An interaction between the ITLOS advisory opinion on climate change and the maritime legislations on carbon reduction

Abstract: International Tribunal for the Law of the Sea (ITLOS), Inter-American Court of Human Rights (IACHR), and International Court of Justice (ICJ) have successively issued advisory opinions on climate change, requiring States Parties to fulfill their emission reduction obligations. This paper aims to explore the interaction between these advisory opinions and maritime carbon emission reduction legislation. It first systematically examines the core legal developments in the advisory opinions regarding the characterization of greenhouse gases, the specification of State obligations, transboundary obligations and the precautionary principle, as well as the principle of Common But Differentiated Responsibilities and Respective Capabilities (CBDR). Based on this, it analyzes whether and how these developments in legal understanding have produced substantive impacts at the level of maritime carbon emission reduction legislation. The paper concludes that while the advisory opinions have injected crucial legal certainty and political momentum into maritime carbon emission reduction legislation, the implementation of the advocated emission reduction obligations faces significant resistance, and the risk of fragmentation in global rules remains serious. Based on this, to break through the current predicament and promote the orderly advancement of legislation on carbon reduction in shipping, it is recommended that the international community strengthen multilateral cooperation and push forward the construction of a unified and coordinated regulatory system for carbon reduction in shipping.

Keywords: Advisory Opinions, International Tribunal for the Law of the Sea, International Court of Justice, Maritime Carbon Emission Reduction, Climate Governance

1. Introduction

1.1 Advisory opinions on Climate Change by International Judicial Bodies

On May 21, 2024, the International Tribunal for the Law of the Sea (ITLOS) delivered its advisory opinion in response to the request submitted by the Commission of Small Island States on Climate Change and International Law. In its advisory opinion, the ITLOS determined that anthropogenic greenhouse gas (GHG) released into the atmosphere constitute pollution of the marine environment and states parties of UNCLOS bear specific obligations to adopt all necessary measures to prevent, reduce and control such pollution and are required to strive towards harmonizing their policies accordingly (ITLOS, 2024, para.194). The Advisory Opinion

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represents a landmark decision as the first instance in which an international judicial institution has addressed climate change issues.

Following the ITLOS Advisory Opinion, in May 2025, the Inter-American Court of Human Rights (IACHR) issued an advisory opinion on the climate emergency and human rights submitted by the Republic of Chile and the Republic of Colombia, answering the scope of obligations to respect the guarantee of substantive and procedural rights when the climate emergency causes or exacerbates damage (IACHR, 2025, pp.1-5). Regarding national obligations in the climate emergency, the IACHR identifies the duty of due diligence and the obligation to cooperate, and explains its connotations. The advisory opinion places the obligation to reduce emissions under the framework of human rights protection, emphasizing that countries should take timely, effective and urgent action to reduce emissions to avoid human rights violations caused by climate hazards.

In July of the same year, the International Court of Justice (ICJ) issued an advisory opinion on States' obligations on climate change, stating that climate treaties are not the only relevant and applicable law (ICJ, 2025b, pp.5-8). In the area of the law of the sea, the ICJ emphasized that the United Nations Convention on the Law of the Sea (UNCLOS) is also one of the most directly relevant laws, and States parties have an obligation to protect the marine environment from GHG emissions. In addition, the advisory opinion also addresses the legal consequences of breaching obligations. The ICJ clearly states that internationally wrongful acts that violate emission reduction obligations will lead to liability to stop violations, guarantee non-repetition and compensate for losses.

1.2 Discussion on the Relationship between the Law of Climate Change and the Law of the Sea Led to the Advisory Opinions

While advisory opinions cannot directly impose legally enforceable obligations on states and international judicial bodies do not formally adhere to a doctrine of stare decisis, advisory opinion of such can provide authoritative guidance on controversial issues, exerting diplomatic pressure on relevant countries to resolve international climate governance issues through negotiation (Bodansky et al., 2017; Li et al., 2023). This is also the intention of the small island states in initiating this advisory proceedings, combing diplomatic negotiations with judicial measures to clarify states obligations and responsibilities regarding climate change (Gong, 2023).

Therefore, the above advisory opinions have also raised controversies in the process, including the jurisdiction of the tribunal (Barnes, 2022; Qian et al., 2024; Que, 2024), the appropriateness and fairness of allowing a limited group of states to establish an institution empowered to request

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such advisory opinions through an agreement (Holst, 2023), and the relationship between the UNCLOS and the international legal regime of climate change. Among them, the relationship between the UNCLOS and international climate change law is one of the issues of great concern at the substantive law level. It is suggested that the interpretation and application of the UNCLOS should remain consistent with the international legal regime of the climate change (ITLOS, 2023a, 2023b, 2023c), viewing the relationship between the UNCLOS and specialized climate conventions as complementary, coordinated, and compatible rather than hierarchical (ITLOS, 2024, para.224; Kong et al., 2024; Lewis, 2025). However, there are also views that climate change issues fall outside the regulatory scope of the UNCLOS and should be governed exclusively by dedicated climate conventions (ITLOS, 2023d, 2023e).

For the shipping industry, the potential interaction between the Advisory Opinion and the maritime legislations on carbon reduction is worthy of attention. Shipping, similar to aviation, has traditionally been treated as a relatively independent area for the regulation of GHG emissions reduction. The International Maritime Organization (IMO), as the competent international organization authorized under the UNCLOS, has formulated many internationally accepted rules and standards. These instruments have refined and clarified the obligations of states parties concerning marine environment protection in shipping activities under the UNCLOS. Throughout this process, by ensuring consistency between its adopted treaties and the fundamental principles of the UNCLOS, the IMO treats such treaties as "other rules of international law" (UNCLOS, 1982) provided for under the UNCLOS, thereby promoting the overarching framework established by the UNCLOS without compromising its provisions (ITLOS, 2023f). In particular, the IMO has also developed binding legal instruments regarding the reduction of GHG emissions. For example, amendment to Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL) was adopted in 2021 aiming at reducing the carbon intensity of international shipping. The introduction of the Energy Efficiency Existing Ship Index (EEXI) and the Carbon Intensity Indicator (CII) rating scheme established minimum energy efficiency standards and operational carbon intensity evaluations for vessels, thereby targeting improvements in carbon intensity from both technical and operational perspectives[1]. Although the IMO net-zero framework was postponed by the vote in October 2025, the framework specifies the direction of maritime carbon reduction expected by the IMO, namely ship fuel standards and carbon pricing mechanisms.

[1] The amendment has officially come into force. Specifically, EEXI was introduced on January 1, 2023, and the first CII rating based on 2023 data will be carried out no later than March 31, 2024. International Maritime Organization (IMO), Marine Environment Protection Committee (MEPC 76), 10 to 17 June 2021 (remote session). https://www.imo.org/en/MediaCentre/MeetingSummaries/Pages/MEPC76meetingsummary.aspx, 2021 (accessed 21 May 2025).

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It is obvious that the regulation of GHG emissions is primarily under the legal regime of IMO instruments, however, the interpretations of the Advisory Opinion on incorporating GHG emissions within the scope of marine environmental pollution establishes a direct connection between the UNCLOS, international climate treaties and legal instruments of IMO relating to GHG emissions reduction. This connection disrupts the previous relatively independent status of shipping in terms of GHG emissions, forming a potential pathway linking climate conventions, the UNCLOS, and IMO instruments. A question may arise regarding whether the existing definition of marine environmental pollution in international and domestic legislation needs to be adjusted. It is also necessary to analyze and explore whether this potential linkage may produce influence on the regulations of GHG emissions in the shipping sector, especially whether the perspectives articulated in the Advisory Opinion regarding the obligations of states parties align with the existing regulatory frameworks in shipping, and how it can guide the future maritime legislations on carbon reduction.

1.3 Methods, Materials and Analytical Framework

This study focuses on the interactive relationship between climate advisory opinions and maritime carbon reduction legislation, systematically analyzing international judicial advisory opinions, IMO conventions, and the mitigation policy texts of major shipping countries through policy and normative analysis, with a focus on core issues such as the qualitative assessment of greenhouse gases and the definition of national obligations. By employing comparative research methods, it contrasts the legislative stances of developed and developing countries at the international level, as well as the domestic implementation approaches of major economies like the EU. The research materials include climate-related advisory opinions from ITLOS, IACHR, and ICJ, the MARPOL Convention formulated by IMO, ship greenhouse gas reduction strategies, and related conference reports, UNCLOS, domestic legislative policy texts of the EU, and core academic literature on maritime carbon reduction governance and international climate law.

This paper constructs an analytical framework following the logical sequence of review, analysis, and outlook. First, it analyzes the understanding of maritime carbon reduction in advisory opinions, systematically reviewing the core legal developments in these advisory opinions regarding the qualitative aspects of GHG, the clarification of national obligations, and the CBDR principle. On this basis, it examines whether and how the development of these legal understandings has a substantial impact on maritime carbon reduction legislation, exploring its possible role in promoting international climate governance and marine environmental protection. Finally, the paper then examine the interaction between the Advisory Opinion and the shipping

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legislations concerning marine pollution and carbon reduction from both the international and domestic perspectives (Fig.1). By such analysis, this research intends to contribute the literature on the clarification of the obligations of the states in regulating the GHG emission from an interactive perspective of the maritime law and the law of sea, and share the suggestions for the future legislative development of shipping within the context of the Advisory Opinion.

