

Essay

The Control of Microplastic Pollution in Semi-Closed Seas: Good-Faith Cooperation and Regional Practice

Mingfei Ma * and Xinyang Liu

Law School, Dalian Maritime University, Dalian 116026, China

* Correspondence: mamingfei@dlmu.edu.cn; Tel.: +86-0411-84724278

Abstract: The impacts of microplastic (MP) pollution in the marine environment have already been illustrated by natural science. The issues resulting from MPs have revealed the problem of the current international governance arrangement, and international agreements are found to be inadequate to curb the growing MP pollution. This article explores reasons for the failure of governance cooperation from legal normativism and positivism. By analyzing the semi-closed sea system in the UNCLOS, this article concludes that the principle of good faith makes it possible to moderate geographic political tensions during cooperation and help reach an agreement on matters of mutual concern. Then, from the perspective of regional ocean governance, propose strategies for states bordering semi-enclosed seas and others to gradually control MP pollution in the marine environment through legal and policy measures.

Keywords: marine microplastic pollution; semi-closed sea system; regional marine governance; good-faith cooperation



Citation: Ma, M.; Liu, X. The Control of Microplastic Pollution in Semi-Closed Seas: Good-Faith Cooperation and Regional Practice. *Sustainability* **2023**, *15*, 12412. <https://doi.org/10.3390/su151612412>

Academic Editor: Anmin Duan

Received: 10 July 2023

Revised: 11 August 2023

Accepted: 14 August 2023

Published: 15 August 2023



Copyright: © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Threats emerging from MPs in the marine environment, which pose threats to biodiversity, marine ecosystems, and human health, have become a global ocean issue [1]. Generally, MPs can be defined as plastic particles or fragments with a diameter of less than 5 mm [2]. According to the relevant ocean data model, the quantity of MPs accounts for more than 90% of global marine plastic particles, and the overall weight of microplastic pollution is simultaneously rising [3]. Because of the properties of persistent organic matter, MPs will persist in the marine ecosystem for a long time. Then, the ocean will become the ultimate gathering place for plastic waste and MPs. Current research has indicated that the accumulation of MPs can cause damage to ocean creatures. They can be ingested by marine species from zooplankton to senior mammals, including seaweed, fish, sea turtles, and cetaceans, thereby impacting their immune and reproductive systems [4–9]. MPs have been detected in common seafood, and they may compromise food security, food safety, and consequently human health [10]. The sources of MPs are diverse, such as synthetic fibers, rubber tires, personal care products, and the natural degradation of plastics [11]. The international community discharges about 8 million tons of plastic waste into the marine environment every year [12], and these will eventually split into MPs through physical or chemical processes. Microplastics have been observed on the shore, sea surface, and seabed, but ocean gyres, estuaries, and other coastal waters are the most polluted areas [13–15]. Existing studies mostly confirm the impact or threat of MPs on marine ecosystems from the perspective of natural science, and less research on its governance issues from the field of humanities and social sciences.

All states are morally obligated to adopt the necessary measures, whether coastal or land-locked, to protect the marine environment from the harmful effects of MPs. Practices to control MP pollution have become an important topic for the international community. The present studies focus on the impact or risk of MPs enrichment on marine ecosystems

but ignore the research on the international legal framework and regional practice. The existing international agreements lack a coordination mechanism which thus resulted in a fragmented governance structure [16]. The governance of MP pollution in the marine environment needs to start primarily from the regional ocean. This article takes semi-enclosed seas as the logical starting point for research on MP pollution control and specifically analyzes the cooperation mechanisms and governance practices within the framework of the semi-enclosed seas system from the perspective of regional ocean governance. It is envisioned to conclude the solutions to control MP pollution in semi-closed seas with the research of multiple issues, including the rights of geographically disadvantaged states, the practices of functional jurisdiction waters, and the management of land-based pollution.

2. MP Pollution in Semi-Closed Seas under the Global Marine Governance

Global marine governance often starts from regions. MPs are of environmental concern because their size renders them able to be ingested, with impacts on physical and toxicological harm [17]. The issue of MPs has increasingly become an important part of global marine governance. In accordance with the provisions of international agreements, necessary measures shall be taken for the states bordering semi-closed seas to reduce the emission of MPs.

2.1. MP Pollution in Semi-Enclosed Seas

The term semi-closed sea is defined in Part IX of UNCLOS, which means a gulf, basin, or sea surrounded by the land territory and connected to another sea or the ocean by a narrow channel or consisting entirely or primarily of the territorial seas and exclusive economic zones. The Mediterranean Sea, the South China Sea, the Black Sea, and the Baltic Sea are typical semi-enclosed seas. Because of the distinguishing semi-enclosed morphology and various plastic waste emission originating from surrounding countries, the semi-enclosed seas are highly vulnerable to MP pollution, such as the Mediterranean Sea, which is approximately four times bigger than the North Pacific Ocean [18]. In the South China Sea, large quantities of MPs were found on the surface, the distribution pattern of which presented a strong terrestrial impact [19]. Semi-closed seas are deeply affected by human activities; MPs are discharged directly or indirectly into the marine environment by humans, harming the normal conservation order of the coastal states.

