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Saving Dolphins, Saving Fishermen's Livelihoods:

Sustainable Marine Protection and Fisheries

Abstract:

This study investigates the conflict between dolphin conservation and fishermen's livelihoods, exploring innovative methodologies to address this challenge. The research identifies several solutions: three technological measures, including LED nets, banana pingers, and lowering gillnets; and seven non-technological measures, such as fish stock restoration, gear adjustments, and shifting to ecotourism. Despite the potential of these measures, scepticism exists regarding their efficacy in practice. The study also highlights the importance of considering the local context, ecosystem, culture, economy, and politics to develop effective and sustainable solutions. Financial, legislative, and educational measures should complement these efforts, while capacity-building, enforcement, and surveillance are also necessary. Ultimately, the implementation of solutions should take place in a multi-stakeholder setting, considering the needs and characteristics of small-scale fisheries to effectively reduce the conflict between fisheries and marine mammals and to maintain a sustainable balance between conservation and livelihoods.

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Fisheries and marine conservation

The interaction between dolphins and fishers is a widespread and intensifying issue due to declining fish stocks and dolphins' adaptability to human activities and feeding habits. These interactions can harm both sides, with dolphins risking death from incidental capture, while damaged fishing gear and catches result in lost livelihood – in both time and money – for fishermen.

Fishery is a relevant industry for the global economy; an estimated 58.5 million people work in the primary sector, and approximately 600 million livelihoods depend at least partially on fisheries and aquaculture (FAO, 2022). Moreover, seafood has become essential for food security and nutrition due to its potential as a source of protein, omega-3, and other nutrients (Duke, 2021). In this regard, for 3.3 billion people, seafood provides at least 20 per cent of their average per capita intake of animal protein (FAO, 2022).

At the same time, many challenges are associated with the fishery industry, from ocean pollution and over-exploitation of fish stocks to human rights abuses (United Nations, 2019). Among the most critical issues affecting fishing sustainability is the incidental capture of non-targeted species (International Whaling Commission, n.d.a). This is a problem in areas such as the Bay of Biscay and the Mediterranean Sea, particularly for pelagic trawl gear and static net fisheries (EU Official, Anonymous Interview, Belgium, February 2023).

Data from the International Whaling Commission indicates that bycatch of cetaceans, seabirds, and other species occurs in all kinds of fishing operations, from large industrial to localised artisanal fisheries (International Whaling Commission, n.d.a). Furthermore, it can occur not only during active fishing operations but also when fishing gear has been lost or discarded in seas and oceans (NOAA Fisheries, n.d.a).

Fishing techniques include using longlines, trawls, and gillnets that are often undetectable with the naked eye and are extremely strong. These methods are highly effective for fishermen. However, they are not selective enough; as a result, many species are caught in addition to those being targeted (WWF, n.d.a). Bycatch victims include diverse species such as seabirds, turtles, dolphins, and whales caught in gillnets and ropes during fishing operations; unable to get free, they are suffocated or hurt, preventing them from feeding, and ultimately they are killed (Dolman 2022). Sometimes fishermen also kill dolphins intentionally to protect their catch (NGO, Anonymous Interview, Greece, February 2023).

According to the World Wide Fund for Nature (WWF), it is estimated that 300,000 cetaceans die from entanglement in fishing nets every year (Biancatelli, 2018). Hence, this phenomenon has become the deadliest threat to dolphins and whales and the largest cause of mortality for small cetaceans (WWF, n.d.a).

The bycatch phenomenon occurs worldwide. Fishing practices in China were

responsible for the extinction of the Yangtze River dolphin and have endangered the existence of the vaquita dolphin (Tejedor, 2021) in the Gulf of California and the Maui dolphin in New Zealand (Stats NZ, 2019). According to the United States National Oceanic and Atmospheric Administration, bycatch has caused a catastrophic decline of vaquita – close to 50 per cent of the population – per year (NOAA Fisheries, n.d.b), with their number now as low as ten animals. Since 2017, the Observatory Pelagis has identified around 800 dolphins killed per year because of bycatch on the French Atlantic coast (ouest france, 2022). Similarly, British researchers estimate there are approximately 1,500 deaths each year on the shores of the United Kingdom (WDC, n.d.). The Danish International Council for the Exploration of the Sea (ICES) has concluded that bycatch is among the major threats to dolphins in the Northeast Atlantic (ICES, 2020).

