

Main challenges of fisheries ecology in Iberoamerica

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The productivity and dynamics of fish stocks depend on their biological characteristics which, in interaction with the environment inhabited by the species, determine essential processes such as growth, reproduction, and natural mortality. Therefore, it is fundamental to understand their biology and their relationship with the environmental context, including both physical conditions and interactions with other species within the ecosystem. This knowledge makes it possible to adjust population dynamics models to the reality of ecosystems and to improve predictions under different environmental and fishing exploitation scenarios. Consequently, monitoring of biological and ecological processes constitutes the basis for assessing stock health and for sustainable fisheries management. Sustainable fisheries management, based on an ecosystem approach, leads to the conservation not only of the fishery resource itself, but of the entire socio-ecological system. In this context, the studies by Chura-Cruz et al. (2026), García et al. (2026), González-Castrillón and Dominguez-Petit (2026), Partida et al. (2026), and Rábade et al. (2026), published in the present special issue, contribute to expanding knowledge on species of high commercial or ecosystem importance whose biology has been little investigated.

One of the main challenges facing global fisheries is the impact of anthropogenic activities that are altering the natural balance of aquatic ecosystems and must be considered in assessment and management processes. These impacts include not only climate change, but also pollution and the increase in economic and recreational activities associated with aquatic environments, particularly those involving the construction of large infrastructures along coastal and riverine margins (ports, desalination plants, etc.) and offshore (offshore energy platforms, deep-sea mining, oil extraction, etc.). Under a scenario characterized by climate crisis and increasing anthropogenic pollution, coastal areas have become a major focus of concern, as they host numerous nursery grounds for a wide variety of organisms. Accordingly, Veríssimo et al. (2026), in this special volume, highlight the importance of coastal nursery areas for commercially exploited species, which is highly relevant to the development of measures to conserve these resources.

Ibero-America harbors a great number and diversity of fisheries and exploited species, including both freshwater and marine systems. Fisheries in this region range from subsistence fishing carried out by inhabitants of riverine and coastal communities to large, industrial, single-species fisheries such as the anchoveta fishery, as well as multi-species and multi-gear artisanal fisheries. In this region, artisanal and small-scale fisheries predominate in terms of number of vessels, whereas industrial fisheries dominate in terms of catch volume (Dominguez-Petit et al. 2022; INVIPESCA 2021). In general, approximately 334 species are harvested. Of these, 78% are marine species, 20% are freshwater species, and 2% are amphidro-