The protection of the marine environment is a basic international law obligation of all states, and they were reminded to pay more attention to the risk of MPs to the ocean at international conferences. MPs are known to be harmful to the marine ecological environment, causing function damage or the death of marine animals and plants when ingested in large quantities. They can transfer between various media in the marine environment and eventually accumulate in the biological chain with their special chemical properties [20]. The damage caused by MPs to marine organisms has a definite causal relationship, and the risk to the marine ecological environment extends into the future. The principle of precautionary action is a new legal response to scientific uncertainties to avoid the paralysis of decision-makers when confronted with uncertainty, and we should not wait for conclusive proof of environmental harm before adopting appropriate avoidance measures [21]. Based on this principle, coastal countries of semi-enclosed seas shall take measures to control the spread of MP pollution in the region. The MP pollution to be governed is a matter of common interest in semi-enclosed seas, which represents global marine governance practice at the regional level.

2.2. International Legislation on MP Pollution

The control of MP pollution in semi-closed seas depends on the global marine governance framework and relevant international legal documents providing guidelines for coastal states to take action in the region. The existing international conventions, such as UNCLOS, the Stockholm Convention, the Basel Convention, and the London Convention, can guide the coastal states' governance actions. According to the UNCLOS (Article 192 to

Article 196), all states are obligated to protect and preserve the marine environment, so the international community needs to establish a comprehensive legal framework for the regulation of ocean industries and land-based pollution [22]. The Stockholm Convention on POPs is a legally binding instrument for environmental protection, which strives to eliminate persistent organic chemicals worldwide by either prohibiting their production and use or gradually reducing them [23]. The norms of international law can regulate the behavior of member states and promote cooperation in marine affairs in semi-closed seas.

It will become a model of global marine governance if MP pollution can be controlled in semi-closed seas because the cooperation of coastal states has a realistic interest in marine environmental protection. The Stockholm Convention emphasizes that persistent pollutants are toxic, difficult to degrade, and can be enriched and accumulated in the ecosystem, and MPs are, of course, within the category of persistent organic pollutants. The Basel Convention and London Convention make special provisions for the cross-border transfer and dumping of hazardous wastes at sea and try to reduce and control the pollution that may come from human life to the sea. It aims to promote the collective cooperation of sovereign states in protecting the marine environment. It should be reminded here that there are no specific provisions regulating MP pollution in the current effective international legal documents.

2.3. Fragmentation of MP Pollution Control Norms

The dilemma of MP pollution control is mainly manifested in the principled and fragmented governance norms. Not all potential issues can be finally resolved in the form of a treaty, because the members of the international community have irreconcilable differences of opinion, and the ambiguous text or omission of some important issues becomes a prominent feature of some important international legal documents [24]. The norms that coastal states rely on only declare what they should do, with no stipulating penalties. The principled provisions cannot deal with the potential risks posed by microplastics. UNCLOS, as the core of the global marine environmental protection framework, cannot impose sanctions on the parties when they have not fulfilled their marine environmental protection obligations. Relevant international documents only stipulate that coastal states have the general obligation to preserve the marine environment or take necessary measures to deal with the marine pollution problem in the region, but there are ambiguities in the measures on MP pollution control.

The fragmentation of governance rules is the main manifestation of current global ocean governance, which is embodied by the fact that ocean governance rules come from different types of international treaties and customary international law [25]. The issues resulting from plastic waste in the marine environment illustrate a general failure to control this pollutant on both land and at sea, and no legally binding international agreement exists to address the potential impacts on the environment and human health [26]. Some of the content cannot meet the needs of current ocean governance due to the discrepancy in its historical background. On the issue of MP pollution in the marine environment, the governance rules are scattered among many international treaties such as marine environmental protection, garbage pollution management, and biodiversity protection. Coastal states need to invoke the contents of the abovementioned different types of international treaties, respectively, or apply them by analogy. The international treaties are all formulated under their specific historical background, focusing on imposing general obligations on parties to protect the marine environment and human survival, and consequently lack specific applicable content for MP pollution.

3. Inherent Obstacles and Good-Faith Cooperation in the Prevention of MP Pollution in Semi-Closed Seas

The control of MP pollution is closely related to the conservation of marine living resources, but it is limited by the legal ownership disputes caused by geographical circumstances in the semi-closed region. The principle of good faith in the semi-enclosed sea

system can ease geopolitical tensions and promote cooperation in marine environmental protection among coastal countries.

3.1. Geographical Disadvantage Hinders the Government Cooperation

The issue of maritime delimitation influences the willingness of coastal states to cooperate on the topic of marine MP pollution. The overlapping conflicts of claims have resulted in tensions in geopolitical relations. Although there is no unified comprehensive standard for the identification of geographically disadvantaged states, the international community generally agrees that the states bordering semi-closed seas belong to the category of geographically disadvantaged states [27]. If the coastal states all claim the maximum scope of waters under their jurisdiction, their claim is bound to be restricted by the narrow geographical conditions of the semi-closed seas. The overlapping claims of adjacent or opposite states have become a common phenomenon in the semi-closed sea area. The conflict of delimitation caused by the disadvantaged geographical conditions has brought challenges to maritime governance cooperation in semi-closed seas. It has become an obstacle to the practical prevention of MP pollution since the expansion of jurisdiction claims has impacted the integrity of marine affairs management in semi-closed seas.