Not only is bycatch a concerning phenomenon for maritime ecosystems and diverse species' existence; it also has severe economic and social consequences for communities that depend on fishery. In this regard, it is estimated that the loss of equipment due to bycatch is devasting for 95 per cent of the world's fishers, who are artisanal or small-scale fishers supplying their families and villages (International Whaling Commission, n.d.b).

Bottlenose dolphin attacks on gillnet fishing have been a growing concern for fishing vessels, as they have led to significant economic losses and negative consequences for the dolphins themselves. Bottlenose dolphin attacks on gillnet fishing led to yearly economic losses of over EUR 5,000 per vessel. This was due to reduced catch per fishing effort (CPUE), damage to catch and gear, and increased frequency of attacks (35 per cent). During these attacks, CPUE was reduced by almost 50 per cent and the number of damaged catches increased. The presence of dolphins also caused an increase in holes in the nets, resulting in their replacement two to three times per fishing season (Garagouni et al., 2022).

However, dolphins are known to be reliable indicators of the presence of schools of fish in an area, making them a valuable resource for fishermen. Fishermen often search for aggregations of seabirds and dolphins, which often indicates they are engaged in feeding activities. There are even certain behaviours that fishermen look for to determine whether the animals are feeding, such as seabirds diving and dolphins slapping their heads and tails (EU Official, Anonymous Interview, Belgium, February 2023).

In this context, it is important to ensure the coexistence of dolphins and fishing economic activities. Governments, international organisations, advocacy groups, enterprises, and fishers' communities are looking to transform fishery into a sustainable activity and address this threat to marine species and fishers' livelihoods.

Regulatory frameworks

At the global level, a number of international agreements have focused on marine mammal conservation, such as the Agreement on the Conservation of Small Cetaceans of the Baltic, North-East Atlantic, Irish and North Seas and the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area, both under the United Nations Convention on Migratory Species.

Civil society has also contributed to marine conservation globally. The International Whaling Commission (IWC) and the Food and Agriculture Organization recently introduced guidelines to prevent and reduce bycatch (FAO, 2021) of marine mammals in capture fisheries and to promote effective regional frameworks (International Whaling Commission, 2022). Furthermore, the Bycatch Mitigation Initiative (United Nations, n.d.), which is led by the IWC, was established in 2016 to develop strategies and technologies to reduce bycatch. Similarly, the WWF created the Protecting Whales and Dolphins Initiative (WWF, n.d.b) to develop policies and cooperate with governments and fishers. In France, Sea Shepherd launched Operation Dolphin By-Catch to inform the public about the fate of dolphins along the French coast (Sea Shepherd, 2018).

In recent decades the European Union has developed a regulatory framework to protect marine species and reduce bycatch. The 1992 Habitats Directive (EUR-Lex, n.d.) ensures the conservation of a wide range of rare, threatened, or endemic animal and plant species. All cetacean species, including different species of dolphins, are listed in Annex IV of the EU Habitats Directive and are therefore strictly protected under Article 12 of the Directive[1]. In particular, the bottlenose dolphin (Tursiops truncatus) and the harbour porpoise (Phocoena phocoena) are listed in Annex II of the Habitats Directive, which means that Member States must designate and effectively manage special areas of conservation (SACs) to contribute to achieving or maintaining the favourable conservation status of these species. SACs are part of the EU-wide Natura 2000 network, the largest network of protected areas in the world (European Commission, n.d.a).

In addition, the Marine Strategy Framework Directive (European Union, 2008), adopted in 2008 and updated in 2017 as the Good Environmental Status Directive (European Commission, n.d.b) for EU marine waters, recommends that the mortality rate per species from incidental bycatch should be below levels which threaten the species in order to ensure their long-term viability (European Commission, n.d.c). Additional policies include Regulation 812/2004, approved by the EU Council in 2004, which sets out measures concerning incidental catches of cetaceans in fisheries (European Union, 2004). Similarly, in 2019 the EU introduced the Technical Measures Regulation of the Common Fisheries Policy, which includes limitations on bycatch (European Union, 2019).

[1] OJ L 206 22.7.1992, p. 7–50.

