International Journal of Aquaculture, 2024, Vol.14, No.1, 20-28
http://www.aquapublisher.com/index.php/ija

Research Article Open Access

# Sustainable Oceans: Experiences and Lessons Learned from Implementing Effective Fisheries Management Strategies

Min Xia ✉, Rudi Mai
Hainan Institute of Tropical Agricultural Resources, South China Sea Biological Research Center, Sanya, 572025, China
✉ Corresponding author Email: 2984078657@qq.com
International Journal of Aquaculture, 2024, Vol.14, No.1 doi: 10.5376/ija.2024.14.0003
Received: 15 Nov., 2023
Accepted: 19 Dec., 2023
Published: 31 Jan., 2024

**Preferred citation for this article**:
Xia M., and Mai R.D., 2024, Sustainable oceans: experiences and lessons learned from implementing effective fisheries management strategies, International Journal of Aquaculture, 14(1): 20-28 (doi: 10.5376/ija.2024.14.0003)

**Abstract** Fisheries have always been an important means for humans to obtain food and other resources, and an important component of coastal community culture and traditions. Effective fishery management strategies can not only ensure the sustainable development of fishery resources, but also promote the prosperity of coastal economy and social stability. This study analyzes the current situation of global fisheries management and reveals its success factors through cross-border cooperation cases. This study focuses on the technological support of fishery management strategies, introduces methods and technologies for achieving sustainable management of fishery resources, and delves into the impact of socio-economic factors on fishery management. This study comprehensively explores the importance of sustainable fisheries management and the challenges and opportunities of implementing effective management strategies. It summarizes experiences and lessons learned, aiming to provide theoretical and policy support for promoting the scientific, standardized, and sustainable development of fisheries management.
**Keywords** Sustainable oceans; Fisheries management; International cooperation; Technology; Social economy

Global fisheries are an important component of human social development, providing abundant food resources, economic income, and employment opportunities for various parts of the world. Fisheries is not only the development and utilization of marine resources, but also an important embodiment of human civilization and way of life. The development of global fisheries has a long history, and fishermen have diverse lifestyles and work styles, ranging from traditional fishing to modern aquaculture, covering a variety of ecological environments such as oceans, inland waters, and freshwater lakes. With the increasing demand for food and the development of technology, global fisheries are gradually showing a trend of diversification and scaling. Fishery activities include multiple links such as fishing, aquaculture, processing, and sales, involving various industrial chains such as fishing vessels, fishing equipment, processing plants, and sales markets. The types and scales of fishery resources vary in different countries and regions. Some countries use fisheries as their main economic pillar, while others are important participants in fishery activities.

Implementing effective fisheries management strategies is of great significance and far-reaching impact in maintaining the sustainable utilization of fishery resources, protecting the marine ecological environment, and maintaining the livelihoods of fishermen. Effective fisheries management can alleviate the problems of overfishing and resource depletion. Through scientific monitoring and management, fishing volume and intensity can be controlled, avoiding excessive exploitation and depletion of fishery resources, and ensuring the survival and reproduction of marine organisms (Canales et al., 2024). Good fishery management can also promote the stability of fishery production and the growth of fishermen's income. Through reasonable planning and management of fishery activities, the continuity and predictability of fishery production can be guaranteed, the income and employment opportunities of fishermen can be increased, and the economic development and social stability of coastal areas can be promoted. Effective fisheries management can also protect the marine ecological environment, maintain marine biodiversity, and promote the healthy development of marine ecosystems (He and Chen, 2016).

The aim of this study is to explore the experiences and lessons learned from implementing effective fisheries management strategies, and to look forward to the future trends and directions of sustainable fisheries development. This study analyzes the current situation and challenges of global fisheries management, summarizes the experience and lessons learned from implementing effective fisheries management, explores the impact of sustainable development goals (SDGs) on fisheries management, and analyzes the importance of innovation and cooperation for sustainable fisheries development. Through this study, we hope to draw more attention to the sustainable development of fisheries and promote the joint efforts of the international community to achieve sustainable utilization of fisheries and protection of marine ecological environment.