The geopolitical environment affects the effectiveness of regional marine governance, and conflicts over the delimitation of the territorial sea or the exclusive economic zone aggravate the distrust of regional marine governance. The coastal states are unable to reach an agreement on the solution of specific marine problems. At the same time, there is an irreconcilable contradiction between national interests. The integrity of marine environmental protection often limits the access of coastal states to the maximum marine interests in the area. Although the control of MP pollution is beneficial to the common interests of all coastal states, even rational individuals would not cooperate if their interests were at risk. In reality, the action is to participate with inertia and prepare to sacrifice the overall marine environment for domestic interests. The complex geopolitical circumstances aggravate the ambivalence of the coastal states on matters of marine pollution control.

3.2. National Responsibility for Controlling MP Pollution

The key to the ocean government lies in the fulfillment of national responsibilities. Coastal states have the national responsibility to control MP pollution in semi-closed seas. The protection of the marine environment within the framework is the responsibility of the state; they need to take reasonable actions to prevent marine pollution [28]. Admit it or not, it is fundamentally related to their most basic marine interests. The rights are practical only when linked with the performance of obligations. Coastal states have the primary responsibility for regulating marine MP pollution, and their priority marine rights in the semi-closed seas may be recognized by the international community. Coastal states have a definite jurisdictional responsibility for MP pollution in semi-closed seas. They enjoy full exclusive rights within the determined territorial sea and the dominant right for natural resources in the exclusive economic zone; therefore, it is justifiable and necessary to control MP pollution in the jurisdictional area. There is no essential difference in the national governance responsibility of coastal states for protecting the marine environment in territorial waters or exclusive economic zones.

The semi-closed seas involve the division of territorial waters or exclusive economic zones of two or more states. The coastal states have direct responsibility for the governance of environmental matters in these waters, and sea areas with overlapping claims or uncertain ownership of rights shall be governed by the coastal states through consultation. The responsibility endowed by the international conventions on the coastal states is obligatory, and it urges countries to take any action necessary for the preservation of the marine environment. Meanwhile, MP pollution is an issue within the domestic jurisdiction of the coastal state, which is usually regulated by the domestic legal system. MP pollution is increasingly threatening the marine interests enjoyed by coastal states in the region. The full implementation of national responsibilities is the prerequisite for the enduring interest

of the countries in semi-closed waters. If the states refuse the prompt prevention of marine MP pollution in the areas and wait on the sidelines for others to take action, it will breach both the trust and willingness to cooperate among regional states.

3.3. *Obligation to Cooperate in Good-Faith*

The obligation to cooperate in good faith is the core content of the semi-closed seas system. It requires states bordering semi-enclosed seas to perform their rights and obligations under international conventions honestly and sincerely. The semi-closed seas system is a special provision of UNCLOS, which consists of two special provisions: the definition and cooperation of states. It establishes the obligation of states to collaborate with good faith when protecting the marine environment in the form of the text of the Convention [29]. It is linked to Part XII of the Convention, “Protection and preservation of the marine environment”, and the states bordering semi-closed seas should cooperate in their performance of duties under the Convention. UNCLOS sets a persuasive proposal for states, although it does not have any mandatory legal obligations [30]. It means that coastal states should promote cooperation with good faith in semi-closed sea regulation. MP pollution has become independent of traditional plastic waste. MPs cause problems with mechanisms such as entanglement and ingestion and may also carry various toxins that threaten the development of biological resources [31]. The prevention and control of MP pollution is an important part of regional environmental well-being.

The geographically close states can apply common legal systems to manage regional marine matters. Good-faith cooperation is the application of the legal system in real practice, and participation in regional cooperation is an example of the coastal states fulfilling their obligations under international law. In fact, the semi-closed seas system recognizes the special interests of coastal countries in the region in the form of treaties and encourages them to perform the rights and obligations of the convention in good faith. Conservation will ultimately benefit the development of marine resources and marine scientific research. In the fieldwork of protection, the states bordering the Mediterranean Sea have so far shown imagination and flexibility in adopting advanced legal instruments, including the dumping protocol, the land-based protocol, and the waste protocol [32]. Under the construction of international legislation that encourages regional cooperation, the semi-closed seas system provides a theoretical legal basis for coastal states to control MP pollution. It also clarifies that the states should cooperate in good faith in regional environmental protection.

4. Functional Jurisdiction and Regional Practice of MP Pollution

Marine pollution control and conservation of living resources have become the main contents of functional jurisdictional waters. Regional practices can provide a rich experience for marine environmental protection in semi-closed seas, and the whole semi-closed sea can be designated as a cooperative space for controlling MP pollution.

4.1. *Functional National Jurisdiction of the Sea Areas*

Various legal systems existing in human society are effective norms selected from various social lifestyles and eventually become effective and stable institutional experiences tested over time [33]. The practice of functional national jurisdiction waters initiated by Mediterranean states created a model for cooperation in the control of marine pollution. To ease conflicts over maritime delimitation, France, Italy, and other Mediterranean states have jointly established specially protected areas on the marine environment and biological resources in the region, carrying out collective cooperation on matters of common interest such as marine environmental protection. MPs will inevitably lead to a serious marine ecological crisis at a certain time point in the future, and the states bordering semi-closed seas need to learn from regional practices and prepare for potential maritime crises.

The practice of functional national jurisdiction waters can unite coastal states to reach a consensus on the issues of MP pollution and avoid the absence of responsibility for marine environmental protection due to the uncertainty of the jurisdiction of the sea areas.