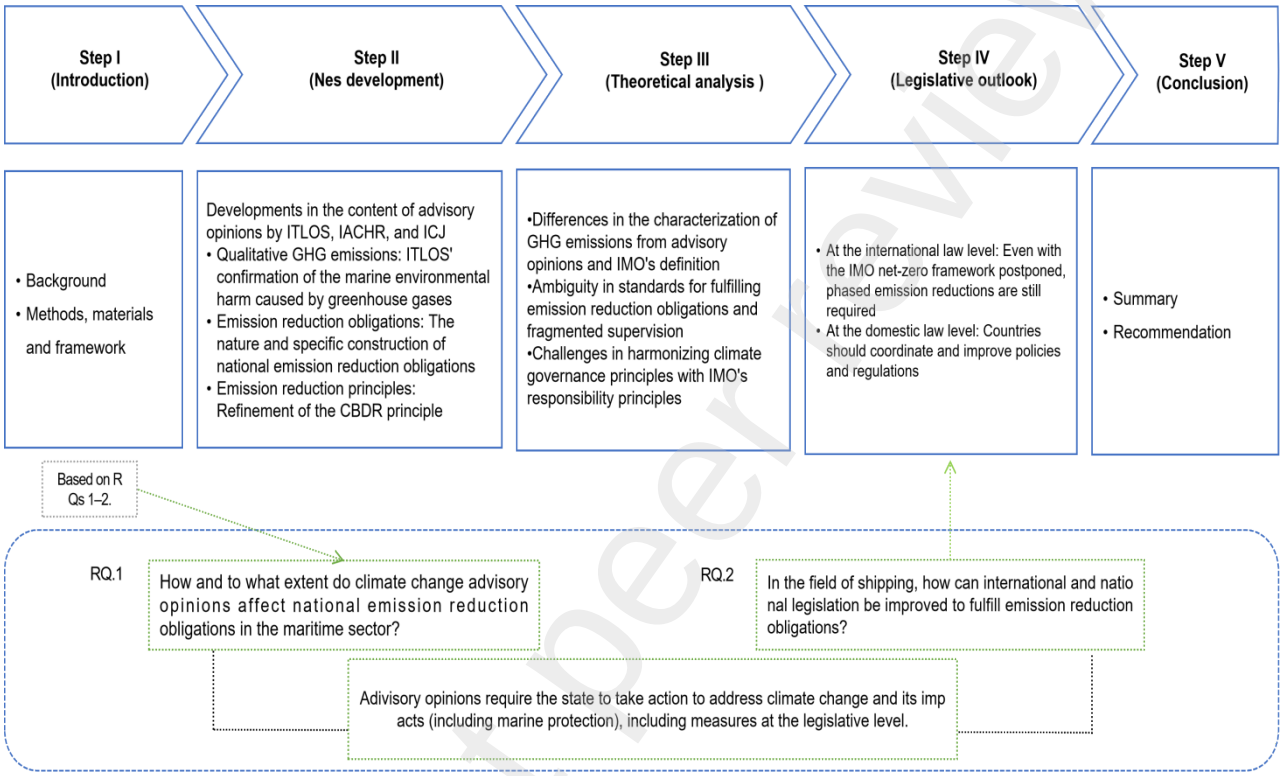

Fig. 1 Research Outline

2 Development of Legal Understanding on Carbon Emission Reduction in the Advisory Opinions

ITLOS, IACHR, and ICJ have successively issued advisory opinions on climate change, requiring States Parties to fulfill their emission reduction obligations. Although advisory opinions are not legally binding, the interpretations and reasoning articulated therein are often cited in subsequent judicial proceedings, thereby gaining authoritative status in practice. The views expressed in judgments or advisory opinions not only apply or interpret existing international law; in many cases, they actively contribute to its development (Sand, 2016). This influence does not depend on whether the document is a formal judgment or an advisory opinion, as both are produced by international judicial bodies with equivalent rigor and scrutiny. Consequently, legal rules or principles previously lacking consensus may evolve through pronouncements by international judicial bodies, effectively becoming recognized as sources of

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international law[2]. This influence is corroborated by past ITLOS advisory opinions. For example, in the case of *Trans-Tasman Resources Limited v The Taranaki-Whanganui Conservation Board*, the Supreme Court of New Zealand cited the advisory opinion on "Responsibilities and obligations of States sponsoring persons and entities with respect to activities in the Area" to interpret the obligation of "due diligence", noting that it is a variable standard dependent on temporal and risk-based factors (Supreme Court of New Zealand, 2021). Based on this, the qualitative judgments in international judicial advisory opinions concerning the impact of GHG emissions on the marine environment, the clarification of the scope and nature of State obligations, and the elaboration of CBDR principle may shape the future development of legal rules on climate change and marine pollution.

2.1 Characterization of Greenhouse Gases' Impact on the Marine Environment

Regarding the characterization of the impact of GHG on the marine environment, the ITLOS advisory opinion concluded, after analysis, that anthropogenic emissions of GHG into the atmosphere fall within the definition of "pollution of the marine environment" under Article 1, paragraph 1, subparagraph 4 of the UNCLOS[3]. First, ITLOS interpreted the term "substances" based on the ordinary meaning of "gases", and considered heat generated as "energy" by citing the commentary of the International Law Commission. Subsequently, ITLOS defines "anthropogenic" and "marine environment" by referring to the definitions of UNCLOS and IPCC, making it clear that emissions are caused by human activities, and combining with other provisions, preamble and objective interpretation of UNCLOS, defining "Marine environment" as a broad ecosystem with both spatial and material levels, not only referring to the seawater itself. So that the impact of climate change on coastlines, ecosystems and even the atmosphere can be considered. Finally, ITLOS affirmed the "introduction" pathway and "harmful effects", reasoning that carbon dioxide, due to its solubility, directly enters seawater causing acidification, and that GHG trap heat in the atmosphere, which is ultimately absorbed by the oceans, leading to warming. Furthermore, the ITLOS advisory opinion confirmed "harmful effects" by citing authoritative scientific reports such as those from the IPCC, substantiating facts like ocean

[2] For example, in the North Sea Continental Shelf case of 1969, the International Court of Justice conducted an in-depth discussion on the principle of equidistance in the delimitation of the continental shelf. The judgement of the International Court of Justice in this case has elaborated in detail the conditions for the application of the principle of equidistance, its scope and its relationship with other relevant principles, thus further clarifying and consolidating the status of the principle of equidistance in international law, and facilitating its gradual emergence as one of the de facto sources of international law in the field of maritime delimitation, thus providing an important legal basis and reference for the subsequent practice of States in the delimitation of maritime boundaries.

[3] Article 1, paragraph 1, subparagraph (4), of the United Nations Convention on the Law of the Sea: "pollution of the marine environment" means the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities.

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warming, acidification, and sea-level rise (Deng et al., 2024).

The ICJ advisory opinion firstly cited the 1979 Declaration of the First World Climate Conference of the World Meteorological Organization, emphasizing the significant impact of carbon dioxide on the Earth's atmospheric temperature and pointing out that its increasing concentration could lead to warming of the lower atmosphere globally, particularly at high latitudes (ICJ, 2025a, para.53).Subsequently, the ICJ further elaborated on the severe and widespread consequences of climate change, affecting not only natural ecosystems but also profoundly impacting human society. Specifically, rising temperatures lead to the melting of glaciers and ice sheets, and sea-level rise, thereby threatening coastal communities and causing unprecedented flood risks. Concurrently, extreme weather events such as hurricanes, droughts, and heatwaves are becoming more frequent and intense, not only disrupting agricultural production but also causing population displacement and water scarcity (ICJ, 2025a, para.73).

The ITLOS advisory opinion, for the first time at the international judicial level, explicitly characterized anthropogenic GHG emissions as “marine pollution” under UNCLOS. This determination directly incorporates the global environmental challenge of climate change from the relatively principle-based and independent climate governance field into the established, more obligation-oriented marine environmental protection legal framework. This means that the legally binding general obligations of States under UNCLOS to protect and preserve the marine environment have been substantively extended to actions addressing climate change and its impacts. In contrast, the ICJ advisory opinion did not directly characterize greenhouse gases but, by systematically citing IPCC scientific reports, authoritatively constructed and reinforced the factual basis of climate change as an imminent global crisis. It elevates climate change from a policy issue to a core legal concern relating to fundamental human welfare and the essential interests of the international community, greatly strengthening the legal legitimacy and moral necessity for States to take urgent emission reduction actions. Together, the two opinions highlight the extreme urgency of the climate crisis and promote the evolution of the international legal order towards a more active and robust response to climate change.

2.2 Development in the Specification of State Obligations

The advisory opinions issued by ITLOS and ICJ provide a legal interpretation of the scope and nature of specific obligations for States in addressing climate change, particularly its impacts on the marine environment, as illustrated in Fig.2. In the ITLOS advisory opinion, the Tribunal identified three broad categories of State obligations under UNCLOS to prevent pollution caused by GHG emissions. First, obligations applicable to all sources of pollution, mainly comprising

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the duty to take necessary measures to prevent, reduce, and control marine pollution, including special obligations applicable to transboundary environments. Furthermore, these obligations require taking necessary measures to protect and preserve rare or fragile ecosystems, as well as the duty to conserve threatened or endangered species and other forms of marine life (ITLOS, 2024, para.195). Second, obligations applicable to specific sources of pollution, concerning Parts V and VI of UNCLOS Part XII, focusing on establishing national and international legal frameworks to prevent, reduce, and control marine pollution from land-based sources, vessels, the atmosphere, or through the atmosphere (ITLOS, 2024, para.264). Third, other obligations, concerning Parts II, III, and IV of UNCLOS Part XII, encompassing obligations for global and regional cooperation, obligations to provide technical assistance to developing States, and obligations related to monitoring and environmental assessment (ITLOS, 2024, para.367). The core lies in specifying that States must take all necessary measures to prevent, reduce, and control pollution of the marine environment from GHG emissions.

The ICJ advisory opinion, from a broader perspective of international law, affirmed and refined State obligations from multiple aspects, including the climate change treaty framework, customary international law, environmental treaties, the law of the sea, and human rights law. Among the most vital obligations identified are, firstly, the obligation to prevent significant harm to the environment, requiring States to avoid, through "due diligence", causing serious damage to the climate system by activities under their jurisdiction or control. Secondly, the obligation to cooperate in good faith for the protection of the environment. These two obligations transcend the membership of specific treaties and are binding on all States. Furthermore, the ICJ incorporated obligations under international human rights law, requiring States to take necessary measures to protect the climate system to respect and ensure the effective enjoyment of human rights. The ICJ determined that the obligation to prevent climate harm has the character of an obligation *erga omnes*, meaning it is owed to the international community as a whole, and any State is entitled to invoke responsibility for breaches of this obligation. The ICJ advisory opinion marks the first time the world's highest court has interpreted international law and State obligations concerning climate change, establishing a legal benchmark for actions States must take to prevent and remedy climate damage, and clarifying the legal consequences of failing to fulfill these obligations.

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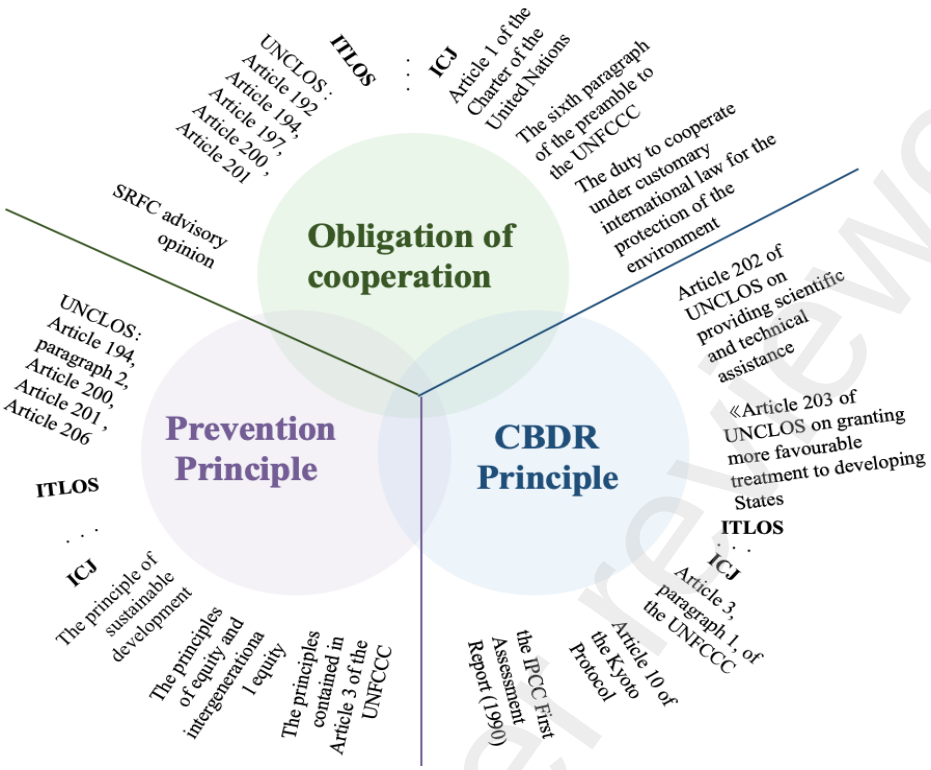

Fig. 2. The obligation content in the advisory opinion

Although based on different legal sources, the ITLOS and ICJ advisory opinions jointly construct a multi-layered framework for State obligations on climate change. They indicate that climate change is not only a political emergency but also a legal crisis, explicitly stating that the law stands on the side demanding accountability and justice. They reach significant consensus on the content of specific obligations, particularly emphasizing that States must undertake substantive emission reduction obligations and collectively address climate change through enhanced international cooperation. Building on this, the two opinions further clarify the legal nature of these obligations, deepen the connotation and performance standards of the obligation to cooperate, and underscore the importance of the obligation of prevention, thus providing key guidance for the future development of legal understanding in the fields of climate change and marine pollution.