## 1 A Global Perspective on Sustainable Fisheries

### 1.1 Current status of global marine fisheries

The current status of global marine fisheries is a complex and multidimensional issue, involving multiple levels such as environment, economy, policy, and society. In the past few decades, global fishing activities have significantly increased due to population growth and rising demand for seafood. According to a report by the Food and Agriculture Organization of the United Nations (FAO), about one-third of global fishing resources are overfished, leading to a decline in productivity in some important fishing grounds, and fishing intensity is still continuing or increasing. Meanwhile, illegal, unreported, and unregulated (IUU) fishing activities have further exacerbated the overexploitation of resources and the deterioration of marine ecological environment (Shui, 2023).

Despite these challenges, the concept and practice of sustainable fisheries are gradually being promoted. More and more countries and regions are recognizing the importance of sustainable management of fishery resources and have taken a series of measures, such as implementing fishing quota systems, establishing marine protected areas, and promoting eco-friendly fishing technologies, to alleviate pressure on marine ecosystems. In addition, scientific research on promoting the recovery and management of fishery resources has been strengthened, providing more data and technical support, and providing a basis for formulating effective fishery management policies and practices.

However, achieving sustainable development of global fisheries still faces many challenges. This includes strengthening international cooperation to jointly address the management issues of cross-border fishery resources; Improve the implementation of fisheries management policies and reduce IUU fishing activities; And adapting to and mitigating the impact of climate change on marine ecosystems and fishery resources. Future efforts require global participation, combined with policies, technology, and community management to effectively protect marine resources and achieve long-term sustainable development of fisheries.

### 1.2 International fisheries management strategy

In the global perspective of sustainable fisheries, international fisheries management strategies play a crucial role in promoting the long-term health and productivity of global fisheries resources. These strategies are typically developed and promoted by international organizations, multilateral agreements, and transnational cooperation frameworks, including but not limited to the Food and Agriculture Organization of the United Nations (FAO), the United Nations Convention on the Law of the Sea (UNCLOS), and regional fisheries management organizations (RFMOs).

The United Nations Convention on the Law of the Sea sets a legal framework for the protection and utilization of marine resources, clarifying the rights and obligations of countries to manage marine resources in their jurisdictional waters. In addition, FAO provides a series of principles and standards through the Responsible Fisheries Code of Conduct, aimed at supporting the sustainable use of global fisheries resources by promoting environmental sustainability, socio-economic responsibility, and effective fisheries management and development. RFMOs are international organizations responsible for managing specific sea areas or fish species, which establish fishing quotas, technical measures, and regulatory strategies to protect and restore fishery resources (Lu and Zou, 2023).

The key to the success of international fisheries management strategies lies in international cooperation and compliance. By sharing data, best practices, and technical support, countries can coordinate their management efforts to address the challenges of cross-border fisheries resources. However, the effective implementation of these international strategies is often constrained by the political will of member countries, the compatibility of laws and systems, and the unequal regulatory capacity. Therefore, enhancing the execution of international strategies, ensuring active participation and cooperation among all stakeholders, and strengthening supervision and enforcement mechanisms are key challenges in achieving sustainable fisheries goals.

### 1.3 Case analysis of cross-border cooperation

In the global perspective of sustainable fisheries, cross-border cooperation is a key way to achieve sustainable management of fishery resources. This cooperation not only involves coordination and resource sharing among countries, but also involves jointly addressing the challenges of marine environmental change, overfishing, and illegal, unreported, and unregulated (IUU) fisheries.