The control of MP pollution can be included in the content of the practice of functional jurisdiction waters. At the same time, the practice is compatible with the obligation of the coastal states to cooperate in semi-closed seas, which is a necessary attempt by the states to protect the marine environment in the region to achieve the conservation of biological resources. MP control is not only the protection of the overall marine ecological environment but also the necessary measures for coastal states to conserve regional marine resources. The practice provides a good example of cooperative marine environmental protection in the semi-closed seas area and integrates the strength of regional marine governance on matters endangering common interests.

4.2. Cooperation for MP Pollution Control in Semi-Closed Seas

The states bordering semi-closed seas have an international obligation to carry out practical cooperation in the fields of the protection of the marine environment, the management of marine resources, and the joint research of marine science. The duty to cooperate is the strongest in the realm of international environmental legislation and thus of direct significance to one of the three topics addressed in Article 123 of UNCLOS, marine pollution [34]. International organizations are often the media for the government's cooperation in semi-closed seas. Due to the connectivity of the marine ecosystem, coastal states need to jointly discuss the protection activities relevant to the marine environment. The effect of regional cooperation depends on the different needs and implementation capacities of states in marine environmental protection [35]. Operational consensus should be reached on the solution to MP pollution through voluntary participation and negotiation.

The marine ecosystem is characterized by the high interconnectivity and interdependence of species inhabiting it, so the fulfillment of the obligation to cooperate on a regional basis is a prerequisite for the effective protection and preservation of the marine environment [36]. Coastal states naturally form a close relationship with the bordering semi-closed seas, and the governance of MP pollution is related to the common interests of the whole area. The semi-closed seas system is a typical system of regional marine governance, which provides a basic framework to solve the problem of MPs. Regional cooperation has obvious advantages in solving low-sensitivity issues, which can improve the effectiveness of setting examples for global marine governance rules and enhance the sense of responsibility for protecting the marine environment. Regional cooperation has made the Conventions more applicable and detailed, so as to effectively improve the ability of global marine governance rules to respond to potential marine crises. The coastal states are able to reach a cooperation framework structure for regional marine governance, which is the result of the common self-selection of all states, and a sense of responsibility for regional marine environmental governance in the process of normative identification is fostered.

4.3. The Practice of MP Pollution Control in the Semi-Enclosed Seas

The control of MP pollution depends on the marine environmental protection actions in the semi-closed sea area. In order to prevent the impact of human activities on the overall environment of semi-closed seas, the major semi-closed sea areas have established a cooperation framework with regional agreements as the foundation, such as the Barcelona Convention in the Mediterranean region, the OSPAR Convention in the Northeast Atlantic region, and the Helsinki Convention in the Baltic Sea region. The Fanplesstic-Sea is a distinct plan to prevent MP pollution launched in the Baltic Sea region, which proposes to prohibit the use of plastic beads in personal care and other measures to prevent and reduce pollution caused by MPs [37]. The coastal states take the lead in carrying out inter-regional national negotiations on specific marine affairs, from fishery resource protection, oil leak prevention, and other separate matters, to the signing of the convention on the integrated marine ecological environment protection of semi-closed seas. The Mediterranean coastal states give priority to phasing out the use of toxic, persistent, and easily bioaccumulated substances in their legislation, to which the microplastic substances clearly conform [32]. Italy publicly informed the European Union that it would gradually ban and eliminate

the MP particles in cosmetics and detergents, while Sweden, as one of the Baltic coastal states, would reduce the pollution of artificial MP particles by issuing a ban on the sale of cosmetics containing plastic particles [38].

International organizations have actively participated in the governance cooperation of MP pollution in semi-closed seas through the establishment of a multilateral mechanism to gather the governance consensus of parties on marine environment protection. It has become the main means of prohibiting the manufacture and sale of cosmetics containing plastic microbeads in the form of laws and policies to reduce the emission of MPs [39]. The resolution of the United Nations Environment Assembly on marine garbage and microplastic pollution provides basic policy guidance for marine microplastic prevention and advocates the sustainable development of marine ecology through the formulation of legally binding agreements [16]. The European Union region is adjacent to many semi-closed sea areas. It has issued legal documents such as the European Plastic Strategy in the Circular Economy and the European Green Agreement to manage plastic products, focusing on strictly controlling the entry of MPs into the sea from the source in an all-around way. The regional marine action plan launched by the United Nations Environment Programme is an important environmental protection action in the semi-closed sea area. It requires the states to reduce and control the impact of pollutants from the land and promote the inclusion of MP pollution into the scope of regional marine governance practices. In addition, the Statement on the Joint Government of Marine Plastic Wastes, the Action Initiative on Marine Garbage, and the Bangkok Declaration on Combating Marine Garbage issued by the East Asia Summit made arrangements for plastic waste management. International organizations are actively promoting regional marine environmental protection, which has become an important driving force for cooperation in the control of MP pollution.

5. The Strategy of MP Pollution Control in Semi-Closed Seas

The control of MP pollution in semi-closed seas depends on an effective cooperation framework. In the absence of a specialized international convention on the MPs, coastal states should expand the application of the general legal principles of marine pollution governance and build the implementation mechanism through multilateral governance practices.

5.1. Core Framework—Enact Binding Regional Agreements

Regional agreements are the key institutional arrangements to control pollution in semi-closed seas. It is the blueprint for the overall planning of marine environmental protection. The written documents reflect the consensus on the protection of the marine environment and are the direct legal basis to cooperate in the restriction of microplastic emissions. An effective regional agreement covers the national jurisdiction responsibility, the cooperative governance system, and the specific commitment arrangements, including the interregional mechanism of marine environmental monitoring and information sharing, the law enforcement and judicial mechanisms, the joint research of marine science, etc. Although the international community has begun to pay attention to the impacts of MPs in the natural environment and begun searching for measures under individual treaties and soft law instruments, it still has a long way to go in promoting international legislation on the prevention and control of global plastic pollution [40].

