

Review

Exploring Policy of Small-Scale Coastal Fisheries in China: Evolution, Challenges and Prospects

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Abstract: China plays a significant role in the global fishing industry. The small-scale fisheries (SSFs) operating along its coast have made noteworthy and invaluable contributions in the areas of poverty alleviation, protein provision, social equity, and overall socioeconomic development. Coastal small-scale fishing management is a persistent challenge for all fishing nations, including China. In recent years, China has made significant strides in adopting scientific and refined approaches to fishery management in this sector. This paper provides an overview of the development of China's coastal fishery management practices, including changes in policies, methods, and modes since the establishment of the People's Republic of China (PRC) in 1949. To address these challenges, this research seeks to enhance the governance system of small-scale coastal fisheries by assessing values from three dimensions: society, economy, and ecology.

Keywords: small-scale fisheries; policy evolution; coastal fisheries; sustainable fisheries policy; data-limited fisheries; China

Key Contribution: Small-scale coastal fisheries management involves multiple economic, social, and ecological objectives. Since the 1950s, China has implemented a series of policies to improve coastal fisheries management. Focusing solely on a single value dimension and management approach cannot address the decline in coastal fishery resources and poses challenges to the livelihoods of traditional fishermen. To address these issues, the government should enhance awareness of sustainable coastal fisheries, expand policy focus beyond ecological value, strengthen understanding and research of SSFs, and implement comprehensive policy support measures that integrate economic, social, and ecological considerations. Enhancing the organizational level of coastal fishing communities, adopting mixed governance models, and employing diverse management approaches are crucial for the sustainable development of coastal fisheries. Continuous exploration and reform are guiding China's coastal fisheries management toward differentiation, refinement, and scientific approaches.



Citation: Xiong, M.; Wu, Z.; Qi, G.; Jiang, K.; Zhao, N.; Jiang, W. Exploring Policy of Small-Scale Coastal Fisheries in China: Evolution, Challenges and Prospects. *Fishes* **2024**, *9*, 451. <https://doi.org/10.3390/fishes9110451>

Academic Editor: Michael E. Barnes

Received: 2 October 2024

Revised: 24 October 2024

Accepted: 31 October 2024

Published: 4 November 2024



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1. Introduction

Over 90% of the 120 million fishers globally who rely on fishing for their livelihoods engage in SSFs [1]. These fisheries contribute to over half of the world's fish catch, with the majority (90–95%) being consumed locally [2]. However, the dominance of large industrial vessels in fisheries management has resulted in the neglect of policy considerations for SSFs [3]. Addressing the needs of SSFs requires global recognition and support. The Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of

Food Security and poverty Eradication (abbreviated as SSF-Guidelines) [2] serve as a foundation and policy framework for promoting sustainable development, conservation of resources, and protection of rights and interests in coastal fisheries countries. Despite the guidelines, several challenges remain in their implementation, such as inadequate financial and technical resources from governments, the need for complementary policy support, and limited international cooperation. To ensure the sustainability of small-scale fishers' livelihoods and facilitate progress towards sustainable development, increased policy input and support are necessary in implementing the global action plan [4].

In China, the classification of coastal marine capture fisheries into SSFs/artisanal or commercial sectors is not straightforward. Factors such as engine size, length of vessels, distance from shore, water depth, and fishing gear used all contribute to the same type of catch [5]. Generally, China's coastal capture fisheries are considered small scale due to their concentration in inshore waters, where fishing vessels have distinct differences in size and power compared to medium and large-scale vessels. However, the 2019 revision of Provisions on the Administration of Fishing Licenses (hereafter referred to as PAFL, 2019) does not provide a clear definition of SSFs. It only distinguishes small-scale marine fishing vessels without offering a comprehensive understanding of the concept [6]. The management of small-scale fishing vessels and their operations currently lack cohesion and defined objectives. Furthermore, the absence of corresponding content in legal and policy documents at provincial and county levels in coastal regions poses additional challenges in defining SSFs.

In light of these circumstances, the 14th Five-Year Plan for Fisheries Development was introduced in January 2022 [7]. This plan includes adjustments in the allocation of fishery resources, such as limiting the number and area of fishery licenses, implementing fishery quotas, and enforcing seasonal fishery closures. It also supports the transformation and modernization of small-scale fishing vessels while strengthening supervision and law enforcement. The promotion of cooperation between the central and local governments, fishery associations, and fishermen's organizations indicates a shift towards a more differentiated, refined, and scientific approach to fishery management by the central government.

As the 14th Five-Year Plan for Fisheries Development nears its conclusion, we have conducted an analysis of China's coastal fisheries policy changes over the past 75 years. This analysis aims to understand the motivations behind the policies, assess their effectiveness in implementation, and identify existing issues. The findings will facilitate the formulation of more precise and scientifically grounded policy recommendations for coastal fisheries management in the upcoming 15th Five-Year Plan.

2. Material and Methods

2.1. Policy Text Analysis

We use the policy text analysis method and have a comprehensive and overall grasp of the policy text. First of all, we manually collected the laws, administrative regulations, departmental rules, normative documents, and fishery development plans related to the coastal fishing industry promulgated by the government of China from 1949 to 2024 through the keywords "Coastal fishing industry" or "Small fishing vessels". We paid attention to the objectives, scope, types, and policy tools involved in the policies. Combined with the collected policies, we can infer the relevant characteristics of policy evolution [8].

2.2. Documentary Analysis

We conducted an analysis of 27 papers using the keywords "China coastal fishing fishery" and "fishery policy" within the Web of Science database and made clear the core policies and characteristics of the coastal fishing industry in China at different stages. In China, SSFs are not managed indiscriminately compared with medium and large-scale fisheries. Therefore, the policy characteristics of SSFs are similar to these, which can be roughly divided into the germination period (1949–1977), the development period (1978–2000), and the control period (2000–present).