The Common Fisheries Policy includes measures to meet these obligations, such as the prohibition on catching, retaining, transhipping, or landing of marine mammals or reptiles and the collection of scientific data on incidental catches of sensitive species[2]. EU Member States must implement measures to reduce bycatch, including the use of acoustic deterrent devices (EU Official, Anonymous Interview, Belgium, February 2023).

The EU and its Member States are also protecting dolphins and other cetaceans through other policy initiatives, such as the European Green Deal, the EU Biodiversity Strategy for 2030[3], and the upcoming action plan on conservation of fisheries resources and protection of marine ecosystems (European Commission, 2023). These policies include various actions aimed at conserving marine biodiversity and ensuring sustainable fisheries practices.

The EU presented its action plan on protecting 30 per cent of European waters by 2030 through a marine ecosystems protection plan. A national roadmap facilitated by the Commission for implementing the action plan is being done during spring. By 2024, angel sharks, common skate, guitarfish, Maltese skate, great white shark, sand tiger shark, smalltooth sand tiger shark, spiny butterfly ray, sturgeons, marine turtles, Balearic shearwater and Mediterranean monk seal should be reduced, which would enable their full recovery. By end 2023, harbour purpoise and by end 2030, the reaming sensitive marine species. The primary funding opportunities for supporting the policy objectives for marine conservation include the European Maritime, Fisheries and Aquaculture Fund (EMFAF) and the LIFE programme, while other potential sources of funding include Horizon Europe, the European Regional Development Fund, the European Social Fund+, the European Agricultural Fund for Rural Development, the Connecting Europe Facility, and the Recovery and Resilience Facility, and targeted training and upskilling programmes.

At the national level, several policies have been introduced aimed at addressing the problem of bycatch. In the United Kingdom, through the Fisheries Act 2020, the Joint Fisheries Statement (GOV.UK 2022) lays out its policy for a bycatch mitigation initiative to reduce the bycatch of sensitive marine species. Meanwhile, the United States' policy framework (NOAA Fisheries, n.d.c). includes the Marine Mammal Protection Act to prevent and reduce bycatch; the Magnuson–Stevens Act and its amendment, the Sustainable Fisheries Act, aimed at marine management and conservation; and the Endangered Species Act, which is intended to conserve endangered and threatened species and their ecosystems. In 2017, a major policy update was introduced to the Marine Mammal Protection Act which requires any country exporting fish to the US to have marine mammal protections equivalent to those of the US, including measures against bycatch (WWF, 2017).

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[2] Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21).

[3] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS EU Biodiversity Strategy for 2030 Bringing nature back into our lives.

Despite increasing efforts to enact policies on bycatch, civil society organisations decry the persistent failure to implement conservation efforts to limit bycatch and the lack of law enforcement by national governments. In 2019, a coalition of environmental and conservation organisations called on the European Commission to take legal action over the huge number of whale and dolphin deaths caused by bycatch (WDC, 2019). The organisations claimed that several EU Member States had failed to uphold their commitments to limit bycatch and protect marine species. In 2020, non-governmental organisations scored a major victory when an administrative court condemned the French authorities for failing to take measures to prevent dolphin bycatch (Sea Shepherd, 2020). Furthermore, in May 2020, the ICES proposed to take urgent measures, including a combination of fisheries closures and pingers in the Bay of Biscay and Baltic Sea, to prevent further population decline among marine species (ICES, 2020).

Examples deriving from non-democratic countries are also relevant. In China, the Yangtze narrow-ridged finless porpoise (Neophocaena asiaeorientalis) is another freshwater cetacean that has been severely impacted by bycatch along the Yangtze River. China has imposed a ten-year fishing ban in the Yangtze River to strengthen protection of the critically endangered species (Chinese Academy of Sciences, 2022). Europe's liberal values and the demands of its fishermen make it unlikely to implement such a stringent measure for the conservation of dolphins.

Solutions for protecting dolphins and preserving fishermen's livelihoods

Despite the grim context, efforts are being made worldwide to foster innovative methodologies to limit fishing bycatch and maintain fishermen's livelihood. Ten main solutions are outlined below. These include three technological measures – using LED nets, using banana pingers with a high-pitched sound, and lowering gillnets into the water – and seven non-technological measures: restoring fish stocks tied to seasonal closures, minimising interactions with marine mammals through reduction of the length of time that gear is soaked, using nets with windows, using different types of fishing gear, correcting dolphins' 'lazy' feeding culture, shifting to ecotourism, and capacity-building. When deploying these measures, the local context as well as its legal and financial system must always be considered. The technological tools are outlined below.