The states bordering the semi-closed seas need a binding legal system to take measures to prevent, reduce, and control pollution from MPs. Entities should consider incorporating the issue of MP pollution into the framework through the form of annexes and coordinating the steps of its control under the existing framework of marine cooperation. Even though the ocean regime centered in UNCLOS has failed to prevent the problem of marine plastic pollution, UNCLOS Part XII contains specific rules and norms related to land-based pollution that provide a basis for formulating a binding global plastics treaty [41]. It is time to adopt a plastics treaty that is contracted by the members to ensure their rights to participate in regional marine affairs on an equal basis. Treaty design is a key determinant of success

for plastic regulatory regimes, so the issue-linkage to the international plastics trade, the lifecycle of plastics, and the principle of state responsibility should be the elements of treaty design [42]. The provisions of the agreements should be accepted or absorbed as a formal domestic legal system for the control of MP pollution. By the practices commonly adopted by the international community, the states should be carried out to regulate the MP pollution problems.

5.2. Realistic Path—Expand the Application of General Principles

In the absence of restrictive international norms, the states bordering semi-closed seas should expand the application of the general legal principles of marine pollution control, gradually make effective policies or laws, and build a comprehensive framework to control microplastic pollution [43]. The marine environmental protection principles generally recognized by the international community can temporarily substitute for mandatory rules. Coastal states generally need to invoke the general provisions of the Convention or specify the basic principles of marine environmental protection or solid waste management. They shall apply the principles of risk prevention and damage prevention, which means that sovereign states should not limit or fail to take necessary control measures on the grounds of a lack of scientific certainty when the relevant substances have the possibility or risk of causing a marine ecological crisis. It aims at the current damage caused by MPs and the uncertain risks in the future and requires the states to take the necessary actions actively assume their due marine governance obligations.

The application of the principle of common but differentiated responsibilities is to recognize the differences in the actual governance capacity of the coastal states. The differences do not exempt them from their common governance obligations. Sovereign states could apply different governance standards according to their specific practical capabilities, so as to promote universal cooperation in the governance of regional environmental pollution. The principle of sustainable development is the purpose and destination of the control of MP pollution in semi-closed seas. The reduction in MPs is closely related to the conservation of biological resources, which can solve the problem of intragenerational marine resources equity in the region. The principles serve an essential function in regime-building, bridging legal, and governance processes to identify new strategies and strengthen their connections to the diversity of instruments and institutions involved in addressing a multifaceted problem [44]. By expanding the application of the basic principles of marine pollution government, the states can gradually build a cooperation framework to assure the durable survival and development rights of coastal populations.

5.3. Means of Reduction—Accelerate the Technological Research of Marine

Science and technology innovation and application are prerequisites for the evolution of global ocean governance [45], and the degradation of MPs in the marine environment requires science and technology. The reduction in MPs is mainly a technical problem that depends on the support of advanced technology. The main reason for the increasing seriousness of MP pollution is that the current technology cannot effectively deal with it. The purpose of marine scientific research is to understand, manage, and effectively process marine information to utilize and protect the ocean [46]. The control of MP pollution requires scientific progress to update the current means of marine governance, such as the recovery, degradation, and disposal of plastic products. It is necessary to cultivate a mature, conscious community to monitor and evaluate the regional environmental pollution situation [47]. The protection of the marine environment also needs to attach more importance to marine scientific research in the semi-closed sea area.

The construction of a cognitive community provides an effective solution to marine microplastic pollution. Although increased scientific interest has revealed that MPs are a ubiquitous and widespread marine contaminant, other fundamental questions and issues remain unresolved [48], such as strengthening the joint research on marine science to promote the understanding of natural sciences related to MP pollution among regions and

jointly improve the scientific management level of regional environment protection. At the same time, we encourage the sharing of relevant plastic technologies in coastal states, gradually replacing relevant plastic products with green environmental materials, and minimizing the discharge of plastic waste and MPs [49]. In accordance with the relevant provisions of the convention, it is necessary to establish a legally binding cooperation agreement to ensure the marine scientific research rights enjoyed by coastal states in the region [50]. To solve the problem of MP pollution, the states bordering the semi-closed seas need to jointly improve the research level of marine science to protect marine ecological stability.

5.4. Effective Measures—Strictly Control the Total Amount of Plastic Waste Entering the Sea

Plastic waste in the terrestrial environment is the main source of MPs in semi-closed seas. It is a visible manifestation that the abundant MPs at the estuaries of rivers are generally higher than those in other sea areas. Land-based marine pollution is a result of the imbalance between human populations and industrial activities, and the limited capacity of the maritime environment to absorb the waste they produce [51]. The prevention and control of land-based pollution is an international obligation that the UNCLOS clearly assigns to each contracting party. All states must undertake the obligation to take appropriate measures to prevent the pollution of the marine environment from land-based sources. Coastal states need to control the channels of plastic waste into the sea through strict legal and policy measures and gradually reduce the total amount of MPs discharged into adjacent waters. Environment monitoring is the basis of action, which describes the processes and activities that are required to characterize the status of the environment, and the Norwegian government has developed strategic research for MPs with multi-actor communication [52]. Plastic litter and MPs affect marine systems at different levels, ranging from impacts at the individual to the population and ecosystem levels, so it is necessary to establish national and regional programs to monitor plastic-related risks in the maritime environment or support monitoring initiatives carried out by scientists [53]. Collaboration between governments and the science community can develop a more effective monitoring framework to address this pressing issue of MPs and provide more useful information, such as the distribution of pollutants, hazards, and feasible control measures, for governance actions on a global scale.