3. Results

3.1. *The Evolution and Characteristics of the Coastal SSFs Policy in China*

3.1.1. Embryonic Period of SSFs Management (1949–1977)

Following the establishment of the People's Republic of China, rural areas in China remained largely reliant on traditional small-scale peasant production, characterized by limited productive capacity and low living standards. Amid the national emphasis on increasing grain output, the fishery sector has gained attention as a crucial factor in achieving this goal. Aquatic products serve as a significant protein source for humans. To mobilize collective efforts and maximize production, scattered and relatively unproductive SSF producers were integrated through the establishment of fishery cooperatives. These cooperatives primarily managed low-power wooden fishing boats. By 1958, with the establishment of the Fishery People's Commune, individual production and management by small-scale fishermen transitioned to collective management [9,10]. Fishery organizations, mainly in the form of fishery communities, were implemented, introducing a flexible system in terms of organizational scale, ownership, distribution, operation, and management, which facilitated increased fishery production. Additionally, designated coastal fishing ban zones were established to protect fishery resources in coastal waters.

3.1.2. Development Period of SSFs Management (1978–2000)

Since the Third Plenary Session of the 11th CPC Central Committee in 1978 opened the transition from China's planned economy to a market economy, great changes have taken place in fishery rights and fishery management systems. In particular, in the fishing areas of Guangdong and Fujian, where China's fishery is relatively developed, the coastal areas of Guangdong and Fujian have first begun to explore the reform of the fishing fishery management system. Haifeng County and Yangjiang County in Guangdong, Lianjiang County and Dongshan County in Fujian Province have successively started the reform of the fishing fishery management system and tried to offer a variety of new fishery management models such as discounting the price and accounting for cooperative fishing vessels [11], breaking the original management system of basic accounting with "team" as the production unit, and transferring the main means of production such as fishing boats and fishing nets from collectives to new economies such as cooperative fishing vessels through paid transfer. Fishermen have equal rights, joint possession, and domination. By 1983, the shareholding ratio of cooperative fishing vessels had risen from 15% to 70%, which meant that the fishing rights of the original production teams were generally transferred [11]. In the major fishing areas, we have comprehensively carried out the reform of the shareholding system for fishing vessels, discounted the prices of the fishing boats of the former brigades and gave them to the fishermen for joint ownership, turned large collectives into small groups, and implemented a system of accounting by boats and decentralized management. This is the change in the small-scale fishery management system from collective to individual, from centralization to decentralization in China. Because of China's vast land, long coast, and huge fishing vessels that operate less than 12 m along the coast, this is one of the factors that make it difficult to manage SSFs in China from collective to individual and from centralized to decentralized.

The decentralized management system has boosted fishermen's enthusiasm for production, but it has also led to an increase in the number of fishing vessels and dispersion of fishing activities, exacerbating the depletion of coastal fishery resources. At this stage, the Chinese government recognized the issue of declining fishery resources and implemented specific legislative measures to address it. These measures included the protection of aquatic resources, the implementation of a fishery license system, the establishment of a fishing vessel management system, and the introduction of a series of management and conservation systems for fishery resources.

3.1.3. Management and Control of SSFs (2000-Present)

In 1987, the “double control”—an input control method aimed at reducing or limiting the total fishing capacity of a fishing fleet by controlling the overall vessel number and horsepower of the fishing fleet system for marine fishing vessels, which regulates the number and power of fishing vessels—was introduced with the Opinions on the Control Indicators for Coastal Fishing Motorized Fishing Vessels. However, due to weak implementation, the total number and power of fishing vessels in China show a growing trend from 1992 to 1999, reaching a peak in 2000. During the Ninth Five-Year Plan period, the growth rate of fishing vessel power in the country declined sharply from 43% to 37%, and the number of fishing vessels experienced negative growth [12]. This decline was mainly attributed to a reduction in low-power fishing vessels, indicating that the fishing vessel and power control systems have helped to curb the excessive growth of fishing vessels.

In the 1990s, the excessive fishing activities in China’s coastal areas led to a significant decline in the production of economically important fish species, with some resources approaching extinction. To address this issue and prevent overfishing, the Ministry of Agriculture introduced the concept of “Zero growth of marine fishing output” (hereafter referred to as Zero growth). A year later, the target of achieving “Negative growth of marine fishing output” (hereafter referred to as Negative growth) in marine capture production was set as a means to reduce the intensity of fishing and strengthen the protection and restoration of coastal fishery resources [13].

During this period, there was a shift in the fishery management system from the contract responsibility system to the shareholding system. This transition allowed for self-management and self-accountability in terms of profits and losses, which has remained in place until now [14].

In 2003, the Fisheries Bureau of the Ministry of Agriculture introduced the Opinions on the implementation of Marine Motorized Fishing Vessels Control System from 2003 to 2010, marking the start of the “total control system” phase during the Ninth Five-Year Plan, focusing on reducing the number of fishing vessels [15]. In 2017, the Ministry of Agriculture issued a notice to further strengthen the control of domestic fishing vessels and implement comprehensive management of marine fishery resources, specifying the number and power of fishing vessels in China’s coastal provinces from 2015 to 2020 [16]. While the “Zero growth of marine fishing output” and “Negative growth of marine fishing” policies differ in timing and background from the previous double control and double reduction policy system, the objective remains the same: to reduce the intensity of small-scale fishing vessels in coastal areas. In the 14th Five-Year Plan for Fisheries Development released in January 2022, the management objectives for the coastal fishing industry have shifted from “strict control” (the management focus has changed from simply strictly controlling the total amount of fishing to optimizing the fishing structure, including optimizing the number and scale of fishing vessels, promoting the upgrading of fishing methods and technologies, and protecting fishery resources and ecological environment) to “optimization of fishing structure”, indicating a move towards differentiated, refined, and scientifically managed fishery management by the central government [7].

3.2. Common Characteristics of Policies at All Stages

Through the analysis above, we find that small-scale coastal fisheries, although adjusted according to different social, economic, and policy conditions, share the following common characteristics across different policy stages.

3.2.1. Focus on Ecological Value

Fisheries policies are formulated to tackle intricate social challenges. If the value orientation of these policies is oversimplified, it may overlook the diverse requirements of society across various developmental stages and societal groups. Consequently, such policies may lack adaptability to intricate realities and overly concentrate on a sole objective,

often disregarding the significance of long-term sustainable development. Consequently, these policies can prove ineffective when confronted with intricate SSFs.