2.2.1 Delineation of the Due Diligence Obligation

The primary nature of State obligations in the field of climate change is clearly delineated by both advisory opinions as obligations of due diligence, not obligations of result. The ITLOS advisory opinion explicitly states that States have the obligation to take all necessary measures, but this obligation does not require the immediate and complete prevention of marine pollution caused by anthropogenic GHG emissions. Citing the advisory opinion of the Seabed Disputes Chamber, ITLOS emphasizes that this is an obligation of conduct, not an obligation of result

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(ITLOS, 2024, para.233), meaning that the key to assessing a State's compliance lies in whether it has exerted its best efforts to take actions to prevent, reduce, and control pollution, not whether it has ultimately prevented the occurrence of harm. Therefore, whether a State has complied with its UNCLOS obligations is judged by its conduct, not by the specific outcome of that conduct.

The due diligence obligation requires States to establish a comprehensive domestic institutional framework, including legislation, administrative procedures, and necessary enforcement mechanisms, to systematically regulate relevant activities, and to maintain adequate vigilance to ensure the effective functioning of this system to achieve the intended goal of protecting the marine environment. The ICJ, in its advisory opinion, similarly emphasizes that using all means at the State's disposal is the core standard of conduct. This means that assessing whether a State has fulfilled its obligations hinges on whether it has taken reasonable, good faith actions consistent with the "due diligence" standard, not on whether it has ultimately entirely prevented the harm from occurring.

The clear delineation of the due diligence obligation in the ITLOS and ICJ advisory opinions advances a significant development in the nature of State obligations and performance standards in the field of carbon emission reduction. Together, they promote an evolution in the international community's understanding of State obligations, shifting the legal assessment of State climate responsibility from merely focusing on environmental damage outcomes to systematically evaluating whether a State has established and operated an effective legal and administrative framework and whether it has taken reasonably feasible prevention and emission reduction actions within its capabilities. In practice, this requires States to continuously enhance their degree of diligence based on risk levels, scientific knowledge, and technological capabilities, while also acknowledging reasonable differences in responsibility among different States. This legal delineation not only enhances the operability and assessability of State obligations but also provides a legal foundation for constructing an international legal order that is both normative, adaptable, and equitable in addressing complex global environmental challenges like climate change.

2.2.2 Manifestation of the Obligation to Cooperate

Both ITLOS and ICJ, in their advisory opinions, systematically elaborated on the obligation to cooperate, developing it from a general principle into an obligation with substantive content and performance requirements. ITLOS emphasized that cooperation is a fundamental principle for preventing pollution of the marine environment and permeates the entire structure of Part XII of UNCLOS. The obligation to cooperate is manifested not only in supporting developing States

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through technical assistance and preferential treatment (ITLOS, 2024, para.322), but also includes the duty of States to jointly develop international rules, standards, and recommended practices and procedures consistent with the Convention at the global and regional levels (ITLOS, 2024, para.300); to harmonize policies and actions concerning monitoring, assessment, and combating pollution (ITLOS, 2024, para.230); and to consider climate change impacts when conserving marine living resources (ITLOS, 2024, para.428). ITLOS particularly noted that the obligation to cooperate should be understood in conjunction with the obligation to take all necessary measures, and its fulfillment emphasizes continued, meaningful and good faith joint efforts, rather than merely achieving formal coordination.

The ICJ traced the source of the obligation to cooperate to the Charter of the United Nations, where States are to achieve international co-operation in solving international problems of an economic, social, cultural, or humanitarian character (ICJ, 2025a, para.140). Cooperation is not only a necessary requirement for effective climate governance but also a legal obligation based on common interest and the principle of good faith. The content of cooperation encompasses multiple levels, including technology development and transfer, protection of greenhouse gas sinks and reservoirs, adaptation actions, scientific research, information exchange, and public participation. The ICJ further clarified that the performance of the obligation to cooperate must be guided by the principle of good faith, aiming to promote fair, sustainable, and reviewable collective action.

In the field of carbon emission reduction, the elaboration on the obligation to cooperate has fostered significant developments in relevant legal awareness. First, the nature of the obligation to cooperate has been further clarified. Consistent with the previous subsection, it is understood as an obligation of conduct, emphasizing that States must make genuine and sustained efforts in legislation, policy coordination, technology transfer, and financial support, rather than merely pursuing a certain common emission reduction outcome. Its fulfillment is also subject to evaluation based on the due diligence standard, i.e., whether the State has taken reasonable, good faith cooperative measures within its capabilities to promote collective emission reduction actions. Second, the content of the obligation to cooperate has become more specific and substantive. The advisory opinions extend cooperation from abstract political commitments to operational levels such as joint rule-making, technology transfer, financial mechanisms, capacity building, and data sharing, making it an indispensable institutional support for achieving emission reduction targets. Especially in the face of transboundary and global environmental challenges, cooperation is no longer merely a voluntary act. Third, the link between the obligation to cooperate and the CBDR principle has become closer. Both ITLOS and ICJ indicate that the

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different stages of development, capabilities, and needs of States, particularly support for developing countries, should be considered when fulfilling the obligation to cooperate. This not only give the CBDR principle with procedural and implementational connotation but also makes the obligation to cooperate more feasible on an equitable basis.

2.2.3 Elaboration of the Obligation to Prevent Transboundary Pollution and the Precautionary Principle

Both ITLOS and ICJ, in their advisory opinions, focused on elaborating the precautionary principle, deeply integrating it into the performance of States' due diligence obligations, and promoting a significant development of this principle from a conceptual advocacy towards legal norms. ITLOS explicitly stated that the obligation to prevent transboundary pollution under Article 194, paragraph 2 of UNCLOS is akin to the generally recognized principle of prevention of harm (ITLOS, 2024, para.245). This obligation requires States to take all necessary measures to ensure that activities under their jurisdiction or control do not cause damage by pollution to other States and their environment, and that pollution arising from incidents or activities under their jurisdiction or control does not spread beyond the areas where they exercise sovereign rights. ITLOS emphasized that, concerning marine pollution from anthropogenic GHG emissions, given the potential for serious and irreversible consequences, taking a precautionary approach is necessary. More importantly, ITLOS characterized the precautionary approach as an integral part of the "due diligence" obligation (ITLOS, 2024, para.213). This implies that if a State disregards or fails to adequately assess the environmental risks involved in its activities, it may be found not to have fulfilled its due diligence obligation, even if scientific evidence is not yet fully conclusive. Furthermore, in a transboundary environmental context, given that harm may extend to other States, ITLOS considered that the relevant due diligence standard may even be stricter.

The ICJ similarly affirmed the status of the precautionary principle from the standpoint of customary international law. Citing its previous jurisprudence (ICJ, 1996), the ICJ noted that the general obligation of States to ensure that activities within their jurisdiction and control respect the environment of other States or areas beyond national control is now part of the corpus of international law relating to the environment, and it applies to global environmental problems such as climate change (ICJ, 2025a, para.134). The ICJ observed that major climate change treaties have explicitly incorporated the precautionary principle, for example, Article 3, paragraph 3 of UNFCCC, which states that lack of full scientific certainty should not be used as a reason for postponing measures to address threats of serious or irreversible damage. The ICJ

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indicated that it would take this principle into account when interpreting and applying State obligations under climate change treaties. Additionally, the ICJ linked the precautionary principle with principles such as intergenerational equity and sustainable development, considering them together as guiding principles for interpreting and applying relevant legal rules, thus enriching the normative connotation and interpretative dimensions of the precautionary principle.

In the field of carbon emission reduction, the legal elaboration has significantly strengthened the position of the precautionary principle in international environmental law. ITLOS stated that in the face of threats of serious or irreversible damage, States must adopt a precautionary approach, even in the absence of scientific certainty, and that this approach is an integral part of the general obligation of due diligence. The ICJ similarly confirmed that the precautionary approach is crucial in addressing climate change and can be used in interpreting and applying relevant treaty obligations. This indicates that the precautionary principle has become deeply embedded in the criteria for assessing State due diligence obligations. Taking precautionary action is not a discretionary policy option but an inherent requirement and integral part of fulfilling climate due diligence obligations. When planning and developing low-carbon pathways, assessing emission reduction technologies, and managing climate risks, States must, based on the best available scientific knowledge, take anticipatory measures against potential serious damage risks; failure to do so may constitute a lack of vigilance.

2.3 Deepening of the Principle of Common But Differentiated Responsibilities and Respective Capabilities

The ITLOS advisory opinion elaborated on the importance of the CBDR principle in allocating responsibilities. For instance, when interpreting the specific obligation to take all necessary measures under Article 194 of UNCLOS, the ITLOS advisory opinion emphasized that the scope and content of necessary measures may vary depending on the means available to States and their capabilities (e.g., scientific, technical, economic, and financial capabilities), and that regard must be had to States with limited means and capabilities to avoid placing a disproportionate burden on them in fulfilling this obligation (ITLOS, 2024, para.225). Simultaneously, the ITLOS advisory opinion cited Article 3 of UNFCCC, Article 2, paragraph 2 and Article 4, paragraph 4 of the Paris Agreement, recognizing this principle as one guiding Parties in their actions to achieve the objective of the Convention and implement its provisions. Furthermore, in elaborating on the assistance obligations under Articles 202 and 203 of UNCLOS, ITLOS considered that Article 202 sets forth appropriate obligations to provide assistance directly or through competent international organizations in capacity building, scientific expertise,

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technology transfer, and other matters, and Article 203 provides enhanced support for developing States, particularly those vulnerable to the adverse effects of climate change, by granting them preferential treatment by international organizations in terms of funding, technical assistance, and specialized services.

The ICJ advisory opinion addressed CBDR in three parts: applicable law, the climate change treaty framework, and customary international law. First, in Part I, the ICJ cited the IPCC First Assessment Report, noting that industrialized countries "should take the lead" as they are responsible for the majority of emissions currently affecting the atmosphere and have the greatest potential for change (ICJ, 2025a, para.61).Subsequently, similar to ITLOS, in Part II, the ICJ cited the UNFCCC preamble, Article 3, paragraph 1 and Article 4, paragraph 2, the Kyoto Protocol Article 10, and the Paris Agreement Article 2, paragraph 2 and Article 4, paragraphs 3, 4, and 19 as support for elaborating the CBDR principle (ICJ, 2025a, para.179), clarifying that State obligations under the climate change treaty framework may differ based on Parties' economic situations, historical contributions to anthropogenic GHG emissions, and capabilities to adapt to and mitigate adverse climate change effects. Finally, in Part III, regarding the characterization of obligations, the ICJ emphasized that due diligence obligations vary according to States' respective capabilities, and that other elements of required conduct include undertaking risk assessments and, as appropriate, notifying and consulting with other States (ICJ, 2025a, para.136). Concerning financial assistance obligations, the ICJ advisory opinion stressed the importance of accessible, equitable, and transparent climate finance for developing countries, stating that developed States must provide financial resources and transfer technology to assist developing States in fulfilling their mitigation and adaptation obligations.