Controlling the behavior of plastic garbage entering the sea from the source is an effective measure to control MP pollution in semi-closed seas. The coastal states need to adjust their legal systems and social policies related to the management of the whole life cycle of plastic products because plastic waste can split into MPs after a long time of physical and chemical reactions. The implementation of legislation related to marine environmental protection and waste disposal should be strengthened, and the entry of plastic waste into the sea should be jointly controlled and reduced by any possible means. Due to the limitations of contemporary technologies, it is still expensive to salvage or degrade MPs in the marine environment. The effective strategy for the states is to integrate the existing domestic regulatory resources and reduce the total amount of plastic waste discharged by using legal systems, social policies, and other tools [54]. Therefore, controlling the plastic waste entering the sea is a reasonable choice for coastal states to prevent MP pollution in semi-closed seas.

6. Conclusions

It is a typical regional practice of global marine governance to prevent MP pollution in semi-closed seas. In accordance with international legal documents, the states can independently arrange actions for marine governance in the semi-closed seas through regional agreements. International organizations are capable of connecting the region and participating in promoting the construction of mechanisms in the semi-closed seas. The control of MP pollution is the common responsibility of all states, and only one state cannot solve the real marine threat in the region. Solving the issue of MPs requires an

effective regional cooperation mechanism, and the control of microplastic pollution in the semi-closed seas can be used as a model for the prevention of global marine pollution.

MP pollution in the marine environment is typical land-based pollution. The strict control of plastic waste entering the sea is an effective strategy to reduce the rapid spread of microplastic pollution. Through the innovation of regional legislation and mechanisms, the updating of relevant global marine governance norms can be promoted. International legislation to deal with marine plastic waste and MP pollution can be formulated in due time. The states need to attach importance to the application of the general legal principles of marine pollution control and enhance the political consensus among regional states on the control of MP emissions. Building a cooperative framework through regional agreements is a key step taken to protect the sustainable development of the marine environment and biological resources in semi-closed seas.

Author Contributions: M.M. was responsible for conceptualization, methodology, software, validation, supervision, project administration, funding acquisition, and writing—review and editing. X.L. was responsible for formal analysis, investigation, resources, data curation, visualization, and writing the original draft. All authors have read and agreed to the published version of the manuscript.

Funding: This paper was supported by “the Fundamental Research Funds for the Central Universities” (3132022610); This paper was supported by the Centre for Excellent Chinese Maritime Culture Translation under Grant (2022WYZXA04).

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

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

References

- Onyena, A.P.; Aniche, D.C.; Ogbolu, B.O.; Rakib, R.J.; Uddin, J.; Walker, T.R. Governance Strategies for Mitigating Microplastic Pollution in the Marine Environment: A Review. *Microplastic* **2022**, *1*, 15–46. [\[CrossRef\]](#)
- Wagner, M.; Scherer, C.; Alvarez-Muñoz, D.; Brennholt, N.; Bourrain, X.; Buchinger, S.; Fries, E.; Grosbois, C.; Klasmeier, J.; Marti, T.; et al. Micro-plastics in freshwater ecosystems: What we know and what we need to know. *Environ. Sci. Eur.* **2014**, *26*, 1–9. [\[CrossRef\]](#) [\[PubMed\]](#)
- National Library of Medicine. Available online: <https://pubmed.ncbi.nlm.nih.gov/25494041/> (accessed on 10 July 2023).
- Cole, M.; Lindeque, P.; Fileman, E.; Halsband, C.; Goodhead, R.; Moger, J.; Galloway, T.S. Microplastic Ingestion by Zooplankton. *Environ. Sci. Technol.* **2013**, *47*, 6646–6655. [\[CrossRef\]](#) [\[PubMed\]](#)
- Wootton, N.; Reis-Santos, P.; Gillanders, B.M. Microplastic in fish—A global synthesis. *Rev. Fish Biol. Fish.* **2021**, *31*, 753–771. [\[CrossRef\]](#)
- Duncan, E.M.; Broderick, A.C.; Fuller, W.J.; Galloway, T.S.; Godfrey, M.H.; Hamann, M.; Limpus, C.J.; Lindeque, P.K.; Mayes, A.G.; Omeyer, L.C.M.; et al. Microplastic Ingestion Ubiquitous in Marine Turtles. *Glob. Change Biol.* **2018**, *25*, 744–752. [\[CrossRef\]](#)
- Lusher, A.L.; Hernandez-Milian, G.; O'Brien, J.; Berrow, S.; O'Connor, I.; Officer, R. Microplastic and Macroplastic Ingestion by A Deep Diving, Oceanic Cetacean: The True's Beaked Whale *Mesoplodon mirus*. *Environ. Pollut.* **2015**, *199*, 185–191. [\[CrossRef\]](#) [\[PubMed\]](#)
- Sharifinia, M.; Bahmanbeigloo, Z.A.; Keshavarzifard, M.; Khanjani, M.H.; Lyons, B.P. Microplastic Pollution as A Grand Challenge in Marine Research: A Closer Look at Their Adverse Impacts on the Immune and Reproductive Systems. *Ecotoxicol. Environ. Saf.* **2022**, *204*, 111109. [\[CrossRef\]](#)
- Chen, J.C.; Chen, M.Y.; Fang, C.; Zheng, R.H.; Jiang, Y.L.; Zhang, Y.S.; Wang, K.-J.; Bailey, C.; Segner, H.; Bo, J. Microplastics Negatively Impact Embryogenesis and Modulate the Immune Response of the Marine Medaka *Oryzias melastigma*. *Mar. Pollut. Bull.* **2020**, *158*, 111349. [\[CrossRef\]](#)
- Barboza, L.G.A.; Vethaak, A.D.; Lavorante, B.R.; Lundebye, A.K.; Guilhermino, L. Marine Microplastic Debris: An Emerging Issue for Food Security, Food Safety and Human Health. *Mar. Pollut. Bull.* **2018**, *133*, 336–348. [\[CrossRef\]](#)
- Wang, C.; Zhao, J.; Xing, B. Environment Source, Fate, and Toxicity of Microplastics. *J. Hazard. Mater.* **2021**, *407*, 124357. [\[CrossRef\]](#)
- World Ocean Day: Protect the Sea and Declare War against Plastic Pollution, UN News Network. Available online: <http://news.un.org/zh/story/2018/06/1020561> (accessed on 10 July 2023).
- Shim, J.W.; Thomposon, C.R. Microplastics in the Ocean. *Arch. Environ. Contam. Toxicol.* **2015**, *69*, 265–268. [\[CrossRef\]](#) [\[PubMed\]](#)
- Welden, A.N.; Lusher, L.A. Impacts of Changing Ocean Circulation on the Distribution of Marine Microplastic Litter. *Integr. Environ. Assess. Manag.* **2017**, *13*, 483–487. [\[CrossRef\]](#) [\[PubMed\]](#)