With global climate change leading to the rapid melting of Arctic sea ice, once inaccessible Arctic waters have become navigable and fishable, posing a threat to the ecosystem and biodiversity of the Arctic region (Zou and Mi, 2016). To address this challenge, countries around the Arctic and other countries with Arctic fisheries interests have recognized the urgent need to develop joint management measures. The five Arctic countries (the United States, Canada, Russia, Norway, and Denmark), as well as other fishing interest countries (including China, Japan, South Korea, Iceland, and the European Union), have jointly signed the Arctic Marine Living Resources Conservation Agreement. The agreement aims to prevent unregulated commercial fisheries from operating in the central Arctic waters until scientific data and management measures are sufficient to ensure the sustainability of fishing activities. The signatory countries agree not to engage in commercial fishing activities in the region until sufficient scientific research is conducted and effective management measures are established. In addition, the agreement emphasizes the importance of scientific research and requires signatory countries to cooperate in collecting and sharing data on Arctic marine ecosystems (Zou and Huntington, 2018).

This case demonstrates the important role of cross-border cooperation in protecting fragile marine ecosystems and promoting sustainable fisheries practices. By jointly committing to preventive management and scientific research, countries can protect the unique marine environment of the Arctic while ensuring the long-term sustainable use of fishery resources. This case provides valuable experience for global fisheries management, emphasizing the importance and urgency of international cooperation in the face of global environmental change and ecological challenges.

## 2 Technological Support for Fishery Management Strategies

### 2.1 Remote sensing and monitoring technology

The application of remote sensing and monitoring technology has become a key pillar in ensuring sustainable fisheries practices in fisheries management strategies. These technologies provide an effective means of real-time monitoring and evaluation of fishery resources, thereby helping management agencies make more scientific and accurate management decisions. Remote sensing technology, especially satellite remote sensing, can cover vast marine areas, providing unprecedented capabilities for monitoring changes in the marine environment, distribution of fishery resources, and fishing vessel activities (Chen et al., 2024).

By utilizing high-resolution satellite images, researchers and managers can track the location of fishing vessels and monitor illegal, unreported, and unregulated (IUU) fishing activities. In addition, satellite remote sensing can provide valuable information about marine environmental conditions, such as sea surface temperature, salinity, and chlorophyll concentration, which are important indicators for evaluating fish distribution and predicting fishery productivity.

In recent years, the advancement of artificial intelligence (AI) and machine learning technology has further enhanced the analytical capabilities of remote sensing data. Through automated image recognition and data analysis, these technologies can quickly identify fishing vessel activity patterns, predict changes in fishing

grounds, and provide scientific basis for fisheries management. For example, by analyzing the movement trajectory and behavior patterns of fishing vessels, management agencies can identify potential IUU fishing behaviors and take corresponding enforcement measures.

Near shore monitoring technologies such as unmanned aerial vehicles (UAVs) and autonomous underwater vehicles (AUVs) are also being used in fisheries management. These devices can perform high-precision monitoring work in specific sea areas, collect detailed information about fishing activities and marine ecological environment, support the supervision of marine protected areas and biodiversity conservation work. Mangrove forests are an important component of marine ecosystems and are crucial for the protection of marine biodiversity and the sustainable utilization of fishery resources. Wang et al. (2020) estimated the biomass of mangroves in the northeast of Hainan Island, China, by combining field plots, unmanned aerial vehicle LiDAR (UAV LiDAR) strip data, and Sentinel-2 satellite imagery in their study.

### 2.2 Data analysis and model prediction

In the technological support of fishery management strategies, data analysis and model prediction play a crucial role in providing scientific basis and decision-making support for the sustainable management of fishery resources. The development of this field enables managers to have a more accurate understanding of the status, trends, and dynamic changes of fishery resources, and to develop corresponding management measures based on this information.

Data analysis is the process of processing and interpreting data related to marine environment and fishery resources, including data from marine biology, ecology, fishery statistics, and other fields. By conducting statistical analysis, spatial analysis, and time series analysis on these data, managers can identify the changing patterns, key driving factors, potential risks, and challenges of fishery resources. Zhang and Lu (2018) explored how to improve the ecological environment, reduce natural disasters, and enhance the sustainable utilization of fishery resources by optimizing the allocation of protective forest models in coastal areas of China.