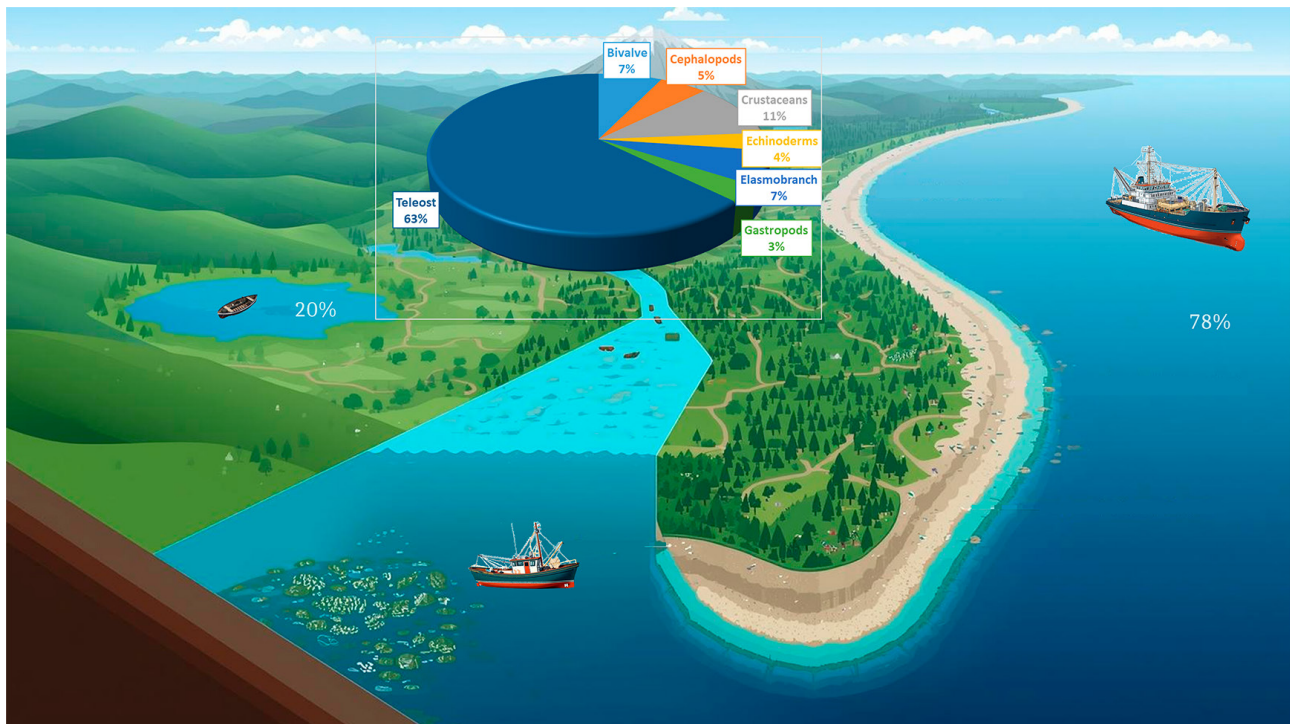


Fig. 1. – Diversity of species targeted by Ibero-American fleets. 78% are marine species, 20% are freshwater species, and 2% are amphidromous species. The pie chart shows the percentage of each taxonomic group of target species. The total number of target species recorded in this study amounts to 334.

mous species. Among them, 49% are benthic, 29% demersal, and 21% pelagic. Although teleost are the primary target of Ibero-American fisheries (63% of captured species), crustaceans (11%), elasmobranchs (7%), bivalves (7%), cephalopods (5%), echinoderms (4%), and gastropods (3%) are also exploited (Fig. 1).

The greatest lack of available scientific data is found in small-scale fisheries, where the high diversity of exploited species, difficult access to fishing and landing sites, and the lack of regulation of local markets hinder the collection of sufficiently robust data series to assess population status. Even for some species with better accessibility and in countries with more developed fisheries regulations, data on key aspects such as reproductive ecology and the factors regulating it are still lacking, despite its critical role in determining recruitment and, therefore, the long-term survival of populations.

Mendoza-Carranza et al. (2025) presented a comprehensive analysis of the causes underlying this lack of knowledge on the biology and ecology of exploited species in Ibero-America. Among the main factors identified are the limited training and integration of fishers in the collection of biological data, the absence of systematic and objective long-term data-collection programs, the scarcity of resources for research, and the lack of implementation of methods that facilitate data acquisition and improve knowledge of the biology and ecology of fishery resources. In this regard, new tools such as environmental DNA (eDNA) and *-omics* approaches represent a major opportunity to improve the current situation. Nevertheless, there are already objective analytical methods that could immediately enhance the quality of the information collected, particularly concerning aspects of reproductive biology. One such example is presented in this special issue by Quispe-Salazar et al. (2026), who propose the use of advanced statistical models to determine the sexual maturity status of fish based on gonad weight. This information is key to identifying both spawning seasons and areas, as well as the size at sexual maturation of exploited species.

CONCLUSIONS

It is urgent and crucial to establish monitoring programs for small-scale fisheries and to involve fishers themselves in data collection across all Ibero-American fisheries. At the same time, it is also essential to promote the sharing of collected scientific data to further advance scientific knowledge. In this context, maintaining scientific discussion forums such as SIBECORP—where advances made by the Ibero-American research community are showcased—and designing strategies to address current fisheries challenges are essential. Likewise, strengthening international collaboration in fisheries research in Ibero-America, encom-

passing all aspects of socio-ecological systems and addressing not only ecosystem-related issues but also the human dimension of fisheries, is fundamental. This Special Issue of *Scientia Marina*, entitled *Reproductive ecology studies for sustainable fisheries management in Ibero-America*, brings together the outstanding contributions presented at the VI Ibero-American Symposium on Reproductive Ecology, Recruitment, and Fisheries (SIBECORP) and aims to help reduce some of the knowledge gaps identified above.

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In this study, Artificial Intelligence tools (ChatGPT, Consensus, Gemini, and Copilot) were used to search for information on target species of Iberoamerican fisheries, both marine and freshwater, which was used to create Figure 1. This figure was designed by using Canva IA image generator.

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