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SUSTAINING BLUE GROWTH: RAISING AWARENESS OF ECOLOGICAL AND ECONOMIC VALUE OF BLACK SEA FISHERIES

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ABSTRACT

Fishing is one of the oldest professions in the world, and aquatic resources are important sources of food for humanity. Despite efforts to improve management, fishing pressure on the marine ecosystem is an ongoing activity.

Between March 2023 and March 2024, a series of public-awareness initiatives swept the Black Sea's coastal regions in Bulgaria, Georgia, Romania and Türkiye, spotlighting the protection of at-risk marine species such as sturgeons, cetaceans and piked dogfish. These campaigns were launched under the General Fisheries Commission for the Mediterranean's BlackSea4Fish Project and coordinated by the GFCM's Technical Unit for the Black Sea. They complemented parallel efforts, namely the CetaByM action, sturgeon pilot projects and the piked dogfish research program contributing to an overarching plan for sustainable fisheries management in the Black Sea. This study explores the planning, execution and impacts of these outreach efforts, distilling key takeaways to guide future conservation planning and bolster sustainable fisheries management in the Black Sea region. The campaigns were specifically crafted to inform fishers and other marine stakeholders about the precarious status of sturgeons, cetaceans and piked dogfish. Also, to promote best practice fishing methods to minimize mortality following catch and release, and to reinforce adherence to existing regional protection measures. Fishermen generally avoid providing information on by-catch species. Enhancing their understanding not only helps them refine their practices for greater economic efficiency but also contributes to sustainable blue growth.

Keywords: blue growth, awareness, promote best practice, sustainable fisheries

INTRODUCTION

The Black Sea ecosystem faces numerous environmental challenges, including overfishing, habitat degradation, climate change, marine litter impact (Oguz *et al*., 2012; Oral, 2013; Seyhan *et al.,* 2025) and there is also the impact caused by the war in the region. The Black Sea is a nearly closed basin, with unique characteristics, which make it vulnerable to numerous pressures and disturbances (Lazăr *et al.,* 2021). Thereby, sustainable fisheries are essential because they serve as a bridge between ecological resilience and economic prosperity, especially in sensitive regions like the Black Sea.

Responsible practices reduce damage to seafloor habitats and minimize bycatch, allowing marine life to thrive and healthy fish populations and ecosystems are more adaptable to climate change, helping buffer the impacts of warming seas and shifting currents (Seyhan *et al.,* 2025).

In the Black Sea region, coastal communities rely heavily on fishing for food (Danilov *et al.,* 2024) and income (Demirel *et al.,* 2024) and overfishing may offer short-term gains, but sustainable practices ensure consistent yields and market stability over

time (Seyhan *et al.,* 2025). Sustainability is not just about saving fish, it's about securing the future of communities, economies, and ecosystems. In this regard, one of the most used practices is to increase awareness of current problems and identify viable solutions, which is rationale of our study.

MATERIALS AND METHODS

International experiences highlight the effectiveness of awareness-raising activities in fisheries management (Barz *et al.,* 2025; FAO, 2023). As such, this investigation is based on the data collected during the period March 2023 - March 2024. The information obtained was based on interviews with fishermen and on scientific fishing surveys.

Because fishermen spend a large part of their lives at sea, they are often the first to notice changes in fish populations (Gomes *et al.,* 2025), changes in water quality, and weather patterns. Their observations can reveal early signs of overfishing (Ullah *et al.,* 2023) or environmental degradation that scientific data might detect later.

The project team conducted outreach meetings across multiple locations, engaging with fishing company managers and vessel captains through structured interviews and awareness-raising sessions. In total, five major ports (Sulina, Sf. Gheorghe, Midia, Constanța, and Mangalia) and fourteen additional landing sites were visited, encompassing fourteen coastal fisheries hubs in total (Fig. 1).