Model prediction is a mathematical model established based on existing data and theoretical knowledge, which simulates and predicts the future trends and effects of fishery resource changes. These models can be population dynamics models, ecosystem models, fishery economic models, etc., used to predict the population dynamics, catch, fishery returns, etc. of fishery resources. For example, with the help of population dynamics models, the impact of different fishing amounts and management measures on fishery resources can be simulated, providing scientific basis for the formulation of sustainable fishing quotas and protection policies (Zhang et al., 2017).

The combination of data analysis and model prediction provides a powerful decision support tool for fisheries management. They can not only help managers better understand the complexity and uncertainty of fishery systems, but also evaluate the effectiveness and feasibility of different management measures, providing scientific basis for achieving sustainable utilization of fishery resources. However, to fully leverage the role of data analysis and model prediction, it is necessary to continuously improve data quality, refine model methods, and strengthen the integration with fisheries practices to ensure effective integration between scientific research and management practices.

### 2.3 Innovative fishing tools and methods

The application of innovative fishing tools and methods plays a crucial role in promoting sustainable fishing practices in the technological support of fisheries management strategies. These tools and methods involve fields such as technology, engineering, and management, aimed at improving the efficiency of fishery resource utilization, reducing losses and environmental impacts, and promoting the economic sustainability and social responsibility of fisheries.

An innovative fishing tool is the design of eco-friendly fishing gear. Traditional fishing tools, such as trawls and seines, may cause damage to marine ecosystems, capturing large numbers of non target species and benthic organisms. Therefore, researchers and engineers are committed to developing new types of fishing gear designs,

such as selective fishing equipment and fishing tools that avoid damaging benthic ecosystems. These innovative fishing gear can effectively reduce the capture of non target species, reduce the impact of fishing on ecosystems, and promote the sustainable utilization of fishery resources.

Another innovative approach is to reduce the technology of bycatch. Bycatch refers to the unintentional capture of other fish, marine organisms, or benthic species while capturing the target species. In order to reduce the number and impact of bycatch, researchers have developed a series of technologies and methods, such as selective fishing gear, escape windows, and improved fishing net design. These innovative methods can improve the efficiency of fishery resource utilization, reduce resource waste, and reduce the impact on non target species, promoting sustainable development of the fishery.

The use of modern technologies such as artificial intelligence (AI), big data analysis, and blockchain has also provided new solutions for fisheries management. Through AI technology, managers can monitor and analyze the movement trajectory and fishing activities of fishing vessels in real-time, identify possible illegal fishing behaviors, and take corresponding regulatory measures in a timely manner. Big data analysis can help managers better understand the changing trends and driving factors of fishery resources, thereby formulating more precise and effective management strategies. Blockchain technology can achieve transparency and traceability in the supply chain of fishery products, improve the quality and safety of fishery products, and promote sustainable development of fisheries.

## 3 Socio-economic Factors and Fishery Management

### 3.1 The impact of fisheries on communities

The impact of fisheries on communities is an important socio-economic factor in fisheries management, which directly relates to the economic, social, and cultural development of coastal communities. Fisheries, as one of the main economic sources for many coastal communities, have a multifaceted impact on these communities.

Fisheries provide employment opportunities for coastal communities. Many residents in coastal communities rely on fishing to engage in related industries such as fishing, processing, and transportation. These jobs not only provide a stable source of income, but also create employment opportunities, supporting the livelihoods and economic activities of the community. Fisheries play an important role in promoting the economic development of communities. The development of the fishery industry chain has driven the development of related industries and service industries, such as fishery processing, transportation, sales, etc., forming a complete fishery industry system. This not only promotes the diversification and prosperity of the local economy, but also provides more employment and entrepreneurial opportunities for community residents.

Fisheries also have a profound impact on the culture and social structure of communities. Many coastal communities have a long tradition of fishermen and fishing culture, and fishermen inherit rich fishing knowledge and skills, which have become a part of the community. Fishery activities also promote interaction and cooperation among community residents, forming close social connections and a sense of community.