The CBDR principle addresses the practical condition of imbalanced economic development among nations and differences in historical responsibility for GHG emissions. It has consistently been a fundamental principle of global environmental governance and a cornerstone of the international climate governance system (Li and Huang, 2024). "In the context of marine pollution from anthropogenic GHG emissions, States with greater means and capabilities must do more to reduce such emissions than States with less means and capabilities" (ITLOS, 2024, para.227). ITLOS emphasized that developed States bear greater responsibility regarding maritime carbon emissions and set out specific obligations to assist developing States, in particular vulnerable developing States, in their efforts to address marine pollution from anthropogenic GHG emissions (ITLOS, 2024, para.339). This does not deny the shared emission reduction responsibilities of developing States, but rather underscores that developed States should fulfill their international cooperation responsibilities to help developing States better meet

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their carbon emission responsibilities in maritime carbon emission reduction (Shao, 2024).The ITLOS advisory opinion specified the CBDR principle within the context of marine environmental protection. The ICJ advisory opinion, by introducing the concept of a spectrum, achieves a differentiation of State responsibility. The ICJ moves away from the traditional binary division of developed-developing countries, instead placing States on a continuous spectrum of responsibility and capability, dynamically and multi-dimensionally considering factors such as historical emissions, current emission levels, economic strength, and technological capacity. This development in understanding more accurately reflects the complexity of the current global geo-economic landscape and lays a crucial legal foundation for constructing a fairer, more targeted, and potentially adaptable responsibility allocation system in future international legal practice based on States' actual responsibilities and capabilities.

3 Impact of the Advisory Opinions on Maritime Carbon Emission Reduction Legislation

3.1 Conflict in the Characterization of Pollution

In the ITLOS advisory opinion, the Tribunal emphasized the specific obligation of States Parties to take all necessary measures, particularly by striving to formulate global and regional rules, standards, and recommended practices and procedures through competent international organizations or diplomatic conferences (ITLOS, 2024, para.280). In the maritime sector, the IMO is the competent international organization designated under UNCLOS responsible for developing international rules and standards for preventing, reducing, and controlling pollution of the marine environment from vessels, a point confirmed by the advisory opinion (ITLOS, 2024, para.287). The IMO has established a series of international conventions for preventing ship-source pollution, including recent amendments to the MARPOL Convention introducing specific rules on maritime carbon emission reduction. However, regarding the characterization of carbon dioxide as pollution, the ITLOS advisory opinion's determination that anthropogenic GHG emissions constitute pollution of the marine environment within the meaning of UNCLOS necessitates an assessment of whether the scope of application or interpretation of existing conventions relating to marine pollution might be affected by this finding.

A review of IMO conventions concerning vessel-source pollution, as illustrated in Fig.3, reveals that conventions targeting specific sources of pollution have clear and limited scopes of application; none of these conventions relate to GHG emissions and are therefore unaffected by the advisory opinion's determination. For comprehensive conventions, the London Convention requires Contracting Parties to take all practicable steps to prevent pollution of the sea by the dumping of waste and other matter that is liable to create hazards to human health, to harm living

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resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea. Although this Convention covers various sources of pollution and has a broad definition of dumping (London Convention, 1972, Art.1), it excludes the disposal at sea of wastes or other matter incidental to or derived from the normal operations of vessels (London Convention, 1972, Art.3). Consequently, the London Convention should not apply to GHG emissions from ship operations. For the most critical comprehensive convention aimed at reducing marine pollution from vessels, the MARPOL Convention, its Annex VI Regulations for the Prevention of Air Pollution from Ships addresses issues related to greenhouse gases. Specifically, Chapter 4 Regulations on energy efficiency for ships introduced into Annex VI in 2021, including EEDI and SEEMP[4], explicitly regulates CO_2 emissions by requiring ships to calculate energy efficiency indices and progressively reduce carbon intensity.

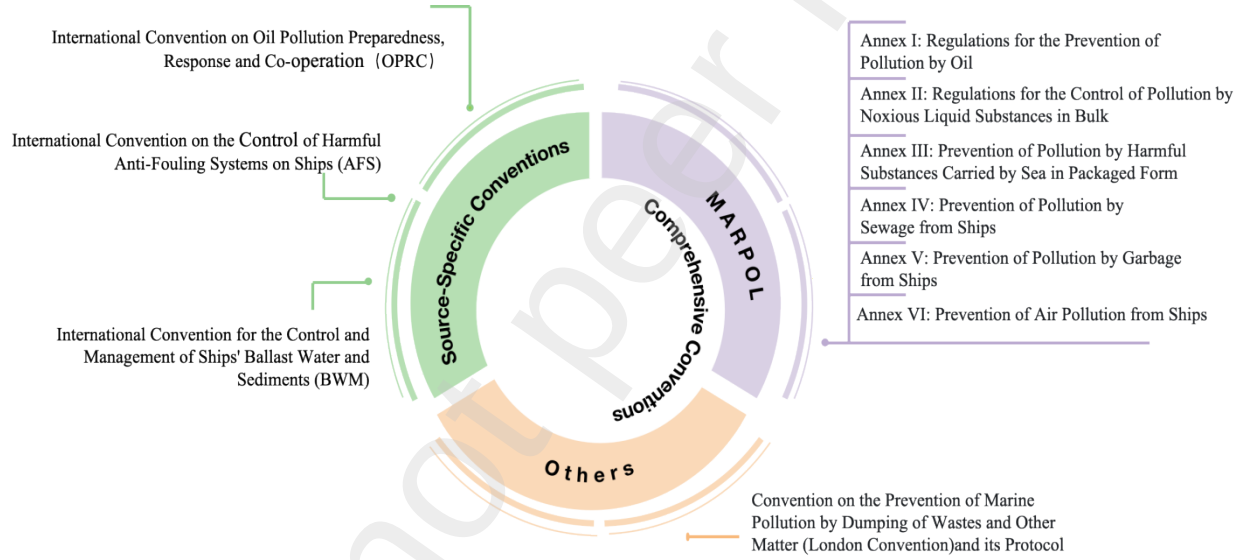

Fig. 3. IMO Existing Maritime Pollution Conventions

However, it must be emphasized that MARPOL Annex VI primarily targets SO_x and NO_x pollution, and the regulation of CO_2 is achieved through energy efficiency rules. In other words, MARPOL Annex VI does not define CO_2 as a ship-source pollutant, differing from the advisory opinion's conclusion that anthropogenic GHG emissions meet the definition of pollution of the marine environment under Article 1, paragraph 1, subparagraph 4 of UNCLOS. Currently, the IMO only acknowledges the negative impacts of CO_2 on atmospheric change and ocean acidification: the absorption of CO_2 by seawater forms carbonic acid, leading to ocean

[4] The Energy Efficiency Design Index (EEDI), as a technical energy efficiency indicator for newly built ships, requires that the ratio of carbon dioxide emissions to the product of a ship's designed deadweight tonnage and reference speed must meet a specified level for major types of new ships above 400 gross tonnage and existing ships undergoing major modifications. The Ship Energy Efficiency Management Plan (SEEMP), through data monitoring, energy efficiency evaluation, and improvement measures, aims to reduce fuel consumption and carbon emissions. It is one of the core management tools developed by the International Maritime Organization (IMO) to enhance ship energy efficiency and achieve carbon emission reduction (IMO, *2023 Guidelines on SEEMP*).

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acidification, which threatens calcifying organisms such as coral reefs and shellfish—a process constituting damage to the marine ecosystem (IMO, 2023b). The IMO's regulatory approach focuses on building consensus and formulating detailed rules for GHG emission reduction, without addressing the contentious issue of defining GHG emissions as pollutants. The ITLOS advisory opinion's interpretation, including GHG emissions within the scope of marine pollution, establishes a direct link between UNCLOS, international climate treaties, and IMO legal instruments on GHG emission reduction. The link breaks the previously relatively independent status of shipping regarding GHG emissions.

3.2 Challenges in Fulfilling Emission Reduction Obligations

3.2.1 Degree of Fulfillment of the Due Diligence Obligation

Both advisory opinions clearly delineate that the primary nature of State obligations in the field of climate change is that of due diligence obligations, not obligations of result. The key to assessing a State's compliance lies in whether it has taken reasonable, good faith actions consistent with the due diligence standard, not whether it has ultimately entirely prevented the harm from occurring. However, due diligence is a variable concept; its degree of strictness depends on factors such as the level of risk posed by the specific activity, the best available science and technology, relevant international standards, and the urgency of the harm. In the context of climate change, given the potential for serious and irreversible damage, the required level of diligence must be set at a very high level.

Consequently, this obligation faces significant practical difficulties and challenges in its implementation. Due to the inherent variability of the due diligence standard, its specific degree of fulfillment lacks clear objective boundaries, making it difficult to establish a universally applicable quantitative evaluation system. Differences among States in capabilities, resources, and stages of development further complicate the fair and consistent assessment of their degree of diligence at the international level. Moreover, the global, cumulative, and long-term characteristics of climate change make it difficult to directly verify the causal link between individual States' actions and overall environmental outcomes. Therefore, while the delineation of the due diligence obligation theoretically clarifies the nature of State obligations and acknowledges reasonable differences in responsibility among States, its practical implementation, measurement, and accountability remain an evolving and challenging legal and practical issue.

3.2.2 Risk of Fragmentation of the Obligation to Cooperate

The ITLOS and ICJ advisory opinions elevate the obligation to cooperate from an abstract

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principle in international relations to an independent legal obligation with clear connotation and performance requirements, marking significant progress in cooperative norms within climate governance. The ITLOS advisory opinion emphasizes that the obligation to cooperate permeates Part XII of UNCLOS, requiring States to develop common rules, harmonize policies at global and regional levels, and provide substantive support to developing States. The ICJ further roots the obligation to cooperate in the Charter of the United Nations, elucidating its inherent link with the obligation to prevent environmental harm, and stressing that cooperation must be guided by the principle of good faith, encompassing concrete areas such as technology transfer, financial support, scientific research, and information sharing. Together, they promote a performance standard for the obligation to cooperate centered on sincerity. However, within the IMO-led international maritime carbon emission reduction process, the specific implementation of the obligation to cooperate faces multiple practical difficulties and structural challenges.

First, divergence in policy pathways and the balance of national interests constitute fundamental obstacles to cooperation. As scholars have noted, climate change negotiations are fraught with deep disagreements over the allocation of responsibilities, policy approaches, and the balance of national interests (Low and Murina, 2010). Influenced by economic and political factors, States link climate action with their own economic development interests and international political struggles, which inevitably affects the form and extent of their participation (Cao, 2025). In the maritime sector, although the IMO framework has established global emission reduction targets and measures, the EU, under Directive 2023/959, will reassess its shipping emission reduction policies based on the effectiveness of the IMO framework and its alignment with EU objectives, aiming to minimize the double burden on shipping companies while ensuring implementation effectiveness (EU, 2023b). The divergence in policies not only leads to significant debates over the legality and effectiveness of unilateral measures, such as whether the EU's maritime carbon trading system complies with international law of the sea and climate legislation (Kotzampasakis, 2023; Mao et al., 2024), but also creates the risk of regulatory overlap, as shipping companies may simultaneously face IMO and national measures, increasing operational complexity and compliance costs, thereby undermining global emission reduction efforts.