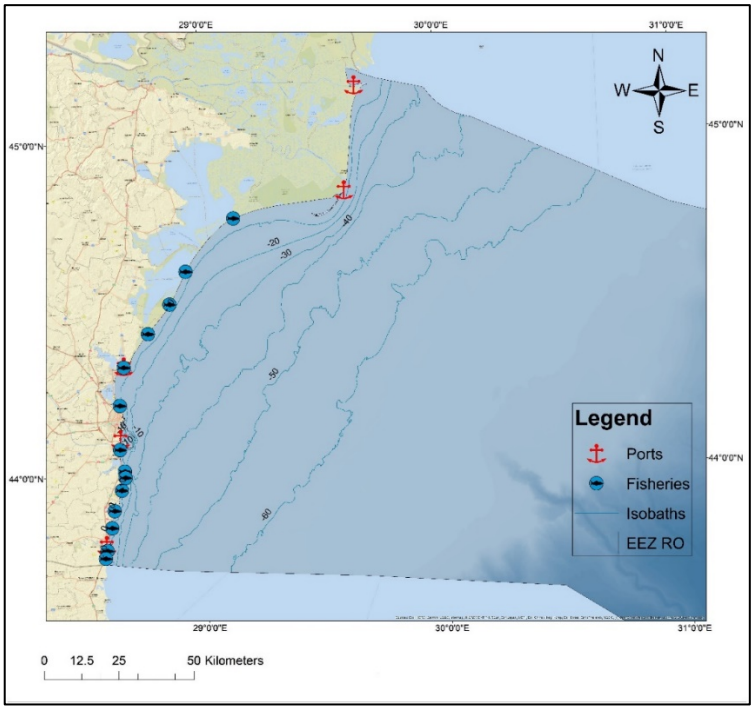

Fig. 1. Map of the areas where the awareness-raising campaign was carried out (@Dragos Niculescu, NIMRD)

Under the first objective, *Stakeholder Awareness and Outreach*, a range of targeted activities were undertaken to enhance engagement and communication with relevant stakeholders:

- mitigation of cetacean by-catch in turbot gillnet fisheries. This involved developing and providing specific information materials and good practice protocols to reduce incidental catches of dolphins and porpoises in Romanian turbot (*Scophthalmus maeoticus*) gillnet operations.
- the conservation needs of piked dogfish in Romanian waters. An assessment of current data on by-catch and population trends of *Squalus acanthias* was carried out and species-specific protection measures were communicated to fishermen and regulatory authorities.
- status and protection of marine sturgeons along the Romanian coast. Presenting updated findings on sturgeon distribution, threats and legal safeguards to coastal fishing communities and management authorities. Awareness posters on priority species were distributed among national project partners to reinforce campaign messages.

Within the second objective - Data Collection, other actions were undertaken:

- fishing effort analysis in turbot gillnet fisheries. A systematic monitoring of turbot (*S. maeoticus*) gillnet fishing operations in Romanian waters was carried out, recording key indicators of fishing effort, such as net length, sinking time, catch frequency and geographical coordinates.
- study on Local Ecological Knowledge (LEK) among Romanian fishermen. Structured interviews and questionnaires were conducted to highlight the fishermen's experience regarding species presence and fishing dynamics along the Romanian Black Sea coast for the species: piked dogfish (*S. acanthias*) and sturgeons.

Three research teams from NIMRD travelled to the commercial fishing companies located along the Romanian coast between 2 Mai and Sulina fishing points and ports. These trips were made to conduct awareness campaigns and to disseminate the Black Sea priority species poster across national partners, and in ports. Leaflets were distributed to each commercial fishing company that carried out activities in 2023 -2024 and discussions were held with them. This campaigns were for the first objective, as for second objective the research teams interviewed the fishermen/administrators of the commercial companies in order to complete the questionnaires. A total number of 58 questionnaires were filled-in.

In this context, the collaborative fisheries research promotes communication and trust among fishermen, scientists, and managers and can provide much needed scientifically valid data for fisheries management (Yochum *et al.,* 2011).