The University of Exeter has developed an LED light system on gillnets to serve as a visual signal (Bielli et al., 2020). The project, tested in Peru between 2015 and 2018, found that the bycatch of small cetaceans and sea turtles was 70 per cent lower in illuminated nets than in those without LEDs. In the US state of Oregon, a similar LED system was implemented to guide species out of the nets, which dramatically reduced the amount of eulachon bycatch (Nargi, 2022).

A British company, Fishtek Marine, has developed a system known as banana

pingers (Nargi 2022); these are attached to nets and, once submerged in water, automatically turn on and make a high-pitched sound that dolphins can hear, causing them to swim away to avoid the sound. However, pingers are problematic as they may be counterproductive – instead of deterring dolphins, they may signal the presence food. Dolphins are highly intelligent creatures: because they regularly observe fishing vessels in the same area as large schools of fish, they associate these two elements. Thus, they eventually associate fishing activities with easy prey. There is concern that the use of pingers may be ineffective, as dolphins may start to associate the sound with a signal that 'dinner is ready' instead of perceiving it as a sign of danger (IO, Anonymous Interview, Belgium, February 2023).

Another method that has been developed is to lower gillnets into the water instead of using them on the surface. This can reduce the chances of fishermen accidentally hauling in dolphins and whales, according to research led by Florida International University and the WWF in Pakistan (Tejedor, 2021).

To address the depredation of fisheries by dolphins, five more non-technological measures have been proposed: restoring fish stocks linked to closures of fishing areas, minimising interactions with marine mammals through the reduction of gear soaking time, using nets with windows, using different types of fishing gear, and correcting dolphins' 'lazy' feeding culture.

Increasing the population of fish in a specific area is known as restoring fish stocks. This can be done using various strategies, such as fishing regulations, safeguarding of habitats, and conservation efforts to rebuild depleted fish populations. The objective of restoring fish stocks is to sustain and fortify both the fish population and the ecosystem.

Extended closures of affected fisheries, where possible, could also be a tool to accomplish both aims – preserving fishermen's livelihood and protecting dolphins – by allowing fish stocks to recover and by forcing dolphins to forage independently from fishing activities (NGO, Anonymous Interview, Spain, January 2023). Seasonal closures have also been proposed to protect dolphins while maintaining sustainable fishing practices (NGO, Anonymous Interview, Belgium, January 2023). This could potentially lead to protection of wildlife, conservation of fish stocks, and increased profitability and sustainability. Additionally, such areas often become hotspots for ecotourism. However, because this measure might initially have a negative financial impact on fisheries, it is not generally recommended. If it is employed, further financial incentives need to be in place to compensate fishermen for short-term losses.

Some fishermen in Greece are attempting to modify their practices to minimise interactions with marine mammals, such as avoiding certain areas or reducing the amount of time their gear is underwater (NGO, Anonymous Interview, Greece, February 2023). In addition, fishing in multiple locations during a single fishing trip can reduce the likelihood of interactions with marine megafauna, reducing the risk of damage to these species. By spreading fishing activity over a large area, the impact on a specific area and its wildlife is reduced, potentially leading to a more sustainable and responsible approach to fishing (Alberini et al., 2022).

In addition, restrictions on the use of fishing gear that is prone to extensive damage by marine mammals and its replacement with more durable gear can reduce the damage caused to both the gear and the catch. This will result in a more sustainable and responsible approach to fishing in areas of high interaction with marine mammals. Nets with escape windows have also been developed to protect dolphins from harm during fishing operations (EU Official, Anonymous Interview, Belgium, February 2023).

Another solution focuses on the process of altering the behaviour of dolphins to prevent their dependence on fishing activities as a food source, which is referred to as correcting the 'lazy' feeding culture of dolphins. Currently, dolphins in Spanish waters tend to feed on fish caught in fishing gear. To address this, steps can be taken to motivate the dolphins to search for food independently of fishing operations by reducing the accessibility of easily obtained food from fishing activities and increasing the availability of alternative food sources for dolpnıns. The aim is to decrease the contact between fishing and dolphins.