Secondly, the challenge of linking carbon markets highlights bottlenecks in constructing cooperative mechanisms. In April 2025, measures including new marine fuel standards and a global emissions pricing mechanism emerged, representing the world's first framework combining mandatory emission limits and GHG pricing across an entire industry sector[5]. In

[5] The proposed amendments encompass several critical components dual annual carbon intensity targets for marine fu els, ship compliance mechanism, IMO Net-Zero Fund, sustainable fuel certification scheme (SFCS), Zero-Emission Zo

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October 2025, the vote on the IMO Net-Zero Framework was postponed. The emergence of the IMO Net-Zero Framework indicates a hopeful consensus within the international community on the future path for shipping decarbonization, but it does not prohibit States from imposing additional domestic regulations based on their own emission reduction policies. The challenge of linking global carbon markets further complicates cooperation among different States. Currently, significant disparities exist among national carbon pricing systems. For instance, in March 2025, EU carbon prices ranged between €65 and €75 per ton (Trading Economic, 2025), while China's carbon prices were between 85 and 90 RMB per ton (National Carbon Market Composite Price Report, 2025). This marked disparity highlights the lack of a feasible basis for integrating the two systems, making cost-effective global emission reduction through market cooperation a difficulty.

In summary, although ITLOS and ICJ have legally reinforced the normative status of the obligation to cooperate, and the IMO Net-Zero Framework demonstrates preliminary achievement of cooperation at the industry level, the comprehensive fulfillment of this obligation remains constrained by policy divergence, institutional conflicts, and implementation gaps. Genuine, sustained, and good faith cooperation requires States not only to reach textual consensus in negotiations but also to overcome obstacles in rule design, mechanism coordination, implementation supervision, and interest alignment. This remains a core challenge for international shipping and global climate governance.

3.3 Reconciliation of Responsibility Allocation Principles

Currently, the ITLOS and ICJ advisory opinions are broadly consistent with the existing IMO-led carbon emission reduction regime. However, based on responsibility allocation principles, greater effort is needed to reconcile the CBDR principle with the No More Favourable Treatment (NMFT) principle. The ITLOS advisory opinion emphasizes CBDR in reducing maritime GHG emissions, considering it a cornerstone of global climate governance: In the context of marine pollution from anthropogenic GHG emissions, States with greater means and capabilities must do more to reduce such emissions than States with less means and capabilities (ITLOS, 2024, para.227). In the ICJ advisory opinion, the Court similarly indicated that sustainable development, the principle of common but differentiated responsibilities and respective capabilities, equity, intergenerational equity, and the precautionary approach or principle may serve as guiding principles for interpreting and applying the most directly relevant legal rules (ICJ, 2025a,

nes (ZNZs) incentive mechanism. IMO, IMO approves net-zero regulations for global shipping. https://www.imo.org/en/MediaCentre/PressBriefings/pages/IMO-approves-netzero-regulations.aspx, 11 April 2025 (accessed 21 May 2025).

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para.161). However, for IMO regulations, the NMFT principle applies, meaning that IMO regulatory measures for maritime emission reduction are binding and apply equally to all flag States (MEPC, 2008). Despite the IMO repeatedly emphasizing its goal of promoting a fair and just transition, conflicting views between developing and developed countries regarding the CBDR and NMFT principles have permeated the entire legislative process, hindering legislative efficiency and consensus formation (Shi, 2016). These mandatory technical and operational measures based on the NMFT principle were ultimately adopted by majority vote, rather than by consensus (Chen, 2021).

Guided by its purpose of "providing services for shipping of the world without discrimination", the international treaty instruments currently developed by the IMO adhere more strongly to the NMFT principle, with limited provisions addressing differentiated responsibilities based on the CBDR principle. In 2012, discussions on market-based measures were suspended, partly due to fundamental disagreements between developed and developing countries on these two principles, which undermined legislative efficiency and consensus-building for maritime carbon emission reduction (IMO, 2013). In 2025, discussions on the IMO Net-Zero Framework resulted in a negotiated compromise due to diverging positions of States based on these two principles. While adhering to the NMFT principle, the provisions on the governance of the IMO Net-Zero Fund and the composition of its governing body emphasized the importance of geographical balance, particularly ensuring adequate representation for Small Island Developing States (SIDS) and Least Developed Countries (LDCs) (IMO, 2025d). In light of this, the emphasis on the CBDR responsibility allocation principle in the advisory opinions makes reconciling these two principles particularly crucial for advancing current maritime carbon emission reduction legislation. Furthermore, although both the ITLOS and ICJ advisory opinions mention the CBDR principle as a responsibility allocation principle, they fail to clarify how it should be coordinated with obligations under UNCLOS, raising concerns among developing countries about potentially unfair burden-sharing.

4. Legislative Outlook for Carbon Emission Reduction in Shipping Based on Advisory Opinions

The above analysis shows that there is a deep and complex interaction between climate advisory opinions and maritime carbon emission reduction legislation. By clearly defining GHG as a marine pollutant and systematically explaining the national due diligence obligations, cooperation obligations, cross-border obligations and CBDR-RC principles, the advisory opinions provide a theoretical basis for maritime carbon emission reduction and set higher legal

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expectations. This marks a major integration of global climate governance and the law of the sea at the level of legal cognition. However, ideal legal principles face enormous tensions in reality when implemented in the highly globalized shipping industry.

4.1 At the Level of International Law

The key to climate governance is to promote the global energy low-carbon transition, through the energy clean revolution and energy efficiency revolution to achieve the unity of the energy economic benefits and environmental interests, taking into account the fact that energy, as a strategic commodity, is both economic and strategic, and that the security of its supply and cost control is a matter of national survival (Bradshaw, 2010). As pointed out in the Advisory Opinion, the importance of recognizing CBDR shall be emphasized. While measures following NMFT principle is more easy to implement, a successful international legal regime on GHG emission reduction in shipping also depends on reconciling the CBDR principle with the NMFT principle (Cao, 2024). In revising its strategy in 2023, a "just and equitable transition" clause was added to recognize the special needs of developing countries, particularly LDCs and SIDS, in capacity-building and technical cooperation. Due account should be taken to ensure a just and equitable transition that leaves no country behind (IMO, 2023a, 2023c). This shows that climate justice, climate responsibility, climate-related human rights and other moral elements shall be considered into the global climate governance framework (Posner and Sunstein, 2008).

Regarding the latest developments in IMO legislation, the shelving of the IMO net-zero framework highlights the complexity of the issue, particularly in establishing the IMO net-zero fund. Although preliminary compromises have been reached, there are still details to be discussed, such as how to raise, oversee and fairly allocate the vast revenues generated by its market-based mechanism, which may total hundreds of billions or even trillions of dollars each year (Baresic et al., 2022). Developed states generally favour directing these funds to reward early adopters and to finance global research, development and technology deployment, with the objective of maximizing emission-reduction efficiency. In contrast, developing states, and in particular SIDs and LDCs, maintain that revenue distribution must prioritize the principles of CBDR and respective capabilities. Drawing on equity norms from international environmental and development law, they argue that a significant share of fund should be used to: (1) compensate for "disproportionately negative impacts" (IMO, 2018), such as increased transport costs, reduced trade competitiveness and heightened food-security risks (IMO, 2023b, 2025c); (2) support the decarbonization of domestic shipping sectors and port infrastructure through technology transfer, capacity-building and facility upgrades; and (3) finance broader climate-

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mitigation and adaptation efforts (Fricaudet et al., 2024; Fricaudet et al., 2025), as restitution for historical emissions and unmet finance commitments by developed states (Dominioni et al., 2023). The MEPC 83/J/9 draft establishes the IMO Net-Zero Fund and outlines provisional eligible uses of its revenues in an effort to reconcile these positions (IMO, 2025b). Nevertheless, legal challenges remain: How to design the fund's governance structure, including council composition, decision-making procedures and voting-right allocations, to guarantee meaningful participation by developing states? How to set precise criteria for disbursement, approval procedures and oversight of projects, to uphold the principles of fairness, transparency and effectiveness in the use of the fund? The translation of the abstract ideal of distributive justice into concrete regulation rules and institutional mechanisms will determine the legitimacy and success of both the economic instrument and the broader Net-zero Framework, and ultimately depends on the strength of future international cooperation.

The impact of the judicial activities of international judicial bodies extends beyond the resolution of legal disputes to the broader advancement of the underlying global governance objectives. Currently, the international climate governance predominantly operate on a negotiation basis, whereby divergences are resolved through intergovernmental dialogue. Thus, the progress and certainty of the negotiation may be influenced by many factors such as the change of administrations, which is fully displayed by the repeatedly withdrawn from the Paris Agreement of the United States of America. Moreover, carbon reduction in shipping is essentially a "behavioral obligation" rather than a "result obligation," making its fulfillment level difficult to quantify. Fundamental disagreements among countries, particularly between developed and developing nations, over funding, technology, and development rights have led to frequent deadlocks in negotiations under the IMO framework. The advancement of emission reduction obligations is facing multiple obstacles, including the slow progress of the shipping net-zero framework, conflicts between unilateral measures and multilateral mechanisms, and weak supervision and accountability mechanisms (Bai and Qing, 2025; Sun, 2023). In the absence of strong multilateral solutions, unilateral measures that countries may take to fulfill their due diligence and transboundary obligations are continuously exacerbating the risk of fragmentation in global shipping regulation. This not only increases compliance costs for the shipping industry but may also erode the multilateral governance system centered around the IMO.

Even in the aforementioned stranded situation, global maritime carbon reduction should not fall into an all-or-nothing deadlock, but should shift to a pragmatic, incremental, and phased consensus transitional approach. Specifically, on the premise of maintaining the core position of IMO's multilateral governance, the approach should prioritize low-controversy measures, resolve

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divisive issues in phases, and collaboratively manage fragmented risks. On the basis of upholding climate justice and CBDR-RC, it should accumulate practical experience in carbon reduction and political mutual trust. Currently, regional carbon reduction practices should still be valued, and the exchange of data between mechanisms and the linkage of carbon quotas should be promoted to form a virtuous cycle of regional exploration and multilateral adoption. This approach respects the differences in development stages among different regions while maintaining the unity of the global shipping market. Ultimately, it should push maritime carbon reduction from principle consensus to action consensus, and from fragmented governance to collaborative governance.

4.2 At the Level of Domestic Law

The Advisory Opinion delineates both general and specific obligations for states to mitigate marine pollution resulting from anthropogenic GHG emissions. Such obligations requires the states to enact laws and regulations addressing ship-based GHG emissions, coordinate policies and regulations to prevent regulatory conflicts, and establish robust law enforcement mechanisms to ensure the effective implementation of these regulations.

4.2.1 Domestic Implementation of Due Diligence Obligations

The Advisory Opinion calls states to prevent, reduce and control GHG emissions, encourages states to strengthen their legal frameworks regarding carbon reduction. In particular, states are urged to adapt these frameworks to their national contexts in line with the international standards. In this context, states must ensure that their domestic legal frameworks meet or exceed the standards set by the IMO, ensuring that national regulations are at least as effective as the IMO rules and, where feasible, go beyond them (IMO, 2024). The legislative approaches taken by the European Union (EU) and China serve as two distinct examples of domestic implementation in this regard.