From the perspective of the different stages of China's small-scale fishery policy, namely the embryonic stage, the development period, and the control period, these stages can be classified based on the policy's value dimension. The value dimension specifically encompasses the economic, social, and ecological aspects of China's fishing industry policy [17]. The economic value primarily centers on the provision of aquatic products, enhancing the market value of fish and other cash crops related to aquaculture, and driving economic growth in fishing-related industries. The social value emphasizes factors such as maintaining stability in coastal areas, improving the living conditions of fishermen, and promoting employment opportunities for fishermen. The ecological value focuses on the conservation of marine living resources and the restoration of marine ecosystems [17]. However, it is noteworthy that the policies pertaining to SSFs in China predominantly prioritize ecological value, with limited emphasis on social and economic value, as indicated in Table 1.

Table 1. Policies, tools, and value dimensions of SSFs introduced at different stages in China. The references for the policies are listed in Supplementary Table S1.

Period	Content	Documents	Policy Objectives	Policy Tools	Value Dimension
Phase 1: Embryonic period (1949–1977).		Common Program of the Chinese People’s Political Consultative Conference (1949) (The First Plenary Session of the Chinese People’s Political Consultative Conference)	Preserving coastal fishing grounds and promoting aquaculture development.	Command-control	Ecological value
		Directives on fishers’ work (1952) (Administrative Department for Fisheries, ADF)	Fishery production serves as a primary source of income for China’s national economy and holds a prominent position among the country’s top five agricultural industries.		Economic value
		Resolution on agricultural production cooperatives (1953) (Communist Party of China, CPC)	The development path of farmers from mutual aid groups and primary cooperatives to advanced cooperatives		Social value
		Order on the prohibition zones for motor trawl fishing in the Bohai Sea, the Yellow Sea, and the East China Sea (1955) (The State Council, People’s Republic of China, PRC State Council)	Ensuring the conservation of China’s coastal aquatic resources and minimizing conflicts between trawling and small-scale fishing activities.		Ecological value
Phase 2: Development period (1978–2000).		Regulations on the protection of aquatic resource reproduction (1979) (PRC State Council)	Conservation and preservation of aquatic resources through reproduction and protection measures.	Command-control	Ecological value
		Interim provisions on certain issues concerning fisheries Licensing (1979) (National ADF)	Implementing a fishery license management system to promote the rational and sustainable utilization of fishery resources and mitigate the risks of overfishing and resource depletion.		
		Notice on the summer fishing moratorium for collective trawlers and joint inspection of the proportion of juvenile fish on state-owned fishing vessels (1980) (National ADF)	Ensuring the conservation of fishery resources and preventing overfishing.		
		Decision of the State Council on the establishment of juvenile fish reserves (1981) (PRC State Council)	To safeguard the reproductive success and growth of <i>L. crocea</i> and <i>T. lepturus</i> juvenile		
		Report on several issues concerning the development of marine fisheries (1983) (National ADF)	Putting emphasis on the conservation of Coastal resources and regulating fishing intensity.		
	Directives on relaxing the policy and accelerating the development of the fishery and aquaculture industry (1985) (No. 5 Central Document) (CPC, PRC State Council)	Standardizing and modernizing the fishing industry will enhance the economic benefits and sustainable development capacity of fisheries.	Economic and ecological value		
	Fisheries Law of PRC (1986, revised and reacted in 2000, 2004, 2009, 2013. The National People’s Congress Standing Committee, NPCSC)				

Table 1. Cont.

Period	Content	Documents	Policy Objectives	Policy Tools	Value Dimension
		Provisions on the arrangement and management of fishing seasons in the main fishing grounds of the East China Sea, Yellow Sea, and Bohai Sea and Opinions on control indicators for nearshore and coastal motorized fishing vessels (1987) (National ADF) Opinions on controlling the growth indicators of marine fishing intensity during the 8th FYP period (1992) (National ADF) Opinions on the implementation of controlling indicators of marine fishing intensity during the 9th FYP period (1997) (National ADF) Opinions on further accelerating fisheries development (1997) (National ADF) “Zero-growth” policy for national annual marine fishing yield (1999) (National ADF) “Negative growth” policy for annual fishing yield (2000) (National ADF)	To protect and rationally utilize key economic fish and shrimp resources, maintain fishing ground productivity, and regulate fishing intensity. Control the blind growth of nearshore fishing vessels and protect and rationally utilize fishery resources. Control the uncontrolled growth of coastal fishing vessels and ensure the protection and rational utilization of fishery resources. Enhance the protection and sustainable utilization of coastal fishery resources. The shift from quantity expansion to quality and efficiency improvement has effectively enhanced the protection of fishery resources and the ecological environment. Maintain the current level of marine fishing output in China.		Ecological value
Stage 3: Restriction and compression period (2001–present).	Opinions on the implementation of Marine Motorized Fishing Vessels control system in 2003–2010 (2003) (National ADF) Interim Provisions on the Use and Management of Special Funds for the Restructuring of Marine Fishermen (2004) (The Ministry of Finance of the People’s Republic of China, MOF; MARA) Notice on the investigation of fishing gears and methods in the national fishing industry (2009) (The Ministry of Agriculture and Rural Affairs of the People’s Republic of China, MARA) Regulations of the People’s Republic of China on the registration of fishing vessels (revised and reacted in 2013, MARA) Notice on soliciting opinions on the improvement in the minimum mesh size system and the fishing gear access system for marine fishing 2013, MARA)	Regulate the number and capacity of fishing vessels to ensure that fishing intensity in the area aligns with the sustainable catch limits of fishery resources. Encourage fishermen to change their professions and promote the optimization and upgrading of fishery industrial structures. Strengthen and standardize the management of fishing gear and fishing methods, control fishing intensity, and avoid overfishing. Strengthen the supervision and management of fishing vessels. Protecting fishery resources and strengthening management of fishing gear.	Command-control Financially incentive Command-control	Ecological value Economic value Ecological value	

Table 1. Cont.

Period	Content	Documents	Policy Objectives	Policy Tools	Value Dimension
	Notice on further strengthening domestic fishing vessel management and implementing the system for managing total marine fisheries resources (2017, MARA)		Regulate the fishing capacity of vessels and catch, enhance the scientific and refined utilization and management of marine fishery resources, and achieve standardized and organized utilization of marine fishery resources.		
	Regulations on the administration of fishing permits (2019, MARA)		Classification, classification, and zoning control of fishing vessels		
	The 14th FYP for national fisheries development (2021, National ADF)		Enhance the organizational level of fishery production, implement scientific management of fishing vessels, and strengthen coastal law enforcement capabilities.		
	Notice on implementing fishery development support policies to promote high-quality development of fisheries (2021, MARA)		Optimize the fishery industry structure, reduce coastal fishing intensity, and protect marine resources.		