Furthermore, promoting ecotourism alleviates the concerns of fishermen for their livelihood. To promote the protection of dolphins and the sustainable development of local communities, it is recommended that a policy be implemented to promote ecotourism through dolphin-watching tours. This policy should be implemented in collaboration with tour operators and local fisher communities. The policy should establish regulations to ensure that dolphin-watching tours are conducted in a responsible and sustainable manner. Tour operators should be required to obtain permits and follow strict guidelines for conducting tours. Tour guides should be trained to provide educational information to visitors on the importance of protecting dolphins and their natural habitat. In addition, this policy should prioritise the involvement of fisher communities in the promotion and management of dolphin-watching tours, creating alternative and sustainable livelihoods through a circular economy. This will encourage the reduction of fishing pressure on fish stocks and provide an economic incentive for the protection of dolphins and their habitat. By implementing this policy, we can support the sustainable development of local communities and promote the protection of dolphins in their natural habitats. The policy will enable a positive feedback loop in which the promotion of ecotourism leads to the protection of dolphins, and their continued existence in turn attracts more tourists, further promoting the local economy and thus benefiting both the environment and the community. Overall, the implementation of a policy to promote ecotourism through dolphin-watching tours will encourage responsible and sustainable tourism while supporting the conservation of marine biodiversity and the development of local communities.

Capacity-building is also important to create sustainable fisheries and promote dolphin conservation. To effectively protect marine megafauna species such as dolphins from accidental entanglement, it is recommended that a capacity-building programme for fishers be implemented. The programme should provide comprehensive training for fishers on safe handling and release techniques for entangled marine megafauna species. The training should be mandatory

for all fishers, regardless of their fishing type, gear type, and fishing areas. The curriculum should also include training on how to rescue entangled animals during their travels or stay at sea, and fishers should be taught how to properly report accidental catches and sightings of cetaceans during their fishing activities. Furthermore, fishers should be taught basic reading and writing skills to support the collection and reporting of data by fisheries managers. Implementing this training programme will allow fishers to become better equipped to handle accidental catches and entanglements of marine megafauna species such as dolphins. Additionally, this will facilitate the collection of important data on accidental catches and sightings of cetaceans, which will ultimately support effective management and conservation efforts for these species. Overall, the implementation of a comprehensive capacity-building programme for fishers is essential for the protection of marine megafauna species and the sustainability of our oceans.

Critical voices from practice

Interviews show scepticism towards the application and success of these innovative tools for marine protection in Spanish waters. Various experiments have been conducted to reduce the depredation of dolphins in Spanish waters, but with no success. According to the interviews, mitigation measures such as light-up gear, operational changes, and acoustic deterrents have all failed. The increasing scarcity of fish is also leading to more interactions between fishermen and cetaceans. Moreover, another challenge in Spanish waters derives from dolphins. Bottlenose dolphins are intelligent predators with a 'lazy' feeding culture that will be hard to change (NGO, Anonymous Interview, Spain, January 2023).

At the same time, in Greece there is a lack of capacity and regulatory frameworks for marine conservation and fisheries regulation. Natura 2000 sites have limitations and inadequate capacity for marine conservation, and they are not ideal tools for conserving mobile species. Some sites have been designated as Sites of Community Importance for cetacean habitat, but no significant conservation measures have been implemented. There seems to be a lack of frameworks to regulate human activities. However, environmental studies are being released for public consultation to establish a clear framework for Natura 2000 protected areas (NGO, Anonymous Interview, Greece, February 2023).

Critical remarks were also made regarding the institutional structure regulating fisheries and marine conservation. Financial support is available from EU funds via the European Maritime and Fisheries Fund[4], through which Member States can support the implementation of conservation strategies, such as management plans for protected areas, or the implementation of various mitigation measures. It can also be used to provide compensation to fishers for damage done by

[4] OJ C 422, 22.11.2018, p. 1–3. Communication from the Commission amending the Guidelines for the examination of State aid to the fishery and aquaculture sector.

protected species. In addition, funding for research and innovation on these topics will also be available under the EU's Horizon Europe programme. Meanwhile, pilot projects and methods testing can also be supported financially through the European Maritime, Fisheries and Aquaculture Fund.