RESULTS AND DISCUSSION

The awareness campaigns aimed to address several topics of interest and areas where data is lacking, as follows:

1. Collection of fishing effort data in the turbot gillnet fishery in Romania

In this case, interviewees reported only the number of gillnets registered on their licenses; however, unofficially, the fishing effort appears to be higher. All 58 questionnaires were completed. Key findings are summarized below:

- Some respondents were reluctant to provide complete answers.
- The 58 vessels fishing for turbot in 2023 reported deploying over 1,422 km of nets.
- Nets were used between 7 and 21 days per month.
- Net height ranged from 1.7 to 4 meters.
- Lost gear over one year totaled 53.3 km, primarily due to storms and trawler interactions.
- Cetacean by-catch occurred throughout the year at depths ranging from 30 to 65 meters.
- There were 69 cetacean mortalities in 2023, including 61 *Phocoena phocoena* specimens.
- Reasons for underreporting cetacean mortalities included lack of communication with authorities, lack of interest from fishermen, bureaucracy, and fear of restrictions.
- Visual observations indicated that dolphin abundance in the Black Sea has remained “unchanged” or is “increasing” over the last two decades, largely because industrial fishing for anchovy, sprat, and horse mackerel (preferred dolphin prey) has decreased in recent years.
- Interactions between dolphins and fishing gear have changed over time. The recent discontinuation of relon nets for turbot fishing has contributed to a reduction in dolphin mortality.
- Most fishermen interviewed supported the use of mitigation devices provided, such as pingers.

2. Romanian Fisheries Local Ecological Knowledge (LEK) on the Distribution, Seasonality, and By-Catch of Piked Dogfish

- For this task, a total of 10 questionnaires regarding piked dogfish were completed.
- All respondents are active fishermen with experience ranging from 5 to 27 years.
- Fishermen continue to catch piked dogfish due to its economic value, with the main challenge being the lack of regulations permitting evisceration on board.
- Catches of piked dogfish are generally not reported, primarily due to bureaucracy and ambiguous legislation.
- Piked dogfish are mainly captured using longlines.

3. Distribution, seasonality and by-catch of sturgeons.

A total of 30 questionnaires concerning sturgeons were completed for this task:

- Most of the fishermen interviewed reported that they had no sturgeon catches in 2023–2024. Only 6 out of 30 stated that they had caught sturgeons, particularly those from Sulina.
- A total of 267 sturgeons were caught using turbot gillnets, of which 157 were released alive. Additionally, 15 sturgeons were captured using the pelagic trawl, all of which were released alive.
- All fishermen indicated that they were aware of the requirement to report accidental sturgeon catches. However, many do not report them due to the time required for paperwork, fear of authorities, expectations of subsidies or investments, and other reasons.

4. Current State of Small-Scale Fisheries (SSF) on the Romanian Black Sea Coast

Almost all respondents indicated that they perceive the future of small-scale fishing as very bleak. The main challenges currently facing SSF in Romania include:

- Unfavorable weather conditions for fishing.
- Lack of authorized personnel.
- Lengthy and time-consuming paperwork.
- Poor communication between state institutions and fishermen.
- Insufficient support from state institutions.
- Decrease in the number of fishermen and overall labor force.
- Ambiguities in commercial fishing legislation.
- Interaction of recreational fishing on commercial fishermen in the summer season.

5. Current state of the trawl fisheries in Romanian Black Sea waters.

A total of 34 questionnaires were completed for this assessment, covering both Pelagic and Beam Trawl fisheries. Most trawler-operating vessels reported Midia as their landing port, while only one vessel landed in Mangalia and another in Murighiol.

A significant share of fishermen interviewed did not suggest any gear or operational modifications, expressing overall satisfaction with the current regulatory framework.

