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Bridging the gaps between international and China's domestic law on ship-sourced marine eco-environmental damage

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During the formulation of domestic legislation, States shall duly consider the obligations stipulated in the international treaties to which they are parties. This ensures the conformity of their municipal legal frameworks with international laws and regulations, and refrains from enacting domestic laws incompatible with treaty obligations. Notwithstanding this imperative, discrepancies persist between the provisions of China's domestic legal regime regulating the scope of compensation for vessel-sourced oil pollution and the stipulations of pertinent international treaties and relevant state practices. Such legal inconsistencies may engender potential gaps in application, undermining the operational efficacy of international maritime regulatory instruments in this domain. To bridge such gaps, this paper synthesizes contemporary international maritime regulatory regime and comparative extraterritorial legislative precedents, endeavoring to from a coherent interpretative framework through which China's domestic laws on oil pollution compensation scopes may achieve synergistic alignment, thereby securing uniformity in the rules and standards governing environmental obligations of States for marine ecological endangerment.

KEYWORDS

international law, domestic law, compensation scope, ship sourced oil pollution, marine eco-environmental damage

1 Introduction

In traditional theory of international law, the relationship between international law and domestic law remains subject to diverse views (Giannattasio, 2018; Wuerth, 2017). Generally, international law as a theoretical framework, should serve to impel the international community to recognize and comprehend the underlying logic of reality, and its applicability depends on the similarity of relevant circumstances (Lando, 2018). Therefore, the approach to this issue must be contingent upon specific contexts. In the field of marine environmental protection, there may be a stronger alignment with the monist

perspective in understanding the relationship between international law including contemporary international treaties and relevant domestic laws. On the one hand, their objectives of protecting the marine environment and advancing its sustainable development represent a shared commitment between international law and domestic legal systems. On the other hand, regulatory divergence may arise concerning the same issues on marine environmental protection between international and domestic legal regimes under non-monist legal frameworks, potentially escalating to normative conflicts. For example, Article 237 of the United Nations Convention on the Law of the Sea (UNCLOS) ensures mutual harmonization among treaties, achieving systematic integration on ocean governance. Simultaneously, Articles 192 and 194 of the UNCLOS acknowledge the State obligation to protect and preserve the marine environment, primarily relying on States to “take, individually or jointly as appropriate,... measures ... that are necessary”¹ to regulate marine pollution. The above demonstrates that, in resolving marine environmental challenges, the international community exhibits a preference for a monist approach to conceptualizing the relationship between international law and domestic legal systems. In practice, this monist approach manifests most distinctly in regulating marine pollution from vessels including oil spills.

Oil spills from ship collisions or groundings have been among the most notable maritime accidents over the years (Andersson, 2016). The volume of oil released in such incidents was significantly higher compared to other disasters, meriting particular attention. Since 1960, approximately 410 oil spills have each released over 700 tons (Rogowska and Namiesnik, 2010). Additionally, several accidents have collectively released over 5.5 million tons of oil into the ocean, typically with devastating consequences (Vieites et al., 2004). Oil pollution from marine transportation, constituting about 34% of all marine pollution (Andersson, 2016), leads to significant ecological and environmental damage. Compensation should follow any damage. Therefore, the compensation scope is central to global systems addressing marine ecological and environmental damage.

To address these issues, the international law, including the UNCLOS, the Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction (BBNJ Agreement) as general treaties to regulate marine environmental pollution, and the 1992 Protocol to the 1969 International Treaty on Civil Liability for Oil Pollution Damage (hereafter ‘1992 CLC’), the 1992 Protocol to the 1971 International Oil Pollution Compensation Fund Treaty (hereafter ‘1992 Fund’), and the 2001 International Treaty on Civil Liability for Bunker oil pollution Damage (hereafter ‘Bunker Oil Treaty’) as specific treaties in shipping pollution regulation, consistently stipulate the compensation scope for marine eco-environmental damage, which are effective in China. In contrast, China’s domestic law features a fragmented legislative model, with provisions for marine

eco-environmental damage compensation scattered across various rules, regulations, and judicial interpretations. In terms of law specialis, amended in 2024, the *Marine Environmental Protection Law* (hereafter ‘MEPL’) serves as the fundamental law for marine protection, with Article 114 applying the Chinese *Civil Code* to define a broader compensation scope for marine damage.² The Chinese *Maritime Code*, which should address ship-sourced oil pollution but lacks comprehensive regulations on maritime environmental violations. In terms of the Chinese *Civil Code*, article 1235 stipulates the compensation scope of marine damage and emphasizing permanent environmental impacts, which is larger than the scope stipulated in the international treaties. Hence, the MEPL emphasizes enhanced marine ecological protection via civil legal norms. China has achieved significant consistency in legal norms across general and special laws concerning compensation scope for marine damage from ship-sourced oil pollution. In terms of policy guidance, the *Reform Program for Ecological Environmental Protection* (hereafter ‘Reform Program’) provides policy guidance, while it is not applicable for ship-sourced oil pollution of marine eco-environmental damage.³ Given the similar nature of ecological damage, the *Reform Program*’s framework significantly guides legal norms for compensating damage from ship-sourced oil pollution. Consequently, the MEPL, the Chinese *Maritime Code* and the Chinese *Civil Code*, along with *Reform Plan* guidance, present an optimal time to enhance legal norms for compensating ship-sourced oil pollution of marine eco-environmental damage in China.

Given that existing literature has paid scant attention to the gaps between international and China’s domestic law pertaining to the compensation scope for ship-sourced marine eco-environmental damage, this article seeks to analyze these regulatory gaps. As eco-environmental damage from ship-sourced oil pollution is a new category of marine damage in holistic marine zones, which justifiably involves both international law and domestic law. However, China’s domestic law stipulates a broader compensation scope for marine eco-environmental damage from ship-sourced oil pollution than international treaties do, which also stands apart from the comparable domestic laws and practices of other States. Such “broader” or indeed “stricter” domestic law thus might be challenging to implement and enforce in concrete cases. This article discusses the impacts of this legal gap and proposes strategies to bridge the gap, aiming to harmonize the legal frameworks protecting the marine ecosystem.

1 United Nations Convention on the Law of the Sea, Art. 211(2), Dec. 10, 1982, 1833 U.N.T.S. 397, Articles 194.

2 Article 114 of the Marine Environment Protection Law provides: “Anyone who pollutes the marine environment or destroys the marine ecology and causes damage to others shall bear civil liability by the provisions of the Civil Code of the People’s Republic of China and other laws.”