15. Hitchcock, N.J.; Mitrovic, M.S. Microplastic Pollution in Estuaries Across a Gradient of Human Impact. *Environ. Pollut.* **2019**, *247*, 457–466. [CrossRef] [PubMed]
16. Carlini, G.; Kleine, K. Advancing the International Regulation of Plastic Pollution Beyond the United Nations Environment Assembly Resolution on Marine Litter and Microplastics. *Rev. Eur. Comp. Int. Environ. Law* **2018**, *27*, 234–244. [CrossRef]
17. Thompson, C.R. Microplastics in the Sea: Concern is Rising about Widespread Contamination of the Marine Environment by Microplastics. *Science* **2020**, *345*, 144–145.
18. Sharma, S.; Sharma, V.; Chatterjee, S. Microplastics in the Mediterranean Sea: Sources, Pollution Intensity, Sea Health, and Regulatory Policies. *Front. Mar. Sci.* **2021**, *8*, 634934. [CrossRef]
19. Cai, M.; He, H.; Liu, M.; Li, S.; Tang, G.; Wang, W.; Huang, P.; Wei, G.; Lin, Y.; Chen, B.; et al. Lost but Can't Be Neglected: Huge Quantities of Small Microplastics Hide in the South China Sea. *Sci. Total Environ.* **2018**, *633*, 1206–1216. [CrossRef] [PubMed]
20. Ivleva, N.P.; Wiesheu, A.C.; Niessner, R. Microplastic in Aquatic Ecosystems. *Angew. Chem. Int. Ed.* **2016**, *56*, 1720–1739. [CrossRef]
21. Gullett, W. Environmental Protection and the Precautionary Principle: A Response to Scientific Uncertainty in Environmental Management. *Environ. Plan. Law J.* **1997**, *14*, 52–69.
22. Spalding, A.K.; de Ycaza, R. Navigating Shifting Regimes of Ocean Governance: From UNCLOS to Sustainable Development Goal 14. *Environ. Soc.* **2020**, *11*, 110102. [CrossRef]
23. Fiedler, H.; Kallenborn, R.; de Boer, J.; Sydes, L.K. The Stockholm Convention: A Tool for the Global Regulation of Persistent Organic Pollutants. *Chem. Int.* **2019**, *41*, 4–11. [CrossRef]
24. Nordquist, M.H.; Long, R. *Marine Biodiversity of Areas beyond National Jurisdiction*; Brill: Leiden, The Netherlands, 2021; p. 305.
25. Tanaka, Y. A Dual Approach to Ocean Governance: The Cases of Zonal and Integrated Management in International Law of the Sea. *Int. J. Mar. Coast. Law* **2004**, *19*, 506. [CrossRef]
26. Raubenheimer, K.; McIlgorm, A. Can the Basel and Stockholm Conventions provide a global framework to reduce the impact of marine plastic litter? *Mar. Policy* **2018**, *96*, 285–290. [CrossRef]
27. Xing, W. Review on the Issue of the Marine Geographically Disadvantaged States from the Perspective of China. *Pac. J.* **2016**, *24*, 11–19.
28. Djatmiko, A.; Pudyastiw, E. Protection and Preservation Sea Environment in International Law Perspective. *J. Komun. Huk.* **2020**, *6*, 185–197. [CrossRef]
29. Zhang, Y. The Enlightenment of the Semi-closed Sea System on Cooperation in Low-sensitive Areas in the South China Sea. *Acad. Forum* **2016**, *6*, 68–69.
30. Wang, M.; Tan, C. Joint Development of South China Sea as An Example of Cooperation Between States Bordering Enclosed or Semi-Enclosed Seas: A Discussion with Mr. Christopher Linebaugh. *Academics* **2016**, *10*, 126–136.
31. Li, J.; Liu, H.; Chen, J.P. Microplastics in freshwater systems: A review on occurrence, environmental effects, and methods for microplastics detection. *Water Res.* **2018**, *137*, 362–374. [CrossRef]
32. Scovazzi, T. International Cooperation as Regards Protection of the Environment and Fisheries in the Mediterranean Sea. *Anu. Esp. De Derecho Int.* **2018**, *34*, 301–322. [CrossRef]
33. Huang, Y. *Introduction to the History of Chinese Law*; Guangxi Normal University Press: Guilin, China, 2018; pp. 14–15.
34. Franckx, E.; Benatar, M. The “Duty” to Co-Operate for States Bordering Enclosed or Semi-Enclosed Seas. *Chin. (Taiwan) Yearb. Int. Law Aff.* **2013**, *31*, 66–81.
35. Zhang, X. On the Legal System for Regional Cooperation in Marine Environmental Protection. *J. Ocean Univ. China (Soc. Sci. Ed.)* **2011**, *4*, 1–5.
36. Morskie, P. The Role of Cooperation in the Protection and Preservation of the Marine Environment and its Realization in the Baltic Sea Region. *Marit. Law* **2020**, *XXXVIII*, 65–82.
37. Interreg Baltic Sea Region. Available online: <https://interreg-baltic.eu/project/fanplesstic-sea/> (accessed on 10 July 2023).
38. Kentin, E.; Kaarto, H. An EU Ban on Microplastics in Cosmetic Products and the Right to Regulate. *Rev. Eur. Comp. Int. Environ. Law* **2018**, *27*, 257. [CrossRef]
39. Drohmann, D. Regulating Microplastics: The Global Status on Microbeads Control Legislation in Cosmetics & Personal Care Products. *Int. Chem. Regul. Law Rev.* **2018**, *1*, 79–86.
40. Kirk, E.A.; Popattanachai, N. Marine plastics: Fragmentation, effectiveness and legitimacy in international lawmaking. *Rev. Eur. Comp. Int. Environ. Law* **2018**, *27*, 222–233. [CrossRef]
41. Mendenhall, E. Making the most of what we already have: Activating UNCLOS to combat marine plastic pollution. *Mar. Policy* **2023**, *155*, 105786. [CrossRef]
42. Wysocki, T.I.; Billon, L.P. Plastics at sea: Treaty design for a global solution to marine plastic pollution. *Environ. Sci. Policy* **2019**, *100*, 94–104. [CrossRef]
43. McMahon, M. Tides of Plastic: Using International Environmental Law to Reduce Marine Plastic Pollution. *Hastings Environ. Law J.* **2022**, *28*, 49.
44. Houghton, K. Identifying New Pathways for Ocean Governance: The Role of Legal Principles in Areas Beyond National Jurisdiction. *Mar. Policy* **2014**, *49*, 118–126. [CrossRef]
45. Chen, Y.; Liu, H. Critical Perspectives on the New Situation of Global Ocean Governance. *Sustainability* **2023**, *15*, 10921. [CrossRef]