China's approach to emissions reductions primarily relies on the implementation of international conventions and the development of domestic policies. In 2021, the Ministry of Transport introduced the *14th Five-Year Plan for Green Transportation Development*, which set a policy target to reduce CO_2 emissions per unit of transport turnover by 3.5% for operating ships by 2025, compared to 2020 levels. Subsequently, the revised *Marine Environmental Protection Law of the People's Republic of China (2023)* mandates the improvement of energy efficiency in ships, fostering low-carbon maritime development through initiatives like the promotion of clean-energy vessels and the acceleration of older ship upgrades (Marine Environment Protection Law of the People's Republic of China, 2023). In response to the new requirements for the EEXI and the CII for existing ships, the MSA enacted the *Measures for the Management of ship Energy*

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Consumption Data and Carbon Intensity (2022), which set new requirements for shipbuilding practices. For emission monitoring, China plans to "gradually integrate carbon monitoring into the routine ecological environment monitoring system for coordinated implementation" (Liu and Li, 2022), proposing to refine its carbon emission accounting system and establish a national GHG emission factor database (The State Council of the People's Republic of China, 2024).

In contrast, the EU adopts a more aggressive approach, employing a policy strategy that combines "mandatory constraints and market mechanisms". In 2024, the EU introduced new climate goals, setting a target to reduce net GHG emissions by 90% from 1990 levels by 2040, with the ultimate aim of achieving carbon neutrality by 2050 (European Commission, 2024). On June 5, 2023, the directive to incorporate shipping into the EU Emissions Trading System (EU ETS) came into effect, shipping companies are required to secure carbon allowances for each voyage to the EU and must report and verify GHG emissions data within a specified timeframe (EU, 2023b). In July 2023, the European Parliament and the Council promulgated a regulation mandating the installation of shore-side electrical power systems and liquefied natural gas (LNG) bunkering facilities, which establishes legally binding infrastructure deployment targets calibrated to each port's operational profile (EU, 2023d). Regarding fuel intensity standards, the *EU Marine Fuel Regulation*, which came into force on October 12, 2023, mandates shipping companies to reduce the annual average fuel GHG intensity, encourage the use of renewable, low-carbon fuels, and adopt clean energy technologies (EU, 2023e). Furthermore, the revised *EU Renewable Energy Directive* calls for a 14.5% reduction in GHG intensity across the transport sector or a 29% share of renewable energy by 2030, extending its coverage from road and rail fuels to that of aviation and shipping (EU, 2023a).

The approaches of China and EU show that the fulfillment of the due diligence obligations in domestic policy and legal regimes may differ in different countries and regions. The approach each state takes to fulfill their international obligation is first decided by its policy and legal stance on decarbonization. While the EU supports to classify GHG emissions as pollutants, referencing scientific evidence that demonstrates the harmful effects of GHG emissions on the marine environment (ITLOS, 2023a), China contending that such a classification contradicts the framework of the UNFCCC and lacks universal international practice (Ma, 2024). Notably, the due diligence obligations under the UNCLOS do not explicitly mandate the ways of states to regulate the GHG emissions and do not require domestic laws explicitly classify maritime GHG emissions as marine pollutants. The Advisory Opinion does not impose rigid criteria for the fulfillment of due diligence obligations as well, stressing that the obligation is one of conduct (ICJ, 2025b, pp.11-20; ITLOS, 2024, para.234), which means compliance is measured by actions

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rather than legal definitions. Even in the absence of explicit domestic classifications of GHGs as pollutants, states can still fulfill their obligations by taking adequate and meaningful measures to address the concerns. This is consistent with the "bottom-up" climate governance model of autonomous participation by various countries, which has emerged from the international community's respect for national sovereignty and its adoption of non-confrontational, non-intrusive, and non-punitive action strategies (Qin, 2016).

4.2.2 Fragmentation Risks and Fulfillment of Cooperation Obligations

To handle the fragmentation risk, the fulfillment of cooperation obligation among states are critical. Climate change is no longer simply about reducing emissions, but also about enabling countries to deal with its impacts (Hall and Persson, 2018). The collaborative approach as required by Article 197 of the UNCLOS is paramount given the global impact of carbon emissions, a challenge that no single nation can resolve independently. Collective action is essential, encompassing joint efforts, coordination, information sharing, and the transfer of technical knowledge and support.

In the context of decarbonization in shipping, this requires efforts at least from two aspects. The first is to diminish unwanted overlapping or conflicting measures. For this purpose, states or regions that have adopted unilateral measures shall consider to abandon their domestic measures that may lead to a overlapping in their application with the IMO measures. Leveraging the IMO's multilateral platform for the development of unified measures shall be regarded as the most effective strategy to the international regime. Efforts should focus on engaging more nations in international maritime carbon reduction negotiations, strengthening the IMO's global mechanisms, and enhancing existing cooperation networks. The second is to support the capability building of developing countries, in particular the LDCs and SIDS. The ITLOS explicitly states that developed nations bear specific obligations to assist developing countries—especially those that are vulnerable—in mitigating marine pollution caused by anthropogenic GHG emissions, with assistance covering financial, technological, and human resources (ITLOS, 2024, para.339). The IACHR believes that states have the obligation to cooperate sincerely and effectively, and not only to seek cooperation externally but also to actively accept it (IACHR, 2025, pp.4-5). The ICJ explicitly puts forward the view of the obligation to cooperate, analyzing it from multiple perspectives such as customary international law, the climate convention, and UNCLOS, calling on states to formulate relevant rules and standards (ICJ, 2025b, pp.6-19).

For the shipping industry, states shall participate actively in facilitating information sharing, technology transfer, training, and technical cooperation, and projects such as the GHG-SMART

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(Sustainable Maritime Transport Training) Program (IMO, 2020) and Global Industry Alliance (GIA) lauched by the IMO shall be further developed to bring together leading actors in the shipping industry to identify and develop innovative solutions to overcome barriers in energy efficiency technologies, share best operational practices, and promote technology transfer under the international legal regime.

5. Conclusion

The Advisory Opinion underscores its potential role in advancing global climate governance by offering a novel interpretations in the intersection of climate change and the law of the sea. The advisory opinion articulates a comprehensive set of emission reduction obligations encompassing cooperation, technical assistance, and adaptive measures, thereby underscoring the expectation of a just transition and capacity-building for developing States. These conceptual advancements have had a practical impact on the IMO and Annex VI of MARPOL, which focuses on technical and quantitative regulatory standards. On one hand, the advisory opinions have strengthened the justification and urgency for the IMO to introduce global emission reduction measures, such as energy efficiency standards and net-zero frameworks. On the other hand, the nature of due diligence has also left room for countries to adopt domestic measures based on their own circumstances (such as the EU's carbon market, China's energy efficiency management), enabling countries with different development levels to find action paths under unified goals.

However, the differences in national interests and varying views on the CBDR principle, coupled with the lack of a unified market mechanism in the long term, have led to alignment issues between domestically or regionally adopted standards and multilateral measures. Although the IMO Net-Zero Framework attempts to balance technical and economic measures, it remains a compromise text that lacks specific regulatory guidance on how the IMO Net-Zero Fund will be operationalized and is currently in a state of stagnation. Under the influence of variables such as the urgency of climate governance, economic interests, and political games, the global climate governance legal system is in a process of change. For shipping decarbonizaiton, the fundamental challenge at present remains the establishment of a fair and efficient international legal regime that respects the developmental disparities among nations. To address this, the international community shall cooperate to foster more unified emission reduction policies and cooperative mechanisms, ensuring that all countries, particularly developing nations, can equitably participate in the transition towards a more sustainable shipping, and facilitate a positive synergy between climate protection and sustainable marine development.

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The significance of the advisory opinions lies in confirming the direction and setting the bottom line for action. The true test lies in whether countries can transcend differences in positions and transform this consensus into practical, fair, and effective joint actions in technical pathways, financial arrangements, and daily supervision. Therefore, the key for the future does not lie in proposing new principles, but in how to implement existing consensus in concrete arrangements, which will be the decisive step for the shipping sector to truly contribute to global climate goals.

Refernce

Bai, J.Y., Qing, Y.L., 2025. Mitigation to GHG emission during Arctic shipping based on SDG: legal impetus and challenges response [in Chinese]. Journal of Dalian Maritime University (Social Science Edition) 24 (5), 24-36.

Baresic, D., Rojon, I., Shaw, A., 2022. Closing the Gap: An Overview of the Policy Options to Close the Competitiveness Gap and Enable an Equitable Zero-Emission Fuel Transition in Shipping. UMAS, London.

Barnes, R., 2022. An Advisory Opinion on Climate Change Obligations Under International Law: A Realistic Prospect. Ocean Development and International Law 53 (2-3), 180-213. https://doi.org/10.1080/00908320.2022.2106329.

Bodansky, D., Brunnée, J., Rajamani, L., International Climate Change Law, 2017. International Climate Change Law. Oxford University Press, Oxford., p.289.

Bradshaw, M. J., 2010. Global Energy Dilemmas: A Geographical Perspective. The Geographical Journal 176, 275-290.

Cao, J.J., 2025. The changing logic of global climate legal system [in Chinese]. Chinese Review of International Law (2), 39.

Cao, X.G., 2024. Coordinated approach to constructing China's maritime carbon emission market mechanism [in Chinese]. Pacific Journal 32 (1), 72-85. https://doi.org/10.14015/j.cnki.1004-8049.2024.01.006.

Chen, Y.L., 2021. Reconciling common but differentiated responsibilities principle and no more favourable treatment principle in regulating greenhouse gas emissions from international shipping. Marine Policy 123, 104317. https://doi.org/10.1016/j.marpol.20

Preprint not peer reviewed

This preprint research paper has not been peer reviewed. Electronic copy available at: https://ssrn.com/abstract=6389794

20.104317.

Convention on the International Maritime Organization, 1948. United Nations.

Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other M atter (London Convention), 1972. 1046 UNTS 120. Available at: https：//www.imo. org/en/OurWork/Environment/Pages/London-Convention-Protocol.aspx (accessed 28 Fe bruary 2026).

Deng, Y.; Zhang, H.; Pratap, A.; Failou,B.; Hussain,A.; Putri, H.M., 2024. Integrating C limate Change into Global Ocean Governance: The ITLOS Advisory Opinion on th e Specific Obligations of State Parties to the United Nations Convention on the La w of the Sea. Journal of Island and Marine Studies 1, 110011. https://doi.org/10.59 711/jims.11.110011.

Dominioni, G., Rojon, I., Salgmann, R., Englert, D., Gleeson, C., Lagouvardou, S., 202 3. Distributing Carbon Revenues from Shipping. World Bank, Washington, DC.

EU, 2023a. Directive (EU) 2023/2413 of the European Parliament and of the Council, 1 8 October, p. 51. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?u ri=OJ:L_202302413 (accessed 21 May 2025).

EU, 2023b. Directive (EU) 2023/959 of the European Parliament and of the Council, 10 May, p.30. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:3 2023L0959 (accessed 21 May 2025).

EU, 2023c. Directive (EU) 2023/959 of the European Parliament and of the Council, 10 May. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32023L 0959 (accessed 21 May 2025).

EU, 2023d. Regulation (EU) 2023/1804 of the European Parliament and of the Council, 13 September, Art.17. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?ur i=CELEX%3A32023R1804 (accessed 21 May 2025).