3 The *Reform Program* stipulates that “Environmental damage referred to in this Program means adverse changes in environmental elements such as the atmosphere, surface water, groundwater, soil, forests and other biological elements such as plants, animals and microorganisms, as well as degradation of the functions of the ecosystems constituted by the above elements, caused by pollution of the environment and destruction of ecology.”

By doing so, it aims to provide valuable insights and practical references for researchers, government legislators and policymakers specializing in marine environmental damage under both international and domestic levels.

2 The compensation scope under international law and China's legislative practice

Marine pollution from ships constitutes one of the most intractable legal issues in the law of the sea. Such pollution originating from vessels will ultimately jeopardize human life and health while transcending political boundaries of a State. Consequently, it is imperative to coordinate international and domestic laws on marine pollution from ships. China has effectively adopted the principle of “treaties prevailing over domestic law” in international marine environmental protection from its legislative practice. However, due to constantly emerging novel challenges in the marine environment protection such as physical damage to vulnerable marine ecosystems from ship oil pollution, inevitable coordination gaps persist between China's domestic legislation and prevailing international legal frameworks. These gaps may render the current framework inadequate for addressing emerging marine environmental issues. This section undertakes an examination of compensation scope for vessel-sourced pollution under both international legal frameworks and China's domestic legislation, thereby revealing their regulatory disparities.

2.1 The compensation scope under international law

From the international law perspective, Part XII of the UNCLOS imposes general obligations of States to protect and preserve the marine environment, including adopting measures to prevent, reduce, and control marine pollution from any source.⁴ Within this framework, the IMO has adopted series of regulations addressing maritime navigation safety, marine pollution prevention, and liability and compensation for pollution damage, supplemented by dozens of codes and standards and guidelines. The IMO and various international and regional treaties and regulations including MARPOL collectively establish a highly flexible international maritime legal framework, regulating measures of flag States towards oil pollution and delineating coastal States' jurisdiction.

Specifically, international treaties consistently define the compensation scope for marine eco-environmental damage from ship-sourced oil pollution. According to Article 2(3) of the 1992 CLC,⁵ ‘pollution damage’ includes damages from oil spills, losses

outside the polluting ship, costs of preventive measures, and subsequent eco-environmental damage. However, the compensation scope for eco-environmental damage is confined to the cost of reasonable reinstatement measures, whether already taken or planned (Bai, 2011). Both the 1992 *Fund* and the *Bunker Oil Treaty* adopt the 1992 CLC's definition of ‘pollution damage.’ This reflects a harmonization of the core concept within the international legal framework for liability from ship-sourced oil pollution. The International Maritime Committee (hereafter ‘CMI’) ‘s *Oil Pollution Guideline*, established in 1994 and revised in 2016, details compensation scope for eco-environmental damage, emphasizing reasonable restoration costs to expedite environmental recovery, including research costs to assess damage and restoration efficacy (Hu et al., 2021).

This provision simplifies the quantification of costs for environmental restoration in compensation scope for marine eco-environmental damage. Although the treaty recognizes compensation scope for marine eco-environmental damage from ship-sourced oil pollution, it also permits national laws and courts to set and adjust compensation standards. As awareness of marine environmental protection has grown, international treaties have expanded compensation scope for eco-environmental damage—from none in the 1969 CLC to inclusion in the 1992 CLC. However, this compensation is limited to actual or anticipated costs and does not yet cover permanent damage. In addition, the liability of the obligated subject is reasonably limited in the compensation for damage to the marine ecosystem, i.e., the limitation of liability system. Such limitation of liability refers to the fact that the subject of the obligation to pay compensation for losses arising from damage to the marine ecosystem caused by a single pollution incident from a ship is liable for damages only up to the limit of compensation set by law, which is the limit of maritime liability established in the 1976 Convention on Limitation of Liability for Maritime Claims.

Consequently, while international law establishes minimum standards for the compensation scope, its interpretation dynamically evolves alongside the progressive development of international marine environmental protection law, and the ambit of this obligation is subject to temporal variation (Harrison, 2017). Nevertheless, “permanent damage” remains explicitly excluded from the compensatory ambit defined by international law, and its discretion in this regard largely depends upon the provisions of municipal laws.

the ship, wherever such escape or discharge may occur, provided compensation scope for impairment of the environment other than loss of profit from such impairment shall be limited to costs of the ship. (b) loss or damage caused outside the ship by contamination resulting from the escape or discharge of oil from the ship, wherever such escape or discharge may occur, provided compensation scope for impairment of the environment other than loss of profit from such impairment shall be limited to costs of reasonable measures of reinstatement actually undertaken or to be undertaken; and (b) the costs of preventive measures and further loss or damage caused by preventive measures.

⁴ See UNCLOS, Articles 192, 194 and 195.

⁵ “Pollution damage” in 1992 CLC means: (a) loss or damage caused outside the ship by contamination resulting from the escape or discharge of oil from

2.2 The compensation scope in China's domestic law

As ship-sourced oil pollution, often termed as marine environmental disaster, is believed to have profound impacts on the marine ecosystem and environment, international maritime rules alongside domestic laws of flag States jointly form the international minimum standards to mitigate ship-sourced oil pollution that States must uphold as the implementation and enforcement of shipping standards ultimately rest with flag States (Freestone, 2008). In China's legislative practice, the Article 123 of the *MEPL* clarifies the relationship between international treaties and China's domestic law, stating that China's domestic law shall, except for China's reservations, apply relevant provisions of relevant international treaties.⁶ Besides, the *MEPL* serves as the foundational law for marine environmental protection, outlining domestic compensation guidelines for marine eco-environmental damage from ship-sourced oil pollution. The *MELP* also introduced legal liability provisions for "marine environmental pollution damage" and "marine ecological damage" within its Chapter "Legal Liability". These establish general provisions concerning the compensation for marine eco-environmental damage, thereby aligning with Part XII of the UNCLOS (Xue, 2021). However, the *MEPL*'s definition of marine eco-environmental damage in Article 121 does not address ecological destruction comprehensively.⁷ Article 114 of the *MEPL* extends the liability coverage to include ecological damage.⁸ Consequently, Article 1235's definition of compensation scope for eco-environmental damage is vital in determining the extent of compensation scope for such damage from ship-sourced oil pollution.⁹

Furthermore, the Chinese Maritime Code targets marine eco-environmental damage from ship-sourced oil pollution; its provisions on maritime environmental violations remain incomplete and unspecific. The *Regulations of the Supreme Court*

of the People's Republic of China on Several Matters Concerning Trial on Compensation scope for Ship sourced oil pollution Damage from Ships (hereinafter '*the Judicial Interpretation of Ship sourced oil pollution from Ships*') and the *Regulations of the Supreme Court of the People's Republic of China on Several Matters Concerning the Trial of Disputes over Damages Caused by Marine Natural Resources and the Environment* (hereinafter '*the Judicial Interpretation of Compensation scope for Damages Caused by the Marine Environment*') are two judicial interpretations which provide specific rules for defining the scope of damage compensation. Practice increasingly depends on these judicial interpretations and relevant international treaties to manage and mitigate ship-sourced pollution. However, these judicial interpretations are not as effective as the Chinese *Civil Code* in addressing these issues.