46. Chen, H. 'Competent International Organization' and the Development of the International Legal System for Marine Scientific Research. *SJTU Law Rev.* **2023**, *1*, 35–58.
47. Wang, M.I.; Chen, Y. Analysis and Inspiration of Legislature Modes of Marine Environmental Protection Cooperation under the System of Closed or Semi Closed Sea. *J. Northwest Minzu Univ. (Philos. Soc. Sci.)* **2020**, *1*, 78–79.
48. Cole, M.; Lindeque, P.; Halsband, C.; Galloway, T.S. Microplastics as contaminants in the marine environment: A review. *Mar. Pollut. Bull.* **2011**, *62*, 2588–2597. [[CrossRef](#)] [[PubMed](#)]
49. Liu, X. Protecting Marine Animals: Domestic and International Regulation on Ocean Plastic Dumping. *Chic.-Kent J. Environ. Energy Law* **2018**, *8*, 22.
50. Wang, Y.; Chang, Y. The Legal Basis and Mechanism Construction for Joint Scientific Research in the Disputed Sea Area of the South China Sea. *Asia-Pac. Secur. Marit. Aff.* **2019**, *2*, 54–71.
51. Tanaka, Y. *The International Law of the Sea*, 3rd ed.; Cambridge University Press: Cambridge, UK, 2019; p. 326.
52. Lusher, A.L.; Hurley, R.; Arp, H.P.H.; Booth, A.M.; Bråte, I.L.N.; Gabrielsen, G.W.; Gomiero, A.; Gomes, T.; Grøsvik, B.E.; Green, N.; et al. Moving Forward in Microplastic Research: A Norwegian Perspective. *Environ. Int.* **2021**, *157*, 106794. [[CrossRef](#)] [[PubMed](#)]
53. Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection. *Guidelines for the Monitoring and Assessment of Plastic Litter in The Ocean*; Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection Press: London, Britain, 2019; pp. 57–71.
54. Wood, S.F. Move Over Diamonds-Plastics are Forever: How the Rise of Plastic Pollution in Water Can be Regulated. *Villanova Environ. Law J.* **2018**, *29*, 160.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.