However, the impact of fisheries on communities also faces some challenges and issues. Overfishing and unreasonable fishery development may lead to the depletion of fishery resources and the deterioration of the ecological environment, thereby affecting the economy and livelihoods of communities. Fishery activities may also have some negative impacts, such as pollution from fishing boats, port traffic congestion, insufficient fishing port facilities, etc., which bring a certain degree of pressure and burden to the community environment and life.

### 3.2 Economic incentive measures

In fisheries management, economic incentives are widely applied to influence and guide fishing activities, promoting the development of sustainable fisheries. These economic incentive measures are a crucial part of the interaction between socio-economic factors and fishery management, and their design and implementation directly affect the utilization of fishery resources and the behavior of fishery activities.

Fisheries subsidies are a common economic incentive measure aimed at reducing the economic burden on fishermen and increasing their enthusiasm for participating in fisheries management. These subsidies can include direct cash subsidies, subsidies for oil crops, fishing gear, and ships, as well as indirect tax reductions and loan interest rate incentives. By providing subsidies, the government can encourage fishermen to adopt sustainable fisheries management measures, such as quota fishing, protected area management, and gear renewal, in order to achieve long-term sustainable utilization of fishery resources (Yulisti et al., 2024).

The shaping of the fishery market mechanism is also an important economic incentive measure. Through price policies, market access restrictions, trade tariffs, and other means, the government can influence the prices and market demand of fishery products, thereby guiding the behavior of fishermen. For example, increasing the prices of fish products for sustainable fishing and reducing the demand for overfished species can incentivize fishermen to shift towards sustainable fishing methods, enhance awareness and management efficiency of fishery resources.

The allocation of rights and responsibilities in fisheries management is also an economic incentive measure. By establishing systems such as fishing rights, fishery management rights, and fishery law enforcement responsibilities, the government can incentivize fishermen to make reasonable use of fishery resources and punish violations. For example, implementing a fishery quota system and a fishing permit system can limit the development of fishery resources, encourage fishermen to adopt sustainable fishing behaviors, and punish illegal fishing to ensure the sustainable utilization of fishery resources.

### 3.3 Policies and governance mechanisms

In fisheries management, socio-economic factors are closely related to policy governance mechanisms and have a significant impact on the sustainable utilization of fisheries resources and the healthy development of communities. Policy and governance mechanisms play a guiding, supervisory, and coordinating role in fisheries management, aiming to balance economic interests in fisheries, social equity, and ecological environment protection.

The fishery policy formulated by the government is an important factor affecting the socio-economic development of fisheries. Fisheries policies involve multiple aspects such as resource management, fishing quotas, licensing systems, vessel registration, and subsidy policies. For example, by establishing fishing quotas, establishing fishing permit systems, and implementing fishing vessel registration systems, the government can control the development and utilization of fishery resources, prevent overfishing and resource waste, and ensure the sustainable development of the fishery.

The establishment and operation of governance mechanisms are key to fisheries management. The governance mechanism includes collaboration and coordination among fisheries management agencies, supervisory departments, scientific research institutions, fisheries associations, and other parties. These institutions are responsible for supervising fishing activities, formulating fishing management rules, providing technical support and training, and promoting the standardization and modernization of fishing production. An effective governance mechanism can ensure the rational utilization of fishery resources, safeguard the legitimate rights and interests of fishery practitioners, and protect the health of the fishery ecological environment (Rodriguez-Perez et al., 2023).

The government can also guide and promote the sustainable development of fisheries through economic incentive measures. For example, providing economic incentives such as fishery subsidies, loan support, and tax incentives, encouraging fishermen to adopt eco-friendly fishing methods, invest in advanced fishery equipment, and participate in activities such as fishery resource protection and management. These measures can not only promote the economic benefits of the fishing industry, but also promote its sustainable development, achieving a win-win situation for the economy, society, and environment.

## 4 Challenges and Opportunities in Implementing Effective Fisheries Management

### 4.1 Compliance and enforcement challenges

Implementing effective fisheries management faces a series of challenges and opportunities, among which

compliance and enforcement challenges are important aspects. Compliance refers to whether fishery practitioners comply with fishery management policies and regulations, while enforcement challenges involve how management agencies effectively supervise and implement these policies and regulations.