3.2.2. Mainly Based on Input Control Means

Command control is one of the commonly used policy tools [18]. In China, input control measures often need command-control tools to implement, which are commonly employed in the management of small-scale fisheries. This tool entails regulating the exploitation and utilization of fishery resources by controlling factors such as the number of individuals, fishing vessels, fishing gear, fishing grounds, fishing seasons, and fishery rights, employing government-led command and control mechanisms as a form of management [19,20]. In China, input policy tools (refer to Table 2) are characterized by the government’s ability to enforce specific measures through administrative authority, particularly in public goods with pronounced negative externalities, such as SSFs, where it plays a crucial role in safeguarding coastal fishery resources and ensuring the safety of fishery production. However, in China, the command-control policy tools exhibit deficiencies in their policy design characteristics: (1) they overlook variations in the process of policy implementation. Command and control approaches often impose uniform standards for different types of fisheries in diverse regions with varying natural characteristics, scales, operating methods, and levels of development, thus underestimating and disregarding the socioeconomic impact of SSFs; (2) they fail to address information asymmetry. The governance challenges of SSFs stem from the difficulty in obtaining data, leading to the government’s inability to acquire comprehensive, accurate, and complete information, resulting in decision making that is often flawed, thereby posing significant challenges [21,22].

Table 2. Management measures are commonly used in the management of SSFs in China.

Input Control	Purpose/Role
Management of fishing permits	Licenses serve as the only means of controlling the number of people involved in fishing.
Fishing efforts are controlled	There is a direct limitation of effort input, e.g., fishing time, traps, or trawl settings.
Closed to fishing, Closed fishing zone	conserving known populations at a specific place or time; it is usually its spawning or juvenile stage. It can also be used to control total fishing efforts, eliminating fishing from a specific group of areas or time of year.
Fishing gear restrictions	These are usually designed to control the size or type of fish being caught, for example, by adjusting the size of the mesh used in the net or trap.

3.2.3. Mainly Rely on the Management System of the Central Government

The existing SSFs management system, from the central to the local level, primarily focuses on controlling inputs based on quantitative indicators. However, there are several issues with the legal system and normative policies at all levels of government. Firstly, there is an unclear definition of SSFs and fishermen, which creates ambiguity and a lack of a solid management foundation. Secondly, local governments are not responsive to higher-level government policies. Local governments have been slow in implementing and adhering to central government policies. For instance, despite the new version of PAFL, coastal governments at all levels have not issued legal and policy documents related to the management of SSFs, nor have they made the necessary revisions in accordance with the new regulations on fishing permits.

In the current small-scale fishery management system, there is a lack of clear policy documents that provide a precise definition of SSFs. Differentiated policies are necessary to distinguish SSFs from other types of fisheries based on factors such as water type, dependency level, and historical evolution. Policy tools should be adjusted according to the specific characteristics of SSFs.

Regarding institutional arrangements, current policies have limited provisions addressing SSFs. Although PAFL has introduced several elements of SSFs management, there are no specific implementation rules at the local level. Generally, the physical characteristics, management models, and policy provisions for PAFL are similar. However, regional

differences arise due to variations in the dependence of local fishermen on SSFs, economic income, aging levels, and government support [5].

Furthermore, the enforcement and regulatory capacity of local governments significantly impact the development of SSFs. In many areas, the lack of effective regulatory mechanisms and inadequate human resources allows unrestricted fishing, resulting in resource overexploitation and environmental degradation. The trade-off between economic development and environmental protection in some local governments may also affect the sustainable growth of SSFs.

The quality of fishermen and their understanding of policies also play a significant role in policy implementation. Many fishermen lack sufficient awareness of new policies, leading to deviations in their practices. Additionally, information asymmetry prevents some fishermen from accessing timely policy information, causing them to miss out on government support.

To address these challenges, it is crucial to establish a more scientific and adaptable local management system. This includes the development of implementation rules tailored to local contexts, increased awareness and training for SSFs, and improved policy understanding and participation among fishermen. Local governments should also enhance financial support, provide necessary technical guidance, and ensure resource availability to facilitate the sustainable development of SSFs.

While central policies provide a framework and guidance for small-scale fishery development, the active participation of local governments and fishermen is indispensable. Only through collaborative efforts can we promote the healthy and orderly growth of SSFs.

3.2.4. Command-Control Model Is Dominant

In some cases, command-control management models have certain advantages, such as improving management efficiency and the execution of decisions, ensuring the uniform implementation of policies and measures, and better centralizing and allocating limited resources. However, there are also some drawbacks to this management model, including relative rigidity, information asymmetry, lack of participation and feedback mechanism, and the social governance system being overly dependent on the government's command and control means and lacking autonomy and innovation. In addition, the command-control management model leads to a lack of financial support. Some local policies on small-scale fisheries, such as Shengsi County, have introduced more specific measures, but they cannot be implemented due to a lack of funds [5]. Due to China's command-control management model, the government's budget determines the government's priorities. Therefore, local governance issues do not attract attention, and neither do policy and financial support.

For example, according to the latest PAFL [6], the authority to approve the indicators of small fishing vessels and net tools is delegated to the provincial-level fishery authorities, and the provincial-level departments are decomposed and passed on layer by layer according to the resource status of the province and the goals and policy orientations set by the higher-level government. However, at present, local governments mainly focus on reducing fishing intensity, restoring coastal resources, promoting the conversion of fishing industries, and improving the capacity building of grassroots fishing vessels in accordance with the policy directives of the central government.

Stuck in the command-control management model for a long time, China has repeatedly demonstrated the ability to "concentrate on doing big things", which reflects the long-term dominance of command and control means in China's action logic, the social governance system has formed an over-dependence on the government's management model, and the social system is scattered and lacks experience and social trust.

4. Challenges and Constraints of SSFs Policy in China

Coastal fisheries have significantly contributed to China's economic development and the well-being of its people in recent decades. They have generated numerous employment opportunities for fishermen and related workers, thereby boosting income growth in

coastal communities. In parallel, the Chinese government has prioritized marine ecological protection in coastal fisheries by implementing measures such as enhanced supervision, reduction in illegal fishing, prohibition of unauthorized fishing activities, and preservation of marine ecosystem diversity and stability.