2.3 Major disparities

In general, the Civil Code of a State plays a leading role at the current stage. As for China, the special rules for oil pollution damage were still being revised, but the effect of their judicial interpretation was not enough. Under such influence, the inconsistency between China's domestic law and international treaties regarding compensation scope for ship-sourced oil pollution and eco-environmental damage is expected to increase.

The ecological damage liability system, detailed in Chapter 7 of the Chinese *Civil Code* under 'Liability for Environmental Pollution and Ecological Damage,' embodies the concept of 'ecological civilization' from the Constitution within the civil legal system, highlighting the advancement and protection of both private and public interests. This also underscores the progressive nature of the Chinese *Civil Code* and its commitment to protecting both private and public interests (Wang, 2021). Article 1235 of the Chinese *Civil Code*, a general law provision, defines the compensation scope for eco-environmental damage, thus addressing the legal gap in marine ecological damage from ship-sourced oil pollution (Lv, 2020). Consequently, domestic law now thoroughly addresses eco-environmental damage from ship-sourced oil pollution, encompassing treaty-defined damage scopes and losses from permanent damage.¹⁰ However, from the perspective of *lex specialis*, the *Maritime Code* has yet to address environmental damage caused by ship-sourced oil pollution adequately. The limitation of maritime liability is a unique system of maritime law generally accepted by the international society, referring to the system

6 See Article 123 of the *MEPL*.

7 Article 121 of the *Marine Environment Protection Law* defines damage by pollution of the marine environment as "the direct or indirect introduction of substances or energy into the marine environment, which produces harmful effects such as damage to marine living resources, harm to human health, disruption of fisheries and other lawful activities in the sea, damage to the quality of seawater use and impairment of environmental quality".

8 Article 114 of the *MEPL* stipulates, "Anyone who pollutes the marine environment or damages the marine ecology and causes damage to others shall bear civil liability in accordance with the provisions of the Civil Code of the People's Republic of China and other laws."

9 Article 1235 of the Civil Code stipulates, "If environmental damage is caused in violation of state regulations, the organs prescribed by the state or the organizations prescribed by law shall have the right to request the infringer to compensate for the following losses and expenses: (i) losses resulting from the loss of service functions during the period between the damage to the ecological environment and the completion of the restoration; (ii) losses resulting from the permanent damage to ecological environment functions; (iii) costs of investigating, identifying (c) Costs of investigation, identification, assessment, etc. of the environmental damage; (d) Costs of removing pollution and restoring the ecological environment; (e) Reasonable costs incurred in preventing the occurrence and expansion of the damage."

10 The definition of the scope of compensation scope for damage to the marine environment mainly applies to the "*Ship Oil Pollution Judicial Interpretation*" "*Judicial Interpretation of Compensation scope for Damage to the Marine Environment*", Article 1235 of the Civil Code is the same as the scope of the definition of the "*Judicial Interpretation of Compensation scope for Damage to the Marine Environment*", and the introduction of the "*Civil Code*" presents the characteristics of the judicial interpretation of the legalization of the system to make up for the shortcomings of the private law in the relief of environmental damages, and to enhance the ecological compensation scope for damage. The level of effectiveness of legal norms.

whereby the responsible person has the right to limit his liability to a certain extent in accordance with the provisions of the law in the event of a major maritime accident. In the absence of specialized provisions on oil pollution damage in maritime law, the regime creates an inconsistency with the unlimited liability of the Chinese *Civil Code*.

Consequently, China's domestic laws stipulate that ship-sourced pollution leads to oil pollution, which damages the eco-environment. Special laws cover compensation scope for this damage, encompassing costs of preventive measures, marine ecological restoration, restoration costs, loss during the restoration, and investigation and assessment costs. However, international treaties focus on the actual costs of the incidents and limit the compensation scope, excluding permanent damage from the compensation scope for marine eco-environmental damage. In summary, China's domestic law recognizes new forms of permanent damage, establishing gaps on the compensation scope for marine eco-environmental damage from ship-sourced oil pollution with international treaties.

3 Gaps between international and China's domestic law on compensation scope

It is clear that international law may be insufficient to achieve this objective in isolation. In numerous instances, its effective implementation necessitates its transformation into domestic law to ensure State compliance with international obligations (Harrison, 2017). Article 211 (2) of the UNCLOS stipulates that "States shall adopt laws and regulations for the prevention, reduction and control of pollution of the marine environment from vessels flying their flag, which shall have at least the same effect as that of generally accepted international rules and standards established through the competent international organization or general diplomatic conference."¹¹ Should inconsistencies arise on crucial issues, the efficacy of applying and enforcing such international rules and domestic legal standards will be significantly diminished. In details, while flag States may enact domestic laws that are stricter than international law, overly stringent domestic laws could potentially impede a state's ability to fulfill its corresponding international obligations. Here, domestic law establishes a general legal framework for compensation scope for eco-environmental damage from ship-sourced oil pollution but also highlights discrepancies in compensation scopes between domestic law and international treaties. An overly broad compensation scope under domestic law hinders the achievement of the legislative goals of environmental protection.

3.1 Non-compliance with the requirement of consistency

The growing contradiction between domestic laws and international treaties, and the tension between diversity and

uniformity, have eroded the authority and predictability of the legal systems (Gu, 2007). In practice, most States have adopted a presumption that domestic law is intended to conform to international law (Shelton, 2011). The inconsistency between domestic laws and international treaties primarily affects legislative efficiency, law enforcement, and the law's guiding role (Klabbers, 2023).

Firstly, this contradiction reduces legislative efficiency by disregarding the shared experiences and standards established by existing international treaties. Consequently, China will likely need to devote more time and resources to developing legal norms for compensating for eco-environmental damage from ship-sourced oil pollution. However, the global trend toward convergence in environmental law may pressure China to engage more with relevant international treaties. To fulfil treaty obligations, China needs to adjust or amend any contradictory legal provisions. These amendments will decrease legislative efficiency and necessitate further legislative resources.