EU, 2023e. Regulation (EU) 2023/1805 of the European Parliament and of the Council, 13 September. Available at: https://eur-lex.europa.eu/eli/reg/2023/1805/oj (accessed 21 May 2025).

European Commission, 2024. 2040 climate target. Available at: https://climate.ec.europa.e u/eu-action/climate-strategies-targets/2040-climate-target_en (accessed 21 May 2025).

Preprint not peer reviewed

This preprint research paper has not been peer reviewed. Electronic copy available at: https://ssrn.com/abstract=6389794

Fricaudet, A., Majidova, P., M., Frosch, Smith, T., Rehmatulla, N., Prakash, V. Stewart, J., Oluteye, D., Baresic D., Chin-Yee, S., Almula, N., 2024. An overview of the d iscussions from IMO's Intersessional Working Group on GHGs 18th session. Londo n.

Fricaudet, M., Fabiano, F., Smith, T., Food security, 2025. Food security, IMO mid-term measures' impact on states and revenue distribution. Analysing synergies as well as risks. London.

Gong, W., 2023. The advisory opinion of the International Tribunal for the Law of the Sea on the obligations of states with respect to climate change: legal basis, effectiv eness, and possible impacts [in Chinese]. Pacific Journal 31 (9), 80. https://doi.org/ 10.14015/j.cnki.1004-8049.2023.09.006.

Hall, N., Persson, A., 2018. Global climate adaptation governance: Why is it not legally binding? European Journal of International Relations 24 (3), 540-566. https://doi.org /10.1177/1354066117725157.

Holst, R.J.R., 2023. Taking the current when it serves: prospects and challenges for an ITLOS advisory opinion on ocean and climate change. Review of European, Comp arative and International Environmental Law 32 (2), 217-225. https://doi.org/10.1111 /reel.12481.

IACHR, 2025. Advisory Opinion AO-32/25 requested by the Republic of Chile and the Republic of Colombia on Climate Emergency and Human Rights. Official summary issued by the Inter-American Court, 29 May.

ICJ, 1996. Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion. ICJ Reports 1996 (I), p.264, para.102.

ICJ, 2025a. Obligations of States in respect of Climate Change, Advisory Opinion, 23 J uly.

ICJ, 2025b. Summary of the Advisory Opinion of 23 July 2025, Summary, 23 July.

IMO, 2013. MEPC 65/22, Report of The Marine Environment Protection Committee on its Sixty-Fifth Session, 24 May.

IMO, 2018. MEPC 72/17/Add.1 Annex 11, Initial IMO Strategy on Reduction of GHG Emissions from Ships, 13 April, para.4.13. Available at: https://wwwcdn.imo.org/loc alresources/en/KnowledgeCentre/IndexofIMOResolutions/MEPCDocuments/MEPC.304(

Preprint not peer reviewed

This preprint research paper has not been peer reviewed. Electronic copy available at: https://ssrn.com/abstract=6389794

72).pdf (accessed 21 May 2025).

IMO, 2020. IMO and Republic of Korea partner to address ships' GHG emissions. 28 October. Available at: https://www.imo.org/en/MediaCentre/PressBriefings/pages/39-GHG-SMART-.aspx (accessed 21 May 2025).

IMO, 2021. Marine Environment Protection Committee (MEPC 76), 10 to 17 June (remote session). Available at: https://www.imo.org/en/MediaCentre/MeetingSummaries/Pages/MEPC76meetingsummary.aspx (accessed 21 May 2025).

IMO, 2023a. 2023 IMO Strategy on Reduction of GHG Emissions from Ships. Resolution MEPC.377(80), Annex 15, adopted 7 July.

IMO, 2023b. Request for an Advisory Opinion submitted by the Commission of Small Island States on Climate Change and International Law, Advisory Opinion, 16 June, para.68.

IMO, 2023c. Revised Strategic Plan for the Organization (2024-2029). Resolution A.1149(32), adopted 15 December.

IMO, 2024. ISWG-GHG 17/2/17, The ITLOS Advisory Opinion: legal obligations on States, 9 August, p.4, para.17.

IMO, 2025a. Circular Letter No.5005, Draft revised MARPOL Annex VI, 11 April, pp. 62-64.

IMO, 2025b. MEPC 83/7/30, Why a flat levy should not be adopted by IMO, 31 January.

IMO, 2025c. MEPC 83/INF.32, Why a flat levy should not be adopted by IMO--development of rationale, 31 January.

IMO, 2025d. MEPC 83/WP.11, Report of the Nineteenth Meeting of the Intersessional Working Group on Reduction of GHG Emissions from Ships (ISWG-GHG 19) and the Working Group on Reduction of GHG Emissions from Ships, 10 April, p.27.

ITLOS, 2023a. Request for an Advisory Opinion submitted by the Commission of Small Island States on Climate Change and International Law, Written Statement Submitted by the European Union, 15 June, p.28.

ITLOS, 2023b. Request for an Advisory Opinion submitted by the Commission of Small Island States on Climate Change and International Law, Written Statement Submit

Preprint not peer reviewed

This preprint research paper has not been peer reviewed. Electronic copy available at: https://ssrn.com/abstract=6389794

ted by the United Kingdom, 16 June, p.33.

ITLOS, 2023c. Request for an Advisory Opinion submitted by the Commission of Small Island States on Climate Change and International Law, Written Statement Submitte d by Germany, 14 June, pp.16-17.

ITLOS, 2023d. Request for an Advisory Opinion submitted by the Commission of Smal l Island States on Climate Change and International Law, Written Statement by the Republic of India, pp. 5-7.

ITLOS, 2023e. Request for an Advisory Opinion submitted by the Commission of Small Island States on Climate Change and International Law, Written Statement Submitte d by the Government of the Republic of Indonesia, 15 June, p.18.

ITLOS, 2023f. Request for an Advisory Opinion submitted by the Commission of Small Island States on Climate Change and International Law, Written Statement of the I nternational Maritime Organization, 16 June, p.9.

ITLOS, 2023g. Request for an Advisory Opinion submitted by the Commission of Smal l Island States on Climate Change and International Law, Written Statement Submit ted by the European Union, 15 June, paras. 43-44.

ITLOS, 2024. Request for an Advisory Opinion submitted by the Commission of Small Island States on Climate Change and International Law, Advisory Opinion, 21 May.

Kong, L.J., Shao, H.Y., 2024. A reinterpretation of Article 194(1) of the UNCLOS in t he light of the convergence of UNCLOS and UNFCCC [in Chinese]. Boundary and Ocean Studies 9 (3), 62-64.

Kotzampasakis, M., 2023. Intercontinental shipping in the European Union emissions tra ding system: A 'fifty-fifty' alignment with the law of the sea and international clim ate law? Review of European, Comparative and International Environmental Law 32 (1), 29-43. https://doi.org/10.1111/reel.12485.

Lewis, R., 2025. The 'Constitution for the Oceans'? The Law of the Sea Convention as a Living Treaty. International and Comparative Law Quarterly 74 (1), 23. https://do i.org/10.1017/S0020589325000120.

Li, H.M., Huang, H. 2024. International Legal Controversies on Global Regulation of G reenhouse Gas Emissions from Shipping and China's Approach [in Chinese]. Journal of Qingdao University of Science and Technology (Social Sciences Edition) 40 (4),

Preprint not peer reviewed

This preprint research paper has not been peer reviewed. Electronic copy available at: https://ssrn.com/abstract=6389794

84.

Li, W.Q., Tian, H.Y., Guo, J.P., 2023. The ITLOS Climate Advisory Opinion: background, jurisprudential basis, and spillover effects [in Chinese]. Qinghai Social Sciences (4), 176.

Liu, W.X., Li, C., 2022. Collaborative planning and guarantee of greenhouse gas and air pollutant control in China [in Chinese]. China Population, Resources and Environment 32 (12), 4.

Low, P., Murina, M., 2010. Managing cooperation on climate change: What can we learn from the WTO? Journal of International Trade and Economic Development 19 (1), 135-161. https://doi.org/10.1080/09638190903327567.

Ma, X.M., 2024. International Tribunal for the Law of the Sea Advisory Case on Climate Change: China's position and views——Ma Xinmin's Keynote address at the 2024 Colloquium on International Law hosted by the Asian Academy of International Law. WeChat public article, 11 July. Available at: https://mp.weixin.qq.com/s/yvNLBMqGlaSDv1zAfym69Q (accessed 21 May 2025).

Mao, Z.K., Ma, A.D., Zhang, Z.J., 2024. Towards carbon neutrality in shipping: Impact of European Union's emissions trading system for shipping and China's response. Ocean and Coastal Management 249, 3. https://doi.org/10.1016/j.ocecoaman.2023.107006.

Marine Environment Protection Committee (MEPC), 2008. MEPC 57/21, Report of the Marine Environment Protection Committee on its Fifty-Seventh Session, 7 April.

Marine Environment Protection Law of the People's Republic of China, 2023. (Revision). Art. 88.

National Carbon Market Composite Price Report. https://www.cneeex.com/zhhq/quotshown.html (accessed 13 April 2025).

Posner, E., Sunstein, C. R., 2008. Climate Change Justice. Georgetown Law Journal 96, 1565.

Qian, J.T., Sun, K.J., Chang, Y.C., 2024. The impact of the ITLOS climate change advisory opinion on the development of international law. Marine Policy 170, 2. https://doi.org/10.1016/j.marpol.2024.106406.

Preprint not peer reviewed

This preprint research paper has not been peer reviewed. Electronic copy available at: https://ssrn.com/abstract=6389794

Qin, T.B., 2016. The "bottom-up" approach in the Paris Agreement and its enlightenme nt [in Chinese]. Chinese Review of International Law (3), 70.

Que, Z.W., Z.W., 2024. The role of international judicial bodies in global climate gover nance [in Chinese]. Zhengfa Luncong (4), 175.

Sands, P., 2016. Reflections on International Judicialization. European Journal of Internat ional Law 27, 885-900.

Shao, L.L. 2024. Allocation and Realization of Responsibilities for International Maritim e Carbon Emission Reduction: Based on the Improvement of Carbon Market Mech anisms [in Chinese]. Studies in Law and Business (3), 167.

Shi, Y., 2016. Reducing greenhouse gas emissions from international shipping: Is it time to consider market-based measures? Marine Policy 64, 123-134.

Sun, Y., 2023. International Legal Governance of Carbon Emissions from Ships: Diverg ence, Models, and China's Path [in Chinese]. Chinese Journal of Maritime Law 34 (4), 16-26.

Supreme Court of New Zealand, 2021. Trans-Tasman Resources Limited v The Taranak i-Whanganui Conservation Board, Judgment of 30 September, para.94.

The State Council of the People's Republic of China, 2024. Notice of the General Offi ce of the State Council on Issuing the Work Plan for Accelerating the Establishme nt of a Dual Carbon Emission Control System [in Chinese]. Available at: https://w ww.gov.cn/zhengce/content/202408/content_6966079.htm (accessed 21 May 2025).

Trading Economics, EU Carbon Permits. Available at: https://tradingeconomics.com/com modity/carbon (accessed 13 April 2025).

United Nations Convention on the Law of the Sea (UNCLOS), 1982. 1833 UNTS 3, A rt. 293(1). Available at: https：//www.un.org/depts/los/convention_agreements/texts/un clos/unclos_e.pdf (accessed 28 February 2026).