A lack of educational content and awareness was also highlighted. Therefore, broader educational initiatives have been suggested, such as environmental education and encouraging conscious consumption choices, including through certification labels. Moreover, public awareness messaging via radio, social media, and television is recommended in some contexts as in Pakistan (NGO, Anonymous Interview, Pakistan, February 2023).

Some actors are excluded from decision-making in both national and global strategies; therefore, some interviewees stressed inclusive decision-making. Best outcomes are achieved when stakeholders, such as fishermen, are fully involved in creating and implementing solutions in a transparent and inclusive way and based on the best available science. Furthermore, countries' collection of data on dolphins and fishers seems to be incomplete and at times inaccurate. Interviewees noted that it is important to create a monitoring and enforcement system.

Interviewees were also critical of the fact that EU subsidies accommodate industrial fisheries and exclude small-scale fishers. Recommendations have been made to redesign EU funds to accommodate small-scale fisheries as well. One interviewee explained the need to re-evaluate the EU subsidies system: 'There is the perpetuation of the use of harmful subsidies, which have been proven multiple times to be ineffective. It does not generate change and becomes a kind of dependence, as a guaranteed source of income' (EU Official, Anonymous Interview, Belgium, February 2023). The policy recommendation would be for governments and international organisations to develop solutions to reduce the conflict between fisheries and marine mammals that specifically address the needs and characteristics of small-scale fisheries. These solutions should be tailored to the unique challenges faced by small-scale fisheries, which are often not addressed by measures designed for industrial fisheries. It is important to recognise the significant contribution of small-scale fisheries to national fleets and to ensure that they are not overlooked in the development of policies and measures to address the small-scale and large fisheries conflict.

Conclusion

Incorporating escape windows on nets, using durable gear, avoiding certain areas, adjusting the length of time the gear is underwater, utilising fishing gear in multiple locations, implementing the use of LED light systems on gillnets, capacity-building, and shifting to ecotourism are the most effective solutions to protect both dolphins and fishermen. Low-cost techniques seem to be the most

effective measures. These solutions have the potential to reduce the conflict between fisheries and marine mammals while minimising the negative impact on fishermen's livelihoods. It is crucial to continue developing and implementing measures that safeguard the sustainability of marine ecosystems and balance the interests of different stakeholders.

Moreover, marine conservation and sustainable fisheries both require taking into consideration the local context, such as the ecosystem, culture, economy, and politics, to develop effective and sustainable solutions. Financial measures should be considered as well, including the development of compensation mechanisms such as financial support for the loss of income. These need to be complemented with legislative measures for the sustainable management of fishing resources and the regulation of fishing. Educational content must also be made available to reinforce these efforts. Moreover, capacity-building, stronger enforcement, and surveillance are necessary. Ultimately, the above solutions, if implemented, need to take into consideration the local context and take place in a multi-stakeholder setting.

Policy recommendations

- Use LED light systems on gillnets to reduce bycatch.
- Employ banana pingers for deterring dolphins (but consider their potential to become counterproductive).
- Lower gillnets into the water instead of using them on the surface.
- Restore fish stocks through fishing regulations, safeguarding of habitats, and conservation efforts.
- Implement seasonal closures to protect dolphins while maintaining sustainable fishing practices.
- Minimise interactions with marine mammals by reducing gear soaking time and using nets with escape windows.
- Shift to different, more sustainable fishing gear.
- Correct the 'lazy' feeding culture of dolphins by reducing their dependency on fishing activities.
- Promote ecotourism, such as dolphin-watching tours, in collaboration with tour operators and local fisher communities.
- Implement a capacity-building programme for fishers, including training on safe handling and release techniques for entangled marine megafauna.
- Increase public awareness and education on marine conservation andvsustainable fishing practices.

- Ensure inclusive decision-making involving all stakeholders, such as fishermen.
- Improve monitoring, enforcement, and data collection systems for dolphins and fishers.
- Re-evaluate and redesign EU subsidies to accommodate small-scale fishers and address their unique challenges.
- Tailor solutions to local contexts, ecosystems, cultures, economies, and politics.
- Develop compensation mechanisms and financial support for fishers experiencing loss of income due to conservation measures. ■

Author bio

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