The challenge of compliance lies in the fact that fishing activities typically occur in open marine environments, making regulation and enforcement difficult. Fishing vessels have a wide range of operations and often cross the waters of different countries, therefore, strengthening international cooperation is necessary for the regulation and coordination of cross-border fishing activities. At the same time, fishing practitioners may engage in illegal fishing, unreported and unregulated fishing activities, which pose challenges to compliance regulation.

The main difficulty in law enforcement is reflected in the insufficient supervision and enforcement capabilities of regulatory agencies. Fisheries law enforcement requires sufficient manpower, material resources, and technical support, but many developing countries have weak fisheries law enforcement capabilities, resulting in ineffective enforcement actions. In addition, there may be bribery, corruption, and conflicts of interest with fisheries practitioners during the law enforcement process, which can weaken the credibility and effectiveness of law enforcement.

However, compliance and enforcement challenges also bring some opportunities and solutions. Strengthening international cooperation is an important way to address the regulatory issues of cross-border fishing activities. Establishing multinational fisheries management organizations, strengthening information sharing and cooperative law enforcement can effectively reduce illegal and unreported fishing. By utilizing modern technologies and regulatory measures such as satellite remote sensing and intelligent monitoring systems, the efficiency and accuracy of fisheries law enforcement can be improved, and real-time monitoring and tracking of fishing vessel behavior can be achieved.

### 4.2 Impact of climate change

Implementing effective fisheries management is currently facing a series of challenges and opportunities brought about by climate change. The impact of climate change on fishery resources is multifaceted, including rising ocean temperatures, ocean acidification, and an increase in extreme weather events, all of which directly or indirectly affect the distribution, growth, reproduction, and quantity of fishery resources.

The challenges posed by climate change to fisheries mainly manifest in the following aspects. The increase in temperature leads to changes in the marine ecosystem, which may cause the migration or reduction of some important fishery resources, thereby affecting the stability and reliability of fishery production. Ocean acidification may also have adverse effects on the survival and reproduction of some marine organisms, further exacerbating the reduction of fishery resources. In addition, the increase in extreme weather events such as storms and hurricanes may lead to damage to fishing vessels and facilities, thereby affecting fishing production and the livelihoods of fishermen (Talbot et al., 2024).

However, climate change has also brought some opportunities to fisheries management. The impact of climate change has prompted fisheries managers to pay more attention to the sustainability of fishery resources and the stability of ecosystems, strengthen scientific research and monitoring of fishery resources, and promote the scientific and refined management measures of fisheries. Some climate change may lead to the migration or increase of marine biological resources, providing new opportunities and challenges for fishery production. Managers can better utilize and protect these resources by adjusting fishery development methods and resource management measures.

### 4.3 Ecosystem protection and biodiversity

Implementing effective fisheries management faces a series of challenges and opportunities in ecosystem protection and biodiversity. Fishery activities have direct and indirect impacts on marine ecosystems and biodiversity, therefore protecting ecosystems and maintaining biodiversity is one of the important goals of fisheries management.

The challenges in ecosystem protection and biodiversity mainly include the following points. Overfishing and unreasonable fishery development may lead to the depletion of fishery resources and the destruction of ecosystems, thereby affecting the survival and reproduction of other biological populations. Fisheries activities may cause damage to marine habitats, including important ecosystems such as coral reefs, seagrass beds, and wetlands, thereby affecting the survival and reproduction of related biological populations (Kyriazi et al., 2023). In addition, factors such as climate change and marine pollution can also have negative impacts on ecosystems and biodiversity, exacerbating the challenges of fisheries management.

However, ecosystem conservation and biodiversity also bring some opportunities. Strengthening fishery management and protecting ecosystems can improve the stability and sustainability of fishery resources, and promote the long-term development of fisheries. Protecting ecosystems and maintaining biodiversity helps to maintain marine ecological balance, promote the healthy development of marine ecosystems, and provide more stable and abundant resources for fisheries (Figure 1). Ecosystem protection and biodiversity also provide certain limitations and constraints for fisheries development, promoting the development of fisheries towards a more sustainable direction and promoting the scientific and refined management of fisheries.