Secondly, inconsistencies between domestic law and international treaties might hinder the implementation of domestic law (De Santa Cruz Oliveira, 2015), and States may confront difficulties in aligning domestic laws with international standards, resulting in potential implementation gaps (World Jurisprudence, 2024). In legal disputes, parties often choose the rules most favorable to them. In disputes over eco-environmental damage from ship-sourced oil pollution, many international treaties are invoked due to their limited compensation scopes. For example, in the case of eco-environmental damage to foreign vessels in Chinese waters, both international treaties and domestic law apply. Yet, parties may prefer international treaties for their narrower liability scope related to foreign factors. Conversely, domestic law should govern cases of eco-environmental damage to Chinese vessels in national waters. However, to seek lesser compensation, Chinese vessels might utilize foreign elements like registering under foreign flags. Over time, the reduced application of domestic law in judicial settings might render it a 'zombie clause,' seldom invoked. This has led some scholars to suggest that even in purely domestic cases, parties might opt for treaty provisions (Xu, 2020).

Thirdly, this circumstance fails to align with the law's core purpose object and purpose of directing social behavior for the benefit of societal progress (Iwasawa, 2022). Given the substantial compensation scope for eco-environmental damage from ship-sourced oil pollution, parties frequently introduce foreign elements to leverage international treaties, especially when domestic compensation exceeds treaty limits. When foreign elements are lacking, parties may register ships overseas to introduce such elements, thereby circumventing larger compensations. Incorporating foreign elements to utilize international treaty principles can lead to unequal treatment and negative consequences due to discrepancies between domestic laws and treaties. For instance, foreign vessels may receive significantly less compensation scope for ecological damage in Chinese waters compared to Chinese vessels. Over time, the disproportionate burden on Chinese ships engaged in maritime activities may drive them out of the competition. This situation hampers the development of China's

¹¹ See UNCLOS, Article 211 (2).

maritime enterprises and contradicts the nation's goal of becoming a maritime power.

3.2 Not conducive to the development of the marine environment liability insurance regimes

Marine environmental liability insurance, originating from ship-sourced oil pollution damage (Hu and Liu, 2014), was established as a legal and technical method to mitigate environmental pollution risks. Insurance coverage depends on the extent of environmental damage from ship-sourced oil pollution, including responsibilities for compensation, ecological restoration, and treatment (Yu, 2013). Once Article 1235 defines the scope of marine eco-environmental damage, insurance coverage must align, encompassing permanent damage which broadens the scope beyond that of international treaties, complicating coverage determination. The *Measures for the Administration of Compulsory Liability Insurance for Environmental Pollution* (hereafter 'Exposure Draft') set up a foundational framework for marine environmental liability insurance via administrative regulations, filling a legislative void in this area (Zhang and Xu, 2018). Consequently, civil law norms should promote the development of marine environmental liability insurance to align with the goals of administrative legislation.

Observations of insurance coverage and the evolution of environmental pollution liability insurance in the U.S. provide insights into the coverage of permanent damage.¹² Initially, environmental liability insurance in the U.S. was provided through public liability policies. Stricter regulations increased the compensation burden on polluters, boosting the demand for this insurance. As a result, more insurers entered the market. Yet, judicial precedents requiring coverage for progressive damages led many to exit due to the inability to manage significant risks.¹³ The unpredictability of persistent environmental damage exceeds the risk management capabilities of insurers (Zhang and Zhang, 2006). Consequently, public liability policies exclude permanent damage (Wu and Yan, 2017). Moreover, the difficulty in pinpointing areas affected by permanent eco-environmental damage and controlling losses may lead specialized insurers to underwrite these risks,

supplemented by specific liability limits.¹⁴ Therefore, the U.S. approach to environmental liability insurance, transitioning from exclusion to limited acceptance of ecological damage, first manifests in specialized insurers and secondly in the structuring of liability limits. This stance aligns with the limited liability for ecological damage stipulated in international treaties, despite the U.S. not being a party to these treaties.

The gap between international treaties and China's domestic laws on compensation scope for eco-environmental damage from ship-sourced oil pollution complicates defining marine environmental liability insurance coverage. If insurance scope and liability are set according to international treaties, they may not fully cover damages as required by domestic law. Purchasing marine environmental liability insurance leaves the insured liable for any remaining damages. Thus, obtaining such insurance may not achieve the goals of risk sharing and loss compensation. This could also reduce the insured's incentive to purchase insurance. If insurance costs and coverage are determined by domestic law. Ecological damage involves considerable factual and subsequent legal uncertainty. Consequently, this uncertainty challenges the insurance industry's ability to predict ecological liability risks and potential losses (Cheng, 2018). If assessing ecological claims risks becomes too challenging or unprofitable, insurers might stop offering such coverage. The negative impacts are clear, for example, significant risks are hard to distribute and ultimately fall on the tortfeasor. Secondly, significant ecological damages lead to higher premiums, deterring insurance participation. This situation harms both the development of insurance mechanisms and risk sharing among tortfeasors.

4 Legal interpretation of the compensation scope

International law provides minimum standards for establishing the scope of compensation for marine eco-environmental damage from ship-sourced oil pollution. However, this does not preclude States from adopting more stringent standards for compensation. Nevertheless, the vitality of such stricter standards hinges upon their effective enforcement. China's relevant domestic laws concerning the scope of compensation shall therefore be holistically considered, enabling China to more reasonably assume its corresponding international obligations. This section will explore the provisions on the scope of compensation in China's

12 The United States introduced its first environmental law, the National Environmental Policy Act, in 1969, laying the foundation for the establishment of various environmental laws and regulations. Subsequently, a series of environmental laws such as the Resource Conservation and Restoration Law, the Comprehensive Environmental Response, Compensation and Liability Law, and the Pollution Prevention Law were successively introduced. As the legal requirements for high-polluting enterprises become increasingly strict, the demand for environmental liability insurance in the market has also sharply increased.

13 The huge market demand for environmental liability insurance, the development of environmental engineering, and the exploration of environmental liability insurance by the insurance industry led to the effective development of environmental liability insurance in the 1990s.

During this period, period-incurred policies, which are liable to pay for all claims made by victims against the insured during the policy term, were created, alleviating the long-tail problem of the previous period-incurred policies.

14 For example, the Environmental Protection Insurance Corporation (EPIC), established in 1988, covers not only sudden and accidental pollution incidents, clean-up costs and third-party liabilities, but liabilities resulting from gradual and cumulative pollution, and provides for a limit of \$1 million per incident.

domestic law through legal interpretation to be consistent with the provisions of international law.