Nonetheless, certain deficiencies in the governance of public affairs, particularly in small-scale fisheries, persist in China. These deficiencies include a lack of long-term and systematic policy support, limited management methods, and insufficient stakeholder participation. Consequently, small-scale fisheries often face challenges on the periphery of fishery management.

The PAFL introduced unprecedented regulations to oversee small fishing boats. These measures include provincial determination of the number of small fishing boats and restrictions on engine power, requirements for approval of fishing grounds in Class A waters (according to Article 23 of PAFL 2019, the marine fishing zone is divided into four categories: A, B, C, D. Class A includes the sea area of the Yellow Sea, Bohai Sea, East China Sea, South China Sea, and other sea areas on the land side of the outer boundary of closed fishing zone for bottom trawling by motorboat; Class B are Chinese and surrounding countries jointly managed fishing areas, which including Nansha sea area, Huangyan Island sea area and other specific fishery resources fishing grounds and aquatic germplasm conservation zone; Class C including the Bohai Sea, Yellow Sea, East China Sea, South China Sea and other sea areas under China's jurisdiction except Class A and Class B fishing zones. Class D fishing area is high seas), and limitations on each family obtaining fishing licenses for more than two small fishing boats. However, the government's understanding of the supporting role of SSFs in China's fisheries economics and industry remains limited.

4.1. Lack of a Sustainable Policy Framework

In the context of sustainable economic development, it is crucial to develop policies that encourage fisheries to adopt sustainable fishing techniques and management practices. This will ensure stable catches and long-term growth in the economic benefits of fisheries. Governments can provide financial support to promote the development and application of innovative technologies that reduce costs and improve the efficiency of fisheries operations. Additionally, policies should encourage the development of the fishery industry chain, provide employment opportunities, and promote economic growth and social prosperity. Developed countries have implemented various policies to support the economic growth of sustainable fisheries. For instance, the Government of Norway has introduced a system of catch quotas and fisheries permits to limit catches and ensure the sustainable use of fishery resources. They also encourage fishermen to adopt environmentally friendly fishing techniques, such as selective fishing and net selection devices, to reduce the catch of non-target species [23]. These measures not only improve fishing efficiency but also increase the economic benefits of fisheries.

In terms of sustainable social development, policies should focus on improving the living conditions of fishers and promoting the sustainable development of communities. Governments can provide training and skills upgrading programs to help fishers adapt to new fisheries management requirements. Social protection and welfare measures should also be implemented to safeguard the basic rights and welfare of fishers. Furthermore, policies should encourage the establishment of fishers' cooperatives and mechanisms for participation in fisheries decision making, enhancing community cohesion and autonomy [24–26]. Developed countries have implemented measures to improve the living conditions of fishermen and foster sustainable community development. For example, the Government of Iceland has implemented a training program for fishermen, providing them with the necessary skills and knowledge to adapt to new fisheries management requirements. Iceland has also introduced a cooperative fisheries management system that encourages the establishment of fishermen's cooperatives, fostering community cohesion and autonomy through consultation and participation in decision making [27].

In terms of ecologically sustainable development, policies should be implemented to protect fishery resources and maintain the health of marine ecosystems. Governments should formulate fishery management regulations, restrict catches, prohibit destructive fishing practices, and establish protected areas and moratoriums to restore and protect important fishery resources [28,29]. Strengthening monitoring and research efforts is also essential to understand the impacts of fisheries on ecosystems and adjust fisheries management policies based on scientific research. Developed countries have adopted a range of conservation measures to protect fishery resources and the health of marine ecosystems. For instance, the Government of Canada has established closed fishing areas and protected areas to restrict fishing activities and protect important fishery resources and ecosystems. Additionally, the Norwegian government has enhanced the monitoring of fishery activities, conducted scientific research to understand the impact of fisheries on ecosystems, and adjusted fisheries management policies accordingly to ensure the sustainable use of fishery resources [23].

4.2. Lack of Differentiated Policy Supply

We reviewed over 150 laws, administrative regulations, departmental rules, and normative documents related to fisheries in China, with a focus on the contents pertinent to SSFs (see Table 1). From a textual perspective, it is observed that most of these documents primarily center on the management of small fishing vessels, emphasizing the reduction in the number of fishing vessels and fishing intensity. Furthermore, the provisions related to the management of small-scale fisheries within China's relevant laws and policy documents are found to be quite limited. Access conditions for small-scale fishers, gear, and grounds have not been clearly defined. For instance, certain coastal provinces have not made corresponding adjustments to the content of fishing areas in marine Category A fishing areas for domestic marine small-scale fishing vessels, as outlined in the PAFL. Therefore, the operating areas of medium- and large-sized vessels and small-scale vessels continue to overlap. Additionally, traditional practices and species of small-scale fishermen have not been classified and managed. In addition to boats, manual types of work such as shore fishing, net insertion, shoveling, picking, and digging are also not adequately addressed.

4.3. Limited Data Are Difficult to Support Scientific Decision Making

For instance, in China's "People's Republic of China (PRC) Fisheries Law" and PAFL, it is stipulated that large-scale fisheries are required to fill in fishing logs, whereas small fishing vessels and manual fishing methods are not subjected to the same requirement. Furthermore, there are no other management requirements for information and data related to SSFs, neither at the national nor local level. This lack of data and dynamic information on the production process of SSF makes it difficult to achieve science-based management. Under the current Fisheries Law, the issuance of permits is supposed to be based on resource capacity indicators such as total allowable catches. However, permits are currently issued based on the number of applications by fishermen rather than the capacity of fishery resources. As a result, there are no substantial restrictions on the conduct of SSFs, making enforcement more challenging.

4.4. Insufficient Governance Capacity and Lack of Technical Assistance

The PAFL authority to approve indicators for small fishing vessels and net tools was delegated to provincial fishery authorities. This demonstrates that China's government has been transforming its functions in the context of decentralization, regulation, and service, aiming to reduce excessive intervention by the central government.