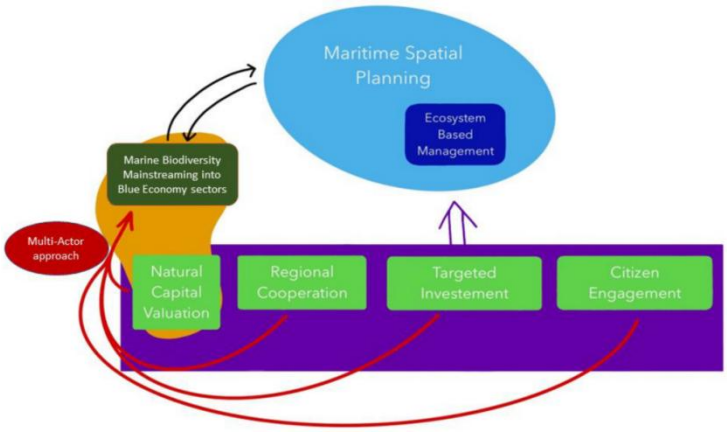


Figure 1 The catalytic role of marine biodiversity in sustainable fisheries (Kyriazi et al., 2023)

## 5 Summary and Outlook

Implementing effective fishery management strategies is crucial for protecting the marine ecological environment, maintaining sustainable utilization of fishery resources, and promoting economic prosperity in coastal communities. The collection and utilization of scientific data and information are the foundation for developing effective management strategies. By monitoring and evaluating fishery resources, ecosystems, and activities, managers can more accurately understand the status and trends of fishery resources, and thus develop targeted management measures. Effective fisheries management requires scientific and refined policies. Management policies should be based on science, taking into account the interests of fishery practitioners and the needs of socio-economic development, and formulating reasonable management policies and measures. In addition, strengthening cooperation and coordination is also key to implementing effective fisheries management. The management of fishery resources involves the balance and coordination of multiple interests, requiring active participation from all relevant parties, strengthening cooperation, forming consensus and joint action.

The Sustainable Development Goals (SDGs) are a global development agenda aimed at addressing various challenges faced globally, with SDG 14 focusing on "protecting, restoring, and sustainably utilizing oceans and marine resources". SDGs have had a profound impact on fisheries management, providing important guidance and support for the sustainable development of fisheries by setting clear goals and action plans. SDGs aim to promote coordinated development of the economy, society, and environment, including specific goals regarding the protection of the oceans and marine resources. Therefore, fisheries management needs to be consistent with SDGs, integrating the concept of sustainable development into all aspects of fisheries management, promoting the

sustainable use of fisheries resources, maintaining the health of marine ecosystems, and protecting the rights and interests of fishermen (Liu, 2024).

Innovation and cooperation will become the key to promoting sustainable development of fisheries. The application of innovative technologies and methods will improve the efficiency and effectiveness of fisheries management, such as using artificial intelligence, big data analysis, blockchain and other technologies to solve difficulties in fisheries management. At the same time, strengthening international and cross-border cooperation will promote the globalization, scientification, and cooperation of fishery management, promote cross-border protection and joint development of fishery resources, and achieve the common goal of sustainable development of fisheries. The future management of fisheries requires continuous innovation, strengthened cooperation, and joint efforts with the international community to achieve sustainable utilization of fishery resources, protect the marine ecological environment, and maintain the livelihoods of fishermen, making positive contributions to the sustainable development of humanity and the earth.