Preprint not peer reviewed

This preprint research paper has not been peer reviewed. Electronic copy available at: https://ssrn.com/abstract=6389794

Fig 1. Research Outline

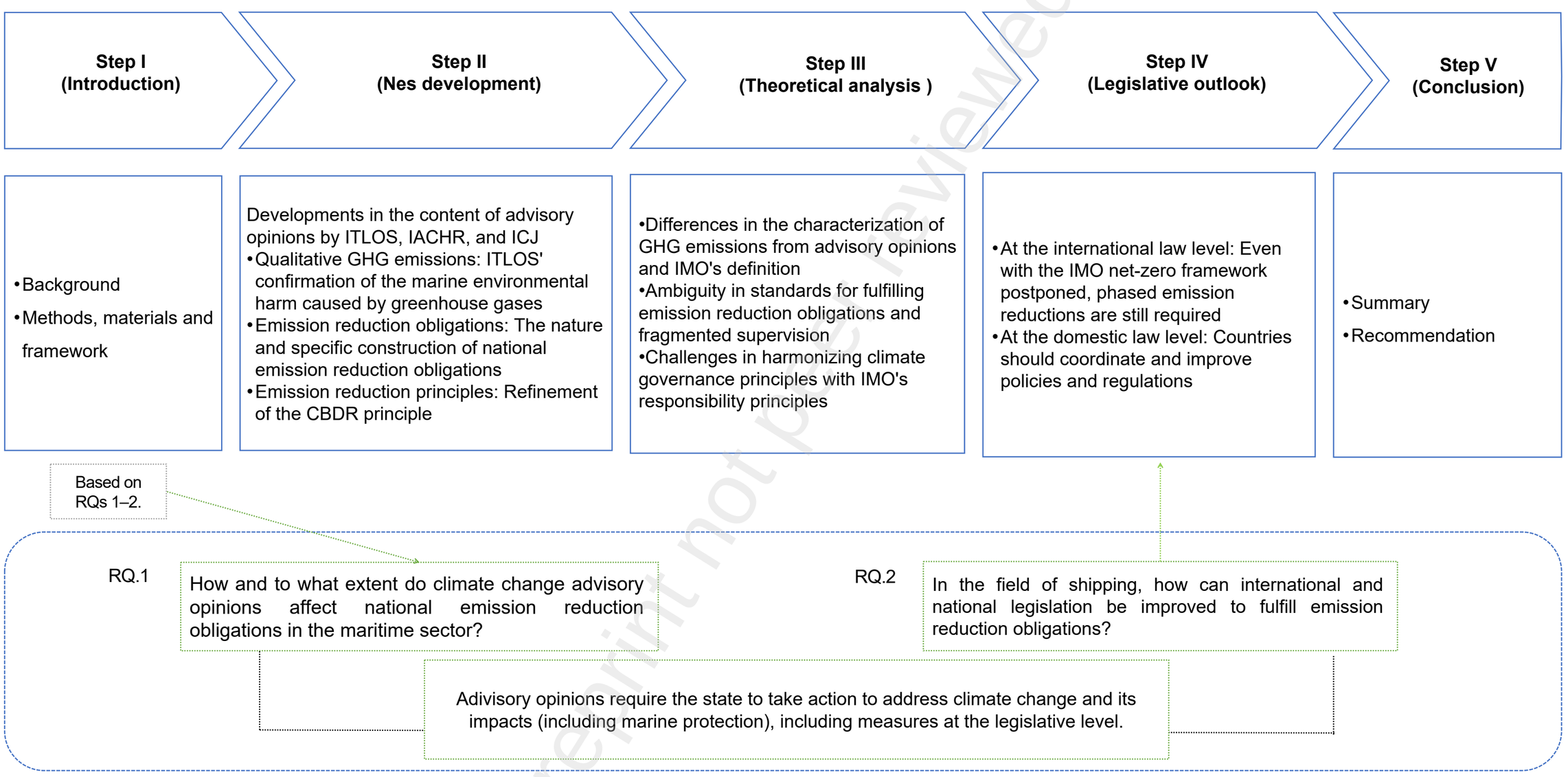

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Fig 2. The obligation content in the advisory opinion

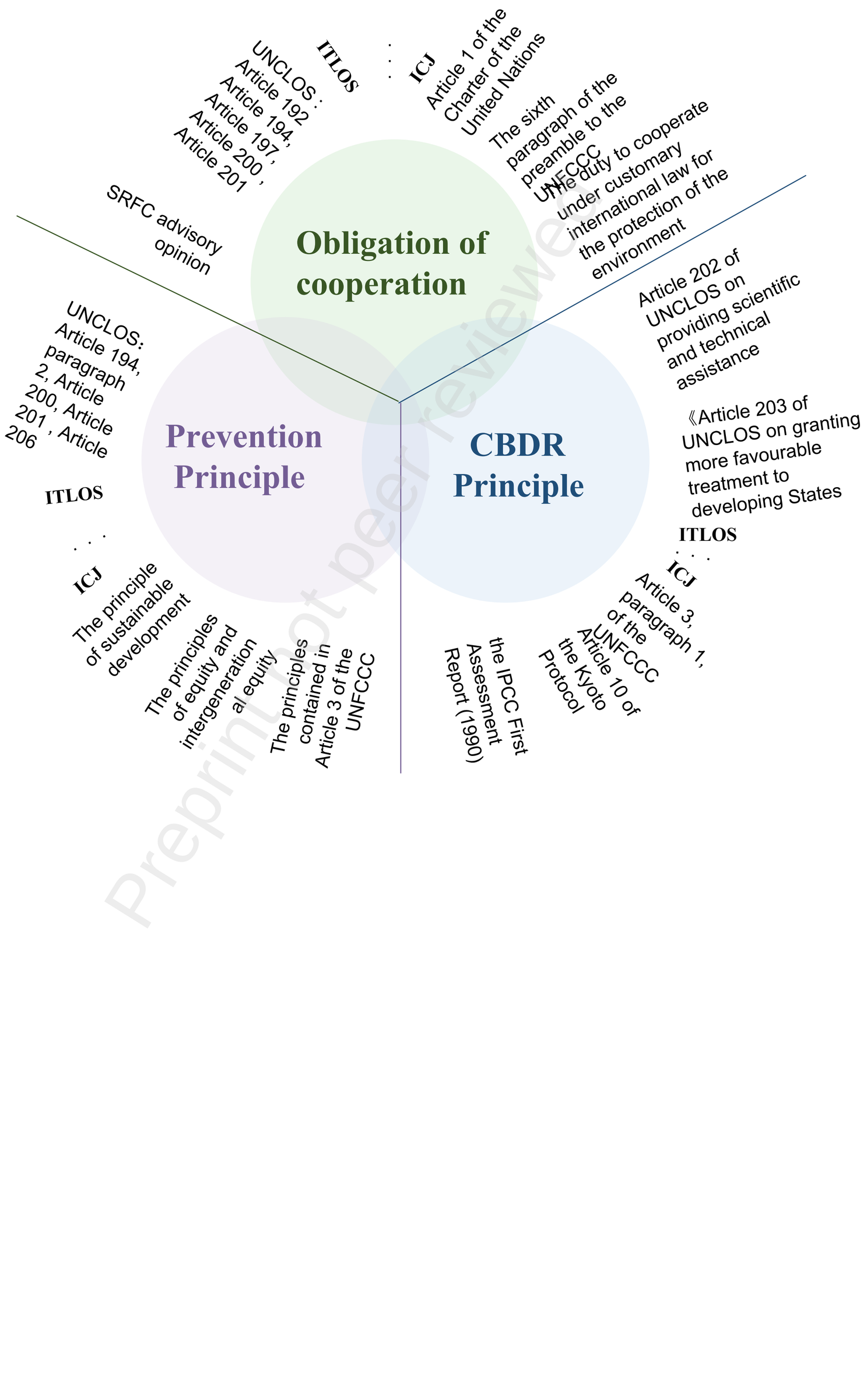

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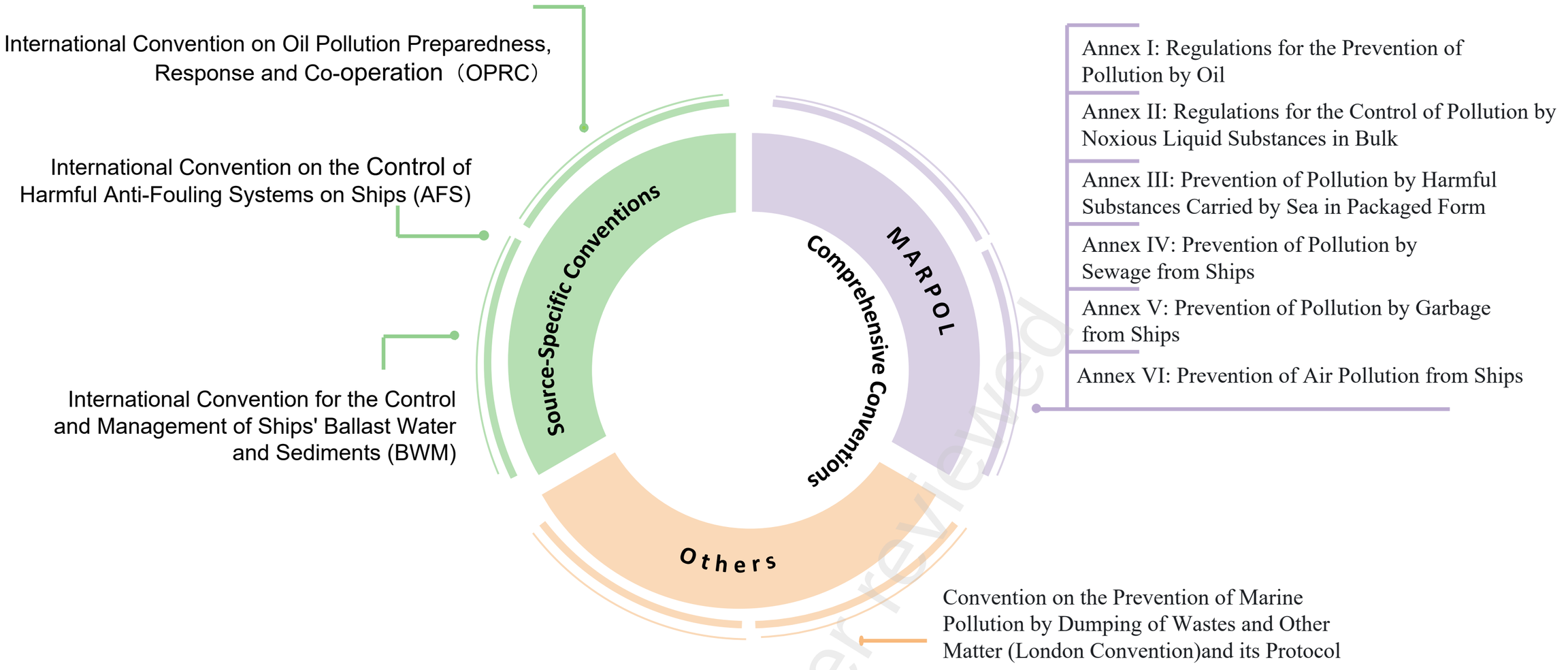
Fig 3. Existing Maritime Pollution Conventions



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