4.1 Eco-environmental damage from ship-sourced oil pollution under the Chinese civil code

Eco-environmental damage from ship-sourced oil pollution pertains solely to ecological harm, distinct from personal and property damage. This damage is a specific type of marine eco-environmental damage, focusing on adverse effects on the sea from pollution and ecological harm. This concept integrates existing legal, regulatory, and technical norms concerning ‘marine environment pollution damage’ and ‘marine ecosystem destruction (Tong and Zhou, 2018).’ As ocean utilization increases, incidents of marine environmental pollution and ecological damage are becoming more frequent. To bolster ocean protection, the range of compensation scope for marine eco-environmental damage has continuously expanded. Based on current regulations and technical specifications, the compensation scope for marine eco-environmental damage from ship-sourced oil pollution covers five areas: preventive measures, repair and restoration of the marine ecosystem, loss during restoration, permanent damage, and investigation and assessment costs.

The *Judicial Interpretation of Oil Pollution Damage from Ships* provides explicit provisions on eco-environmental damage caused by ship-sourced oil pollution. Article 9 specifies the compensation scope for eco-environmental damage aligns with international treaties. However, expression inconsistencies between the *Judicial Interpretation of Oil Pollution Damage from Ships* and the *Measures for Claiming State Losses for Marine Ecological Damage* (the ‘Claims Measures’), which align with the Chinese *Civil Code*, may lead to differing judicial outcomes for the same case. This legal gap thus extends to the level of judicial interpretation.

Despite adjustments to legal relations regarding oil-contaminated environments, legislation remains weak, and fragmentation persists even. The Chinese *Civil Code* integrates the *Judicial Interpretation of Ship sourced oil pollution* and the *Judicial Interpretation of Compensation scope for Damages to the Marine Environment* enhancing the effectiveness of compensation norms (Lv, 2020) and addressing some private law shortcomings in mitigating such damages. However, it overlooks specialized laws during the legislative process. This oversight in considering specific laws during legislation has led to confusion in enhancing legal norms for ship-sourced oil pollution and eco-environmental damage. Fragmented legislation can disrupt marine ecological remedies, increase the cost of environmental compliance for businesses, and fail to encourage proactive legal compliance (Zheng and Wang, 2020). Currently, compensation scope for marine eco-environmental damage aims to achieve multiple objectives. It seeks to prevent pollution spread, reduce cleanup costs, cover tangible property losses, such as direct losses in aquaculture, and include economic losses linked to ecological resources. The reasons for not seeking compensation scope for

the medium- and long-term ecological losses are complex. Firstly, these losses are often estimated and difficult to quantify practically. Estimations are based on theoretical models’ abstract figures, potentially lacking objectivity. Consequently, the accuracy and scientific rigor of these conclusions are questionable. Conversely, the state, responsible for medium- and long-term ecological losses, often incur significant losses. Recent losses, typically attributed to individuals or units, generate fewer substantial claims than medium- or long-term losses. However, recent losses significantly impact the lives and productivity of affected individuals and units, thereby influencing society more profoundly. Permitting compensation scope for medium and long-term ecological losses ensures equitable handling of both minor short-term and significant long-term impacts. Consequently, this approach may result in less compensation scope for recent losses, leading to considerable unfairness.

The principle of full compensation of general law now applies to eco-environmental damage from ship-sourced oil pollution, highlighting conflicts between compensating for permanent damage and international treaty provisions. The *Reform Program* mandates full compensation scope for eco-environmental damage,¹⁵ aligning with the Chinese *Civil Code*, which enforces full compensation when specific provisions are lacking. Applying full compensation principles complicates judicial decisions regarding the scope of compensation scope for eco-environmental damage from ship-sourced oil pollution. The extent of total damage is defined by the Ministry of Environmental Protection’s *Recommended Methods for Identification and Assessment of Eco-environmental Damage (Version II)*, which requires eco-environmental damage to be observable or measurable, limiting compensation to the actual, quantifiable damage. The difficulty in determining and measuring the degradation of environmental quality and ecosystem services precludes their inclusion in civil compensation scopes (Lv, 2017). Therefore, the Domestic Law push for comprehensive compensation challenges the limitations on compensating private interests and creates dilemmas in understanding compensation scopes for eco-environmental damages (Cai and Zhang, 2018).

4.2 Liability limitation for compensation in China’s domestic law

In International treaties, when compensating for oil pollution damage, a reasonable limitation shall be imposed on the liability of the subject liable for compensation, which is called the limitation of liability for compensation. The limitation of liability for compensation means that the liability subject is only liable for the damage arising from the damage to the marine ecological

¹⁵ The *Reform Program* stipulates that environmental damage includes the cost of removing pollution, the cost of ecological restoration, the loss of service functions during ecological restoration, the loss caused by permanent damage to ecological functions, and the reasonable costs of investigating, appraising and evaluating environmental damage compensation.

environment caused by a single vessel-source pollution accident within the compensation limit prescribed by law. The China's domestic Law has incorporated the advancements from judicial practices in ecological damage compensation, transforming judicial interpretations into legal statutes to establish a comprehensive tort liability and damage compensation system for environmental and ecological harm (Ding, 2020). The scope of damage compensation is a crucial aspect of tort liability (Liu, 2020). Compensation scope for ecological damage caused by ship-sourced oil pollution covers all legal interests of the rights holder in existing domestic legal system (Du, 2021). Furthermore, the permanent ecological damage, the civil legal system must rigorously evaluate and refine criteria for relief, given the ecological environment's capacity for self-purification and the quantitative uncertainties in assessing ecosystem and natural resource damages. With a well-defined concept of ecological damage and clear differentiation of legal interests within the affected ecosystem, compensation scope for 'damage to restorable ecological interests' aligns with the civil interests protected under tort law. Conversely, compensation scope for 'permanent damage' must be managed carefully to prevent duplicative payments with a limitation or a cap, which align with international rules.

In summary, under international treaties, the 1992 CLC covers compensation scope for eco-environmental damage from ship-sourced oil pollution but limits it to the cost of reasonable reinstatement measures, either planned or already undertaken. This suggests that compensation scope for eco-environmental damage from ship-sourced oil pollution serves the public interest. The lack of specific legislation in China for compensating eco-environmental damage from ship-sourced oil pollution has led to considerable debate in both practical and theoretical realms. Furthermore, China has not established clear legislation and judicial practice compensation standards. Consequently, China should actively adopt best practices from foreign legislation. Integrating these insights with China's specific context, it is essential to establish reasonable compensation standards that clearly define the scope for environmental damage caused by ship-sourced oil pollution.

4.3 Interpretation difference of compensation scope in other states

Environmental issues resulting from ship-based oil spills have gained global attention. Regarding the scope of compensation, the interpretation of compensation scope under China's domestic laws needs to take extraterritorial law into due consideration. The CMI, after extensive research, has summarized practices from various countries. Furthermore, their guidelines on ship-sourced oil pollution have defined the scope of compensation scope for ecological damage. Under traditional tort theory, national laws determine compensation scope for ecological damage from ship-sourced oil pollution based on the injured party and measurable

private cost. This part focuses on the United States, France, the United Kingdom and the European Union as the primary analysis subjects, exploring the interpretation difference of the compensation scope under their laws compared to China's domestic law.