The management of SSFs primarily falls under the jurisdiction of towns and villages below the county level. However, specific fishers' organizations dedicated to SSFs have not yet been established. China's small-scale fishery sector continues to operate in a decentralized manner. The requirement for a fisherman's organization certificate to apply for a fishing license is currently replaced by the village committee or neighborhood committee

to which the fisherman belongs. However, these organizations are not specifically fishers' organizations but general grassroots self-government organizations, and their members include all residents of villages and towns. Currently, there are no grassroots management organizations specifically dedicated to small-scale fisheries. Even if they exist, they are often managed in conjunction with small, medium, and large-scale fisheries. In some cases, SSFs are excluded by fisheries organizations to avoid increasing management costs. As a result, small-scale fishers have limited participation and influence within these organizations. When faced with management decisions made by the village committee, few opinions or suggestions are put forward by small-scale fishers, and even if they are, they are often ignored in line with the principle of majority rule.

The capacity of relevant central government agencies, local authorities, and small-scale fishers themselves is crucial for the effective implementation of policies. Training programs, technical assistance, and knowledge exchange platforms can play a significant role in building the necessary skills, knowledge, and capacity to address challenges in the implementation of governance policies.

4.5. Inadequate Law Enforcement Capacity

Limited enforcement capacity presents a significant challenge to the implementation of China's marine fisheries policies. The vast coastal areas and large numbers of small-scale fishermen make it difficult for government departments to effectively monitor and enforce regulations to ensure that fishing activities align with sustainable practices. Surveys conducted in Zhejiang Province in the East China Sea have revealed that local policies often fail due to challenges in implementation [5]. The decentralized and small-scale nature of fishing activities makes it challenging for regulatory authorities to cover all fishing vessels, resulting in ineffective monitoring and enforcement of sustainable fishing practices. Consequently, some fishing activities may not meet the requirements of sustainable fisheries, thereby impacting the marine ecological environment.

Another obstacle faced by law enforcement officials is the lack of a precise definition of SSFs and the absence of a uniform definition of small-scale fishing vessels. The inconsistent criteria for judging small-scale fisheries, as evidenced by the changing caliber of small-scale fishing vessel statistics in the Fishery Statistics Yearbook over the years, has led to a lack of standardization. The classification of small fishing vessels according to length, as introduced in the PAFL, has further contributed to a lack of uniformity in the description of small-scale fisheries among fishermen, law enforcers, and other stakeholders. This lack of clarity creates challenges in law enforcement due to the absence of a standardized basis for judgment.

5. Prospects for the Governance of SSFs in China

5.1. Establish a Policy Value System for SSFs

In order to develop effective fisheries policies, it is essential to consider the economic, social, and ecological values associated with fisheries. Economic value should be regulated and scientifically utilized through market mechanisms to ensure the sustainable use of fishery resources and establish effective supervision. Social value should be achieved by understanding and meeting the needs and expectations of fishers and coastal communities while also ensuring fair and equitable distribution of resources. Ecological value emphasizes the maintenance and protection of marine ecosystems' integrity and functioning (refer to Figure 1).

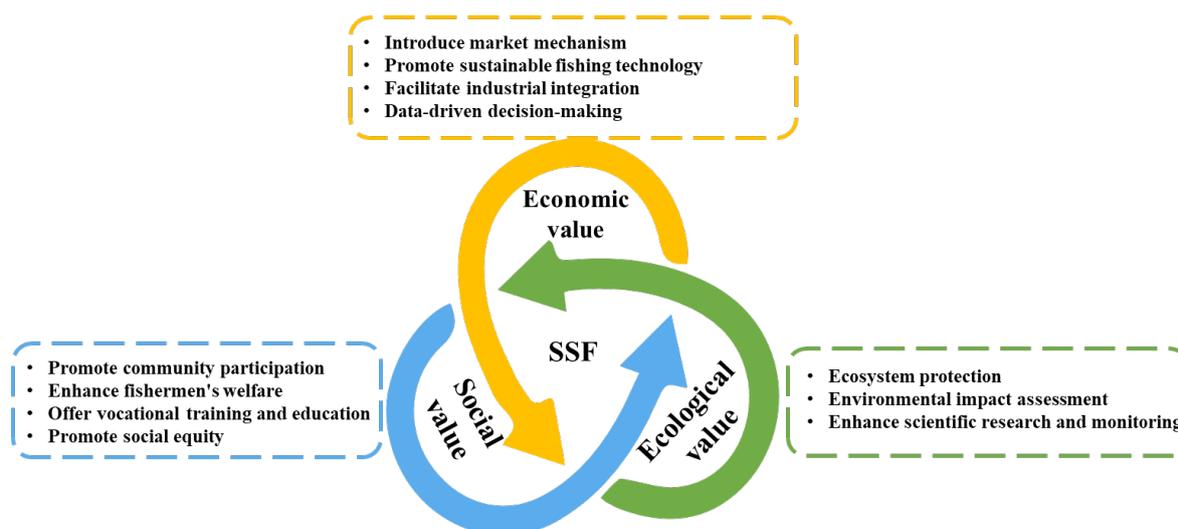


Figure 1. Value system of SSFs coastal sustainable fisheries policy.

To overcome the existing biases and imbalances in current approaches to fishery resource assessment and achieve social, economic, and institutional integration, several actions are necessary. Firstly, the assessment and management process should adopt a holistic approach that considers social, economic, and institutional aspects, not just biological aspects. This requires the involvement of multidisciplinary experts such as economists, social scientists, and policymakers to ensure diverse perspectives and interests are fully considered.

Secondly, appropriate governance mechanisms should be implemented to facilitate interdisciplinary collaboration and decision making. This may involve modifying existing fisheries management systems to integrate and balance all relevant considerations. Additionally, a transparent and participatory decision-making process should be adopted, encouraging all stakeholders to actively participate and provide their views and suggestions.

Furthermore, it is crucial to establish monitoring and evaluation mechanisms to track and assess the effectiveness of fisheries management and decision making. This will allow for necessary adjustments and improvements as needed.

In conclusion, achieving social, economic, and institutional integration is crucial to addressing the current biases and imbalances in fishery resource assessment and management. This requires involving multiple disciplines, establishing effective governance mechanisms, implementing transparent decision-making processes, and establishing robust monitoring and evaluation systems. By integrating these considerations, sustainable fisheries management goals can be achieved, leading to better outcomes and benefits for fishers, decision makers, and society as a whole.

5.2. Establish a Co-Management Mechanism of Fishery Resources Based on Fishing Community

The governance of SSFs is complex due to its characteristics of complexity, variability, publicity, and contradiction. Relying solely on the public sector to achieve positive governance results is often challenging, while the private sector, especially in the management of public resources, generally requires state support.