Responses regarding the technical specifications of trawlers varied considerably, partly due to some fishermen limited technical knowledge. Discussions with respondents indicated a common concern that fisheries legislation changes almost annually, and that notifications of these changes often arrive with delays. While current regulations and the requirement to use digital catch reporting systems are generally viewed as positive, their effectiveness relies heavily on sufficient training and the provision of reliable equipment by authorities. Many fishermen emphasized the need for such training, as well as regular maintenance of vessel tracking systems and reporting applications—whether on a monthly, quarterly, or annual basis.

All respondents identified excessive bureaucracy as the primary cause of inaccuracies in fisheries reporting.

Other contributing factors included poor communication with authorities, fear of new restrictions, and limited interest among fishermen, with response rates ranging from 72% to 78% (Table 1). Correlation analysis (Sellke *et al.*, 2001) confirmed that bureaucracy was cited universally and indicated a slight association between respondents who mentioned lack of communication and those who reported fear of restrictions (Table 2).

Table 1. Binomial test results for factors contributing to inaccurate fisheries reporting

Binomial Test				*95% CI for Proportion*	
Variable	**Level**	**Frequency**	**p**	**Lower**	**Upper**
bureaucracy	Yes	100	< .001	0.938	1
lack of communication with the authorities	No	22.4	< .001	0.125	0.353
	Yes	77.6	< .001	0.647	0.875
fear of restriction	No	25.9	< .001	0.153	0.39
	Yes	74.1	< .001	0.61	0.847
lack of interest on the part of fishermen	No	27.6	< .001	0.167	0.409
	Yes	72.4	< .001	0.591	0.833

(Note. Proportions tested against value: 0.5.)

Table 2. Correlation between reasons for poor fisheries reporting

correlation matrix (pearson)	**bureaucracy**	**lack of communication with the authorities**	**fear of restriction**	**lack of interest on the part of fishermen**
bureaucracy	n.d.	n.d.	n.d.	n.d.
lack of communication with the authorities	n.d.	1	0.15	0.13
fear of restriction	n.d.	0.15	1	-0.01
lack of interest on the part of fishermen	n.d.	0.13	-0.01	1

(Note. n.d. = not defined – because of constant variable)

Among the solutions proposed by fishermen are financial support and the digitalization of the catch reporting process (Fig. 2). Since fishing supports the livelihoods of millions globally, implementing sustainable practices helps maintain

steady incomes for fishermen and coastal communities, while minimizing economic risks caused by stock depletion and ecosystem damage (OceanInfo, 2025).

Fig. 2. Scheme of fishermen's proposed solutions

Direct engagement of the fishing industry in the provision and co-creation of knowledge and data for research and management is increasingly prevalent (Baker *at al.,* 2023).

Fisheries and aquaculture are essential to global food security, economic growth and environmental sustainability, with rising seafood demand driven by population growth (Osei *et al.,* 2025). In this context the circular economy (CE) offers a transformative approach to enhancing sustainability and resilience in these sectors by promoting waste reduction, resource efficiency and environmental regeneration (Fig. 3).

Fig. 3. Circular economy model in fisheries

Fishermen express concerns about the lack of interest in the local market for the sale and processing of marine fish throughout the year. This situation discourages their active involvement in the sector. They believe that revitalizing local processing facilities could boost community interest in fishing, encourage appreciation for local fish products, and ultimately increase both demand and consumption among the local population.

CONCLUSIONS

By combining awareness-raising initiatives with LEK interviews, socio-economic assessments, workshops, and seminars, campaigns become more cost-effective while fostering deeper engagement with fishers and stakeholders. Building on this integrated framework, follow-up activities—such as targeted training sessions or thematic workshops—can be organized to enhance participation quality and maximize overall impact.

It is essential for the competent authorities to involve fishermen more actively in their activities, providing guidance during fishing operations on what is permitted and what is not, ensuring compliance with national and European regulations. Fishermen have also expressed openness to training sessions to better understand relevant issues and are willing to use devices, such as mobile phones, to share information with authorities.

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