In U.S. legislative practice, the U.S. law has evolved from an exclusionary rule denying compensation scope for ship-sourced oil pollution to a more inclusive approach that seeks to maximize compensation and protect the rights of those affected (Guo, 2015). For example, the *Oil Pollution Act 90* (hereafter 'OPA 90') offers a broader scope than international treaties, specifying that compensation must be used solely for restoring, repairing, replacing, or acquiring alternative resources for the impacted environment. This ensures that compensation is directed specifically towards environmental recovery, thus preventing an indefinite expansion of the scope of compensation under U.S. law.

Meanwhile, the French stance on compensating eco-environmental damage from ship-sourced oil pollution remains uncertain, particularly regarding the public interest. In France, compensation scope for eco-environmental damage from ship-sourced oil pollution is contingent upon establishing fault, loss, and causation, similar to general tort cases. In the case of the *Bastia Fishermen and Others v. Soc. Montedison*, the court acknowledged claims for compensation after the Montedison plant's discharge of hazardous substances harmed both local fishermen economically and the public interest (Wu, 1996). Although the compensation system under the French Civil Code does not limit damages, the term "total damage" does not encompass all eco-environmental damage (Xu, 2006).

As for U.K. domestic law, Section 155 of the *Merchant Shipping Act*, enacted in 1995 in the United Kingdom, establishes the legal framework for compensating environmental damage from ship-sourced oil pollution (Han, 2007). Marine eco-environmental damage from ship-sourced oil pollution was traditionally unclaimable, except when accompanying economic losses involved incidental damage to persons or property. UK courts have consistently upheld the common law principle that excludes compensation scope for ship-sourced oil pollution damage. However, some cases in the UK have set precedents for compensating marine eco-environmental damage from ship-sourced oil pollution. This recognition has occasionally involved applying the 'neighbor principle' and 'foreseeability' as criteria for judgment. This means compensation is limited to damages that a perpetrator could foresee, balancing the need to not overburden the perpetrator while promoting the transport industry's growth and benefiting the community. Therefore, this standard is considered reasonably fair (Guo, 2015). Consequently, the UK's approach to such damages has been iterative and complex.

The European Union has also enacted relevant legislation providing legal interpretations of the scope of compensation scope. In 2014, the EU introduced legislation to standardize marine spatial planning across all member states, mandating implementation by 2016. By 2021, every EU member state was

expected to have implemented a Marine Spatial Plan (MSP). The minimum standards for these MSPs include adopting an ecosystem-based approach, accounting for sea-land interactions, engaging stakeholders, fostering member-state cooperation, and utilizing the best available data (Douve, 2008). Growing demands and competition for coastal space and resources—ranging from offshore renewable energy to shipping and aquaculture—necessitate effective management and coordination. Marine Spatial Planning (MSP) examines system uses from spatial and temporal perspectives, facilitating ecosystem-based management (Andersson, 2016).

In summary, the legislative practice on compensation scope from other main States is generally consistent with current international treaties and rules. The U.S.'s *OPA90* acknowledges the public interest in addressing ship-sourced oil pollution and its ecological damages. Similarly, France views this positively, though compensation is limited to actual damages and does not encompass all ecological impacts (Xu, 2006:122). In the United Kingdom, the application of liability exclusion rules is stringent, prohibiting compensation scope for public interest damages from ship-sourced oil pollution. The EU employs standards to align and benchmark the compensation scope for legal interpretation. Compared with the legislative practice of other States, China is more forward-looking in compensation scope lawmaking than other state legislative practices, yet may face significant implementation barriers. Further adjustments must be made to align domestic legal practices with international treaties.

5 Pathways in bridging gaps of compensation scope

As analyzed above, the “gaps” denote the misalignments or discrepancies between international standards and China's domestic laws related to the definition of compensable scope, the categories of recognized damages, and the extent of liability assigned to polluters. Such inconsistencies may result in legal uncertainty, uneven enforcement and potential conflicts in cross-jurisdictional scenarios. As a priority in contemporary international maritime legislation, marine environmental protection increasingly emphasizes the importance of marine ecological conservation (Hu, 2012). In China, the domestic legislation, international treaties, and national policies concerning compensation scope for eco-environmental damage from ship-sourced oil pollution are highly consistent. This alignment forms a robust basis for refining the legal framework and addressing potential gaps.

5.1 Nature-based methodology basis for the compensation scope

The natural characteristics of ship-sourced oil pollution provide a basis for defining the compensation scope for marine ecological damage. Factors influencing the cost of oil spill cleanup include the type and volume of the spill, geographic location, local weather and water currents, season, and the efficiency and cost of cleanup efforts.

5.1.1 Natural properties of ship-sourced oil pollution types

Ship-sourced oil pollution is primarily categorized into light and heavy oils. Light oils, such as refined petroleum products or light crude oil, evaporate quickly and do not linger on the sea's surface for long, reducing the cleanup required. In the Sanger case, the compensation scope for eco-environmental damage was significantly lower than expected because the spilled oil was volatile. In another instance, during the 1993 Blair incident near the Shetland Islands, UK, a ship spilled 85,000 tons of light oil. Despite poor weather conditions, the evaporation and dispersion of the light crude oil resulted in minimal shoreline contamination, with cleanup costs totaling only USD 500,000. Thus, light oil typically does not cause permanent damage due to its propensity for rapid evaporation. Heavy oils, like viscous crude or heavy fuel oil, linger on the surface for extended periods and can coat beaches, man-made structures, and marine equipment due to minimal evaporation. The oil that settles on the ocean floor can be redistributed by storms, scouring shorelines and posing long-term environmental challenges. Additionally, this type of oil is harder to remediate using conventional cleanup methods. Consequently, these factors often result in cleanup costs exceeding ten times those of light oil spills. For instance, the Erika spill off the coast of France involved 20,000 tons of oil. Adverse weather conditions spread the oil widely, resulting in significant coastal pollution and one of history's costliest cleanups (Andersson, 2016). Therefore, due to its enduring presence, heavy oil may cause permanent damage and warrants increased regulatory attention.