From the perspective of interactive governance theory, the logic of multi-subject collaborative governance aims to address the incompatibility between the traditional public management paradigm and the current times. The “Opinions of the Central Committee of the Communist Party of China and the State Council on Strengthening the Modernization of the Grassroots Governance System and Governance Capacity” issued in July 2021 emphasizes the importance of grassroots governance as the cornerstone of national governance [30]. Additionally, Central Document No. 1 in 2022 highlights the need to strengthen

the construction of rural grassroots organizations and village party committees [31]. These documents provide a framework for China's rural governance system.

In the context of SSFs governance in China, the primary responsibility lies with the grassroots government at the county level and below. While the grassroots government is at the end of the administrative chain, it serves as the ultimate implementer and an important subject in the implementation of policies and government governance systems. It acts as the connection between the state and society and directly impacts the effectiveness of government policy implementation.

Therefore, the governance of SSFs should be primarily led by grassroots governance, specifically the government at the county level and below. However, the government should not be the sole independent governance body. It is crucial to involve more participants in small-scale fisheries governance. China's proposal to realize the modernization of national governance is based on the recognition of the limitations of a government-based and single national governance subject. From a pluralistic governance perspective, China's multi-subject collaborative governance should adhere to coordinated governance among multiple subjects under the leadership of the Communist Party of China, promoting governance consensus among all relevant parties.

In 2017, China issued a notice to strengthen the control of domestic fishing vessels and implement the total management of marine fishery resources. This notice introduced the management of fishing vessels based on classification and zoning. It stipulated that the indicators for small fishing vessels and their net tools should be approved and issued by the people's governments at the provincial level, with boats below 12 m being primarily managed by township regulations [16]. The township government, as the lowest level of the national administrative system, faces constraints from the top-down administrative system while also addressing the demands of rural society from the bottom-up. Therefore, a high degree of autonomy should be granted to township grassroots governance. This approach not only resolves the challenge of managing many small and scattered small-scale fisheries but also supports management reforms related to the total management of coastal fishery resources, quota fishing, designated landing points for catches, and catch traceability systems. It further strengthens the supervision of fishery production safety. Since 2017, China has implemented pilot projects on the management of marine fishery quota fishing, with varying degrees of fishery management organization for medium and large fishing vessels and certain fish species. However, the practical results of these pilots also face numerous challenges [32,33].

Therefore, in the current fishery transformation and reform in China, the governance system for small-scale fisheries should gradually explore the establishment of a governance pattern that incorporates grassroots party organizations representing national governance, administrative governance represented by townships, social governance represented by villagers' committees, scientists, fishery industry organizations, non-governmental organizations, and market governance represented by cooperatives.

5.3. Explore Mixed Governance Models

In the model of small-scale fisheries, hierarchical governance, co-governance, and autonomy are usually adopted. Hierarchical governance is the management of the state based on political preferences, and its policy objectives are achieved through centralized management and intervention (refer to Table 3). In the selection of small-scale fishery governance models, hierarchical governance dominates [34]. In Portugal, the octopus fisheries are governed using this model, which is top-down and combined with input and output control management measures. However, this model is usually more complex in practice than it is in theory, and it shows obvious shortcomings and dysfunction in the face of complex, multi-jurisdictional, and mixed fisheries, which are difficult to solve by relying on government departments alone [34,35].

Co-governance is different from hierarchical governance in that it emphasizes the sharing of power and responsibility among multiple parties (refer to Table 3). Due to the

diversity of forms and rich connotations of joint governance [36], representative such as Japan's common fisheries management relies on two representative systems, FCAs (FCAs) and TURFs (Territorial Use Rights Fisheries, TURF) [37,38].

At the heart of the system is the definition of fishery resources as quasi-public goods, giving them a competitive and non-exclusive character. In France, the co-governance of small-scale fisheries mainly comes from the participation of stakeholders such as producer organizations, governments, markets, fishers, etc. Producer Originations (POs) play an important role in management, drafting regional fisheries management plans, and allocating quotas to the organization's members [35].

Autonomy reflects the situation in which actors take care of their own interests outside the purview of the government, and autonomy is not a capacity created by the government but is formed spontaneously [38,39]. FAO (Food and Agriculture Organization) autonomy refers to the fact that fishery actors make their own governance decisions [40,41]. The model of self-government adopted in Chwaka Bay, Tanzania, is completely controlled by local elites and does not ensure the impartial, democratic representation, participation, and identity of village-level fishermen's committees, resulting in inefficient governance [34]. However, autonomy has played a positive role in Korea, which is based on fishing communities and relies on vertical cooperation between central and local governments, as well as cooperation between local governments and fishermen and interest groups, which are prerequisites for successful governance [39].

Mix governance emphasizes the participation of stakeholders at different stages of the decision-making process and plays a greater role than ever in the governance of public affairs, in contrast to the centrally authoritative nature of the traditional, hierarchical state, thereby improving the quality and effectiveness of governance [42]. This model not only represents the mixing and interaction between governance models but also emphasizes that the three types appear in different manifestations, proportions, or combinations. Emphasis is also placed on the interaction between the state, the market, and society [36].

Jentoft et al. argue that fisheries governance is a typical pyramid system with clear boundaries and information transmission chains between hierarchies, which is clearly different from other systems [43]. He once used "roses and pyramids" as metaphors for fishery governance. The "rose" symbolizes the system formed by the alliance of stakeholders, and the groups involved in decision-making and policy formulation jointly or interchangeably become the subject or object of governance, and they prefer to achieve tangible (quota) or intangible (political stance) support through active participation. It is an ongoing process of conflict resolution [42]. The above two management systems are based on two completely different management visions; that is, the concept and principles of meta-governance, as well as the corresponding system design and social interaction, should also be different.

In fact, the diverse, complex, and dynamic nature of SSFs is at odds with a single approach to governance [34]. Most of the time, the governance of SSFs should emerge in a more complex hybrid model and evolve over time as an adaptation to changing political, economic, or ecological environments [34]. The importance of SSFs lies not in their scale per se but in their diversity and complexity in many social, cultural, and institutional dimensions, which involve natural, social, and political dimensions rather than simply technical or scientific activities. Therefore, moving towards interactive governance is an inevitable choice for China's SSFs governance model.

Table 3. The Contents and Characteristics of Different Governance Modes.

