in supporting healthy fisheries and ecosystems.

One very last question: What moves you to do research in this field?

Fisheries is a sector at the intersection of science, economics and sociology. Since I am interested in sustainability, this topic is very relevant to my research. The idea is not only to protect fish but also humans and their livelihoods. Fisheries management is part of our adaptation capacity to climate change. Humans depend so much on a healthy ocean!

GUIA BAGGI

As an independent journalist, she writes about the environment, as well as the relationship between humans and their surroundings. In recent years, she has been focusing on the impacts of climate change and other environmental crises on the Mediterranean region. Building on this experience, she co-founded Magma.

That's it for this month. Thank you for reading this far. See you in March.

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