Generally, the procedure of lawmaking shall consider natural laws and fundamental differences of ecological damage, providing a typological explanation at the level of natural sciences. Given the categorization of legal interests, damage assessment methods, and relief procedures, it is both necessary and feasible to distinguish between restorable and permanent ecological damages. The primary reason for this distinction is the different types of legal interest infringements involved. Damage to environmental public welfare involves both the pollution or destruction of environmental elements, recognized as ‘objects’ in civil law, and the significant degradation of environmental quality or loss of specific ecological services. Civil law ‘damage’ typically lacks this dual quality. Environmental infringement cases fall into three categories: those affecting private interests, those impacting public welfare through pollution or ecological damage, and those involving both private and public interests. Ecological damage represents a distinct category of environmental tort,¹⁶ affecting both public and private interests with extensive repercussions (Yan, 2021). Specifically, cases of ecological damage can affect individual private interests, environmental public welfare, or both (Dou, 2017). ‘The essence of civil code is logic,’ where precision in concepts forms the foundation of this logic (Tax, 2018). Systematization requires that clarifications

¹⁶ Compared with traditional tort damages, the basic characteristic of ecological damages is that the ecological environment itself is the object of infringement, instead of using the ecological environment as a medium to infringe on the personal or property rights and interests of the legal subject.

of legal damages be based on their typology. Logical reasoning serves to organize existing material, while typology should reflect the actual circumstances. Practically, in cases of ecological destruction, damages are not confined to the private interests of the affected parties. Such behavior, once it triggers ecological destruction, invariably also affects public interests. Consequently, in practice, ecological environment infringement cases typically manifest in two forms: disputes over ecological damage affecting public welfare and those involving both personal interests and public welfare. Secondly, the methods of damage assessment also differ. The 2014 *Recommended Methods for Eco-environmental Damage (Second Edition)* stipulates that damage must be observable or measurable (Lv, 2017). This requirement predates the introduction of the concept of permanent damage and primarily applies to restorable eco-environmental damage. It does not apply to permanent damage, which is hard to quantify and typically addressed through alternative remediation.

5.1.2 Types of costs associated with oil spills

The cost types associated with oil spills are crucial for determining the compensation scope for eco-environmental damage from ship-sourced oil pollution. Costs from oil spills fall into three categories: direct clean-up costs, socio-economic costs, and environmental costs.

Firstly, direct clean-up costs involve the cleaning, recovery, storage, and disposal of spilled oil, including the oil left in collection containers. Examples of direct cleanup costs include expensive oil removal equipment, vessels, aircraft, and costs for trained operators and personnel. Personnel and technical equipment costs constitute a significant portion of cleanup expenses, though labor costs vary with the number of volunteer helpers. For instance, the 2002 Prestige oil spill involved about 60,000 tons of oil and incurred cleanup costs of 509 million euros (Loureiro et al., 2006:50).

Secondly, socio-economic costs mainly affect the fisheries, aquaculture, and tourism industries, suffering income loss and property damage from oil spills. Oil spills can reduce fish stocks due to toxicity and cause fish to contain contaminants above safe levels, making them inedible. Oil contamination often leads tourists to avoid affected areas like damaged beaches, commonly resulting in economic losses for local tourism stakeholders. After the Prestige oil spill in Galicia, Spain (2001-2004), the Spanish fisheries sector faced socio-economic losses totaling about 113 million euros. Mussel farming losses were 13 million euros, and tourism sector losses reached 110 million euros.

Thirdly, environmental costs arise from the temporary degradation of natural resources and services due to oil spills (Liu and Wirtz, 2006). Among the three cost types, environmental costs are the hardest to assess due to the lack of established market values for many affected environmental goods and services. Assessing coral reefs' total economic value is particularly challenging, given their diverse and hard-to-value ecosystem services. Coral reefs contribute to tourism, serve as habitats for diverse fish species with significant food and ecological functions, and play a role in the ocean's biogeochemical cycles. Despite the difficulty in assessing

environmental costs, several models exist to value these goods and services. The accuracy of these valuation models is questionable, as they typically only consider three types of impacted resources: beaches, birds, and seals. These models often overlook impacts on other habitats like coastal shelves, deep-sea waters, or benthic systems, and effects on animal reproduction, survival, productivity, and food web dynamics. The Prestige oil spill resulted in 115,000 to 230,000 bird fatalities, valued at approximately €6.4 billion (Loureiro et al., 2006:49). The challenging nature of estimating environmental costs complicates compensation claims for these damages. Moreover, valuation models may fail to account for ecosystems' natural recovery capabilities. Consequently, these issues lead to the exclusion of such model estimates in legal determinations of compensation scopes for eco-environmental damage from ship-sourced oil pollution.

As for jurisdictional practice, according to the analysis of China's Supreme People's Court precedents related to environmental damage caused by oil pollution consulted by Law Wkinfo database (Table 1), the compensation for environmental damage is usually limited to the cost of reasonable restoration measures actually taken or to be taken.

5.2 Paths of revising the China's domestic law to bridge the gaps

In scenarios demanding a dynamic interpretation of compensation scope, it is incumbent upon the international community to formulate a more reasonable compensation scope for eco-environmental damage caused by ship-sourced oil pollution that facilitates effective joint implementation both internationally and domestically. This definition needs to proceed from the minimum standards for compensation scope stipulated by international law, integrated with an assessment of contemporary maritime changes. Specifically, the China's domestic law including the Chinese *Maritime Law* shall be duly revised, predicated on the foundational standards established by both international and domestic law, to bridge the gaps on compensation scope.

5.2.1 The harmonization of international treaties and domestic law

Marine ecological interests, when impaired, affect everyone and are non-specific, differing from general environmental interests by extending beyond domestic concerns. The UNCLOS acknowledges the oceans' indivisibility and emphasizes the interconnectedness of issues across different maritime zones, necessitating a holistic approach. Therefore, it is inappropriate to confine legal remedies for marine ecological interests to civil law; broader legal frameworks should be considered. This approach is consistent with the characteristics of marine ecosystems and addresses ship-sourced oil pollution and associated eco-environmental damage. The integrity of the marine ecological environment is crucial, as its disruption forms the basis for environmental tort liability and impacts ecosystem services that provide environmental benefits.

TABLE 1 Trail cases of China's supreme people's court (collected by authors).