Governance Model	Connotation	Characteristics
Hierarchical governance	Based on political preferences, top-down, centralized management and intervention to achieve policy objectives [36]	Centralized, command-and-control
Co-governance	Final decision making is delegated to all partners, with the government and stakeholders sharing power and responsibilities [36]	Polycentricity and pluralism of stakeholders
Self-governance	Autonomy refers to the fact that the fishery actors themselves make governance decisions [39,41]	spontaneity
Mixed governance	When faced with the governance problem of public affairs, a variety of governance decisions, schemes, styles, or models can be used to solve the problem [23,34,42,43]	Dynamic, adaptable, diverse

5.4. Use Policy Diverse Tools for Management

In order to improve the management and sustainable development of small-scale fisheries, a mixed policy approach should be adopted. Among them, input control is mainly used as the main management tool, and the form of output control and exclusive fisheries management areas (TURFs) are tried [5,38].

Traditionally, small-scale fisheries management has relied primarily on input control, i.e., limiting the resource input required for fishing activities, such as permits, quotas, and seasonal or regional restrictions. These measures aim to control fishing efforts and catch in order to maintain the sustainable use of fishery resources. However, input control alone may not solve all the problems facing fisheries management.

Therefore, a mix of policy instruments, such as output control and exclusive fisheries management areas (TURFs), should be tried [44,45]. Output control is the management of resources based on the output of fisheries, such as setting catch caps or limiting the number of individuals of a particular species or size that can be caught in a fishery.

This approach allows for more direct protection and maintenance of fishery resources and promotes their sustainable development. Specific sea areas are designated as exclusive fisheries management areas, which are jointly managed and protected by fishermen. This form of management can increase fishers' sense of responsibility and participation in the sustainable use of resources and promote the rational use of resources. Exclusive fisheries management areas can also promote community participation and democratization of fisheries governance, enhancing the sustainability of fisheries management.

SSFs can be managed more holistically through the use of a diverse policy approach, combining input control, output control, and exclusive fisheries management areas (TURFs). This diversified management approach aims to balance the sustainable use of fishery resources with the economic interests of fishers and to improve the effectiveness and sustainability of fisheries management. At the same time, a mixed policy approach can also increase the participation and consensus of fishers and relevant stakeholders and promote cooperation and joint efforts in fisheries management. This will contribute to the sustainable use of fishery resources, promote the economic benefits of fishers, and improve the effectiveness and sustainability of fisheries management.

5.5. Enhance Data Collection for SSFs to Facilitate Scientific Decision Making

The lack of reliable and comprehensive data has been a global and long-standing issue in SSFs [34,46,47]. This problem hinders the accurate assessment of the contributions and challenges of SSFs. Additionally, we must acknowledge that the characteristics of SSFs themselves make data collection difficult.

Different methods of data collection should be employed for different types of fisheries. In small-scale fisheries, maintaining fishing logs can be a challenging task. Therefore, we can ask fishermen to report data such as catch, catch volume, fishing areas, and trip

durations to the fishing community upon their return to the fishing port. Furthermore, data regarding small-scale fisheries, including information on fishing vessels, fishing gear, practitioners, sales and distribution of catches, costs, and outputs, can be collected through monthly, quarterly, and annual surveys conducted by fishermen organizations. We can establish a database for these data and ensure its dynamic maintenance. Additionally, video monitoring devices can be used to gather data and enable real-time monitoring.

By employing these methods, we can gradually address the data collection challenges in small-scale fisheries, provide more accurate and comprehensive data support for scientific decision-making, and promote the sustainable development of SSFs.

6. Conclusions

The management of small-scale coastal fisheries is an area with multiple economic, social, and ecological objectives. China promotes the orderly management of coastal fisheries through a fishing licensing system. However, due to the multiple internal and external contradictions of fisheries, focusing only on a single value dimension, management mode, and means cannot alleviate the decline in nearshore fishery resources but poses a challenge to the resources and environment on which traditional fishermen rely for long-term survival. Although China's governance policies for small-scale coastal fisheries are improving, they still face challenges and limitations. With the development of other coastal industries, higher requirements are put forward for the management of coastal fisheries. The government should gradually raise the awareness of sustainable coastal fisheries, extend the policy focus from focusing on ecological values to social and economic values, enrich the governance subjects, adopt flexible governance models, increase the diversity of policy instruments, and improve the governance efficiency of coastal small-scale fishing fisheries.

Through continuous exploration and reform, the Chinese government is moving towards differentiated, refined, and scientific fishery management, which provides new opportunities for improving the management of SSFs in China. However, government knowledge of SSFs is still limited, and research and understanding of them need to be strengthened, as well as more comprehensive policy support measures to promote stakeholder engagement. Only in this way can the challenges of sustainable development of small-scale fisheries be addressed more effectively.

Under the framework of the Sustainable Development Goals (SDGs), the sustainability of fisheries is broader, covering not only the concept of sustainable fisheries but also the sustainable development of the entire fishery system, including the sustainability of the fishery industry chain, the sustainable development of fishing village communities, the livelihood of the fishery workforce, and the sustainability of fishery management policies.

Therefore, China's coastal sustainable fisheries policy should focus more on economic, social, and environmental considerations. This requires the government to gradually raise its understanding of sustainable coastal fisheries and adopt a variety of measures, including enriching the value of policies, increasing the number of governance subjects, and flexibly using governance models and diversified policy instruments to improve the governance efficiency of SSFs.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/fishes9110451/s1>, Table S1: Policies names, release years, and references.

Author Contributions: Conceptualization, M.X. and Z.W.; Methodology, M.X. and Z.W.; Writing—original draft, M.X.; Writing—review & editing, Z.W.; Revision to address the Reviewers' comments, M.X. and Z.W.; Restructure of the manuscript and its revision, G.Q. and K.J.; Writing—reviewing and Editing, N.Z. and W.J. All authors have read and agreed to the published version of the manuscript.

Funding: We are grateful for the support of the Central Public-interest Scientific Institution Basal Research Fund, ECSFR, CAFS (NO. 2022QT01). National Natural Science Foundation of China (32201298). Financially supported by the Laoshan Laboratory (No. LSKJ202201804).

Acknowledgments: We thank all the participants for sharing their time, knowledge, and experience. We are grateful to anonymous reviewers for constructive comments.

Conflicts of Interest: The authors declare no conflict of interest.

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