**References**

Canales C.M., Olea G., Jurado V., and Espíondola M., 2024, Management Strategies Evaluation (MSE) in a mixed and multi-specific fishery based on indicator species: an example of small pelagic fish in Ecuador, Marine Policy, 162: 106044.
https://doi.org/10.1016/j.marpol.2024.106044

Chen A., Lü Z.H., Zhang J.B., Yu G.Y., and Wan R., 2024, Review of the accuracy of satellite remote sensing techniques in identifying coastal aquaculture facilities, Fishes, 9(2): 52.
https://doi.org/10.3390/fishes9020052

He S., and Chen X.J., 2016, Review on management strategy evaluation and its application in fishery, Guangdong Haiyang Daxue Xuebao (Journal of Guangdong Ocean University), 36(5): 29-39.

Kyriazi Z., de Almeida L.R., Marhadour A., Kelly C., Flannery W., Murillas-Maza A., Kalaydjian R., Farrell D., Carr L.M., Norton D., and Hynes S., 2023, Conceptualising marine biodiversity mainstreaming as an enabler of regional sustainable blue growth: the case of the European Atlantic Area, Sustainability, 15(24): 16762.
https://doi.org/10.3390/su152416762

Liu S.Y., 2024, Using Sustainable Development Goal Indicator 14.7.1 to measure sustainable fishery: the statistical limitations, Fishes, 9(2): 57.
https://doi.org/10.3390/fishes9020057

Lu J., and Zou L.L., 2023, Characteristics of the South Pacific Regional Fisheries Management Organization and China's participation strategy, Shanghai Haiyang Daxue Xuebao (Journal of Shanghai Ocean University), 32(6): 1277-1286.

Rodriguez-Perez A., Tsikliras A.C., Gal G., Steenbeek J., Falk-Andersson J., and Heymans J.J., 2023, Using ecosystem models to inform ecosystem-based fisheries management in Europe: a review of the policy landscape and related stakeholder needs, Front. Mar. Sci., 10: 1196329.
https://doi.org/10.3389/fmars.2023.1196329

Shui B.N., 2023, Rethinking and optimization of releasing stock enhancement for marine fishery resources:a review, Dalian Haiyang Daxue Xuebao (Journal of Dalian Fisheries University), 38(5): 737-743.

Talbot E., Jontila J.B.S., Gonzales B.J., Dolorosa R.G., Jose E.D., Sajorne R., Sailley S., Kay S., Queirós A.M., 2024, Incorporating climate-readiness into fisheries management strategies, Sci. Total Environ., 918: 170684.
https://doi.org/10.1016/j.scitotenv.2024.170684

Wang D.Z., Wan B., Liu J., Su Y.J., Guo Q.H., Qiu P.H., and Wu X.C., 2020, Estimating aboveground biomass of the mangrove forests on northeast Hainan Island in China using an upscaling method from field plots, UAV-LiDAR data and Sentinel-2 imagery, Int. J. Appl. Earth Obs. Geoinformation, 85: 101986.
https://doi.org/10.1016/j.jag.2019.101986

Yulisti M., Hidayat A.S., Firdausy C.M., Mu'awanah U., Kurniasari N., and Nurjati E., 2024, Effects of eco-friendly fishing gears on fishermen's welfare and sustainable fisheries: lessons learned from Indonesia, Mar. Pollut. Bull., 198: 115888.
https://doi.org/10.1016/j.marpolbul.2023.115888

Zhang C.L., Chen Y., Han D.Y., Xing L., and Ren Y.P., 2017, The application of ecological models in fisheries management, Haiyang Xuebao (Acta Oceanologica Sinica), 39(10): 1-18.

Zhang Y.S., and Lu W.M., 2018, China's coastal shelterbelt optimization configuration mode division-a case of Zhejiang Coastal Shelterbelt, Shijie Shengtai Xue (International Journal of Ecology), 7(1): 6-11.
https://doi.org/10.12677/IJE.2018.71002

Zou L.L., and Huntington H.P., 2018, Implications of the convention on the conservation and management of pollock resources in the Central Bering Sea for the management of fisheries in the Central Arctic Ocean, Marine Policy, 88: 132-138.
https://doi.org/10.1016/j.marpol.2017.11.019

Zou L.L., and Mi C.X., 2016, Review and prospect on arctic fisheries and its management, Taipingyang Xuebao (Pacific Journal), 3: 85-93.