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Editorial: Multiple stressors and ecological response in marine fishery ecosystems

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Editorial on the Research Topic
Multiple stressors and ecological response in marine fishery ecosystems

In 2018, global capture fisheries production was over 96 million tonnes with marine fisheries contributions of about 88% (FAO, 2020). Fisheries provided more than 3.3 billion people with 20% of per capita animal protein intake and supported the livelihoods of 10% of the world's population in 2017 (FAO, 2020). However, over the past few decades, we have witnessed continued and dramatic declines in global marine fish stocks, with 34% of stocks currently considered unsustainable. (FAO, 2020, but see Zimmermann and Werne, 2019; Juan-Jordá et al., 2022), highlighting the urgency to effectively develop sustainable marine fisheries and ecosystems.Multiple stressors, including poor management measures, unharmonious national fisheries policies, and the joint effect of biotic and abiotic factors (e.g., overfishing, climate change) affect the recovery of fishery resources and sustainability of the marine ecosystem functions (Breitburg & Riedel, 2005; Oguz, 2017; Barange et al., 2018). However, how these stressors interact to affect ecosystems remains poorly understood. Therefore, disentangling the impact of these stressors on marine fisheries and ecosystems will help us better understand the synergies and dependencies of fishery resources, diversity, nutrient cycles, ecosystem threats, and management practices. More importantly, it will provide managers and decision-makers with a solid scientific basis for management to protect marine biodiversity and restore fishery resources.In this Research Topic, we collected seventeen research papers linked to this topic about marine fisheries and ecosystems. These papers covered multiple marine biomes, as well as different ecosystem components, such as fish, zooplankton, or invertebrates, and used various algorithms to analyze the collected data, such as stable isotope, mass models, DNA-based analyses, etc. For instance, an investigation study conducted by Xu et al. (2022) identified the species diversity and distribution of crustacean larvae in the Zhongsha Islands waters, South China Sea by using DNA barcoding and molecular species identification approach, revealing that the crustacean diversity in the islands had been seriously underestimated before.

Fisheries management policies have received considerable critical attention for their conservation effects on resource recoveries. Compared the carbon transfer efficiency of the three large marine ecosystems around China to other ecosystems, Chen et al. (2022) revealed

that without proper fisheries management, the fisheries in the ecosystems were likely to collapse with an increasing carbon transfer efficiency. Indeed, effective fisheries management considering other relevant factors that may affect marine ecosystems is imminent and worth exploring. Based on two mass balance models, Xu et al. (2022) revealed that the implementation of fisheries management policies, especially seasonal fishing moratorium, had positive effects on fishery resources recovery, especially commercial fish in the East China Sea. Thus, they suggested that fishery management in the East China Sea needs to be strengthened by extending the seasonal fishing moratorium and reducing fishing pressure afterward.

Climate change is another factor significantly altering marine fisheries and ecosystems over the world. Here, three studies were conducted to explore the role of climate change in affecting specific marine fishery species. Hou et al. (2022) analyzed the relationship between climate variability and the Skipjack tuna fishery in the Northwest Pacific region, suggesting managing the Skipjack tuna fishery by incorporating the trans-basin climatic variation. Zhang et al. (2022) revealed that climate change might have a large influence on the distribution of small yellow croaker by affecting sea surface temperature and salinity in the China Seas. Meanwhile, Han et al. (2022) reported that the biomass-density hotspots of small yellow croaker in both spring and summer seasons had shrunk or disappeared over the past 40 years by multiple pressures (e.g., climate change, human activity), highlighting the importance of developing targeted spatial conservation measures. These studies provide essential implications and references for predicting and managing marine fisheries by incorporating the climate index. In addition, under the context of climate change, Zhao et al. (2022) underlined the need to implement specific climate-adaptive functional diversity conservation measures and sustainable fisheries management in diverse marine ecosystems.

Moreover, investigating the trophic niches of particularly important commercial fish is also critical to the conservation and management of fishery resources. Stable isotope analysis has been widely used in the past decades in the field. In this topic, Wang et al. (2022) and Jiang et al. (2022) applied the stable isotope analysis to disentangle the trophic interactions of key fisheries species (Sciaenidae and *Thunnus*) in the Solomon Islands and Zhoushan Islands, respectively. They both found that niche overlap existed to some extent between the focal species reflecting the similarity of resources used and prey competition between them. Nonetheless, the differentiation in habitats, migration routes, or body size allows their coexistence in an ecosystem in the same area.

Nearshore species, estuaries, and bay ecosystems are more vulnerable to human disturbance than other marine species and ecosystems. Zeng et al. (2022) investigated the impacts of human disturbances on the species and functional dynamics of the demersal fish community in the Pearl River Estuary, highlighting the complicated interactions between the demersal fish community and disturbances. Ke et al. (2022) revealed that high anthropogenic nutrient loading might reduce the difference in trophic niches among zooplankton groups. They provided detailed information on the distribution of zooplankton $\delta^{13}C$ and $\delta^{15}N$ in Jiaozhou Bay, China, which would be useful for understanding the anthropogenic influence on the ecosystem structure and functions. Du et al. (2022) also found that long-term changes existed in zooplankton composition in the Changjiang estuary due to human disturbance and water temperature rise.

Besides focusing on the taxonomic species groups, two studies assessed the functioning of marine ecosystems with artificial reefs using Ecopath models. Wang et al. (2022) provided a dynamic model framework to alternatively estimate the ecological carrying capacity for stock enhancement practices in the development of marine ranching ecosystems. In contrast, Zhang et al. (2022) revealed that the current artificial system had formed complicated interspecies relations and high-level stability, which could be a way to alleviate the current natural coral reef crisis. These two studies used a similar approach to illustrate the functioning evolvement of established artificial reefs and provide the scientific basis for the improvement of marine fishery production and management.

Overall, this Research Topic has made a significant contribution to improving our understanding of the impact of multiple stressors on the marine ecosystems and the recovery of fishery resources and sustainability. Papers on this topic either revealed the impact mechanism of various stressors from different aspects, or provided new insights for improving marine fishery management. Nevertheless, research on this topic is still far from enough, further actions should be made to develop sustainable fishery management and mitigate the decline of fisheries resources.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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