Trail case no.	Case name	Compensation scope
(2015) Min Shen Zi No. 1637	Ondimar Transportes Maritimos Ltda vs Britannia Steam Ship Insurance Association	The cost of reasonable restoration measures actually taken or to be taken, including reasonable monitoring, evaluation, research, and other expenses
(2019) Supreme Court Min Shen No. 6817	Dispute over the liability of ship pollution damage between the Shipping Insurance Center of Tianan Property Insurance Co., Ltd. and Fuzhou Baiyang Hengfeng Ship Service Co., Ltd	The cost of reasonable restoration measures actually taken or to be taken, including emergency cleaning fees, excluding pumping operation costs for rescue purposes
(2019) Supreme Court Min Shen No. 5164	Zhuhai Bingjun Aquatic Products Co., Ltd. and Xia Shipping Co., Ltd. ship pollution damage liability dispute	The right to enjoy the limitation of liability
(2019) Supreme Court Min Shen No. 1997, 1998, 1995, 1985, 1977, 1976	ConocoPhillips China Co., Ltd. disputed liability for pollution damage in offshore and open waters	Settlement: ConocoPhillips invested 1.09 billion yuan to compensate for the losses caused by the oil spill to the marine ecology, and ConocoPhillips and CNOOC invested 113 million yuan and 480 million yuan, respectively, to assume the social responsibility of protecting the Bohai Sea environment. Exclude claims that do not have a causal relationship
(2018) Supreme Court Min Shen No. 1137	CNOOC (China) Co., Ltd. Tianjin Branch Dispute over liability for pollution damage in offshore and open waters	The cost of reasonable restoration measures actually taken or to be taken, including reasonable monitoring, evaluation, research, and other expenses
(2018) Supreme Court Min Zai No. 368	(Provence Shipowner 2008–1 Ltd), CMA CGM SA (CMA CGM SA), Rockwell Shipping Limited	The cost of reasonable restoration measures actually taken or to be taken, including reasonable cleaning fees
(2015) Min Shen Zi No. 1637	Dispute over compensation for pollution damage in the sea area of the “Atigo” ship	The loss of marine environmental capacity and marine ecological service functions and the cost of investigation and loss assessment shall be limited to the cost of reasonable restoration measures actually taken or to be taken
(2018) Supreme Court Min Zai No. 367, No. 368, No. 369, No. 370	Shanghai Xin'an Shipping Co., Ltd. and Provence Shipowners 2008–1 Co., Ltd. applied for the establishment of a maritime liability limitation fund	The cost of reasonable restoration measures actually taken or to be taken includes oil and sewage treatment fees, cleaning fees, and management fees

Consequently, compensation scope for eco-environmental damage from ship-sourced oil pollution should cover the aforementioned economic and ecological losses. This concept should be broadly understood to include overall damage to the public interest.

The “compliance pull” of international law positions it as a crucial instrument for addressing global challenges including eco-environmental damage from ship-sourced oil pollution (Henkin, 1968). Respectively, it also provides a basis for other States to ensure compliance through the enactment of domestic law (Abbot et al., 2000). Consequently, the international community's assumption of corresponding legal obligations signifies that ‘State’ conduct is dually constrained by international and domestic law.

The 2002 Provisions of the Chinese Supreme People's Court on Several Issues Concerning the Trial of Administrative Cases on International Trade (hereafter the “Provisions”) emphasize harmonizing domestic law with international treaties through consistent treaty interpretation and systemic integration. In particular, the 2022 Minutes of the Supreme People's Court Symposium on the Work of National Courts in Foreign-related Maritime and Commercial Trials (hereafter the “Minutes”) underscore the importance of consistently interpreting laws and international treaties, as outlined in the Provisions, for applying laws in foreign-related civil matters. Article 1 of the 2002 Provisions defines “international trade administrative cases” as those involving trade in goods, services, and intellectual property rights related to international trade, among other types. This is in line with the World Trade Organization's fundamental agreements on

trade in goods, services, and trade-related intellectual property rights. Article 9 of the Provisions states that if multiple reasonable interpretations of laws exist for international trade cases, the interpretation that aligns with international treaties should be preferred, unless specific reservations have been declared by China. This principle of selecting treaty-consistent interpretations applies unless China has declared reservations to specific treaty provisions. This principle is consistently enforced within legal contexts.

Currently, it is important to recognize the recent adoption of the Chinese *Civil Code* and the revision of the Marine Environment Protection Law, particularly regarding conflicts with international treaties. Therefore, amending these laws in the near future is not practical. However, the Chinese Maritime Code, which governs oil pollution from ships, has recently been reviewed for revision, presenting an opportunity to address these conflicts.

5.2.2 Design of the provisions of revised Chinese maritime code

One purpose of legal rules is to balance interests by providing appropriate compensation or indemnification in response to losses. Theoretically, balancing interests tests legislative techniques and policy formulation. Practically, it challenges judges to determine compensation scopes for eco-environmental damage from ship-sourced oil pollution, considering factors like the impact on maritime transportation, the extent of damage, and its foreseeability.

First, based on conceptual definitions, the Measures for *Identification and Assessment of Eco-environmental Damage*

(version II) describe permanent damage as either the difficulty or impossibility of restoring an ecosystem and its services. Under current technical limitations, damaged marine ecosystems often cannot be restored. The 2013 State Oceanic Administration (SOA)'s *Technical Guidelines for Assessment of Eco-environmental damage caused by Ship sourced oil pollution (for Trial Implementation)* emphasize that if *in-situ* restoration is unfeasible, alternative restoration measures must be pursued. Consequently, marine ecological restoration encompasses alternative methods, negating the need to separately account for permanent ecological function damage.

Second, evaluating the reasonableness of legally regulating permanent damage is crucial. It is a legal principle that “an obligation for compensation is valid only when there is a corresponding right that it addresses (Helmut, 2017).” Furthermore, private law remedies require that damages be existing and quantifiable. Similarly, claims for compensation scope for eco-environmental damage from ship-sourced oil pollution must meet these criteria of specificity and quantifiability.

Thirdly, justice and balancing interests underpin the socialization of damages, which necessitates developing risk-dispersal or sharing mechanisms. These mechanisms aim to lower the costs of eco-environmental damage relief and enhance its efficiency fundamentally (Zhao, 2020).

Thus, the major gap regarding compensation scope for oil-contaminated environments is whether it should be limited to costs for reasonable reparative measures already undertaken or planned (Hu et al., 2021). The difficulty in resolving this controversy stems from limitations in general law and the lack of specific legislation. Revising the Chinese *Maritime Code*, as specialized legislation, also offers an excellent opportunity to bridge this gap. For example, China has added Chapter 12 ‘Liability for Vessel-induced Oil Pollution Damage’ in the revised draft Chinese *Maritime Code* to specify the scope of compensation for vessel-induced oil pollution damage in accordance with the relevant international treaties acceded to by China. In details, Article 226 explicitly stipulates the specific types and circumstances of the compensation for vessel-induced oil pollution damage including property damage other than the ship oil pollution caused by ship oil pollution and income loss so incurred, expenses incurred for preventive measures to prevent or mitigate oil pollution damage caused by the ship, losses caused by preventive measures; loss of income arising from environmental damage caused by oil pollution; expenses for reasonable measures that have been taken or will be taken for the rehabilitation of the contaminated environment.

6 Concluding remarks

Under the international law and domestic law, compensation scope for eco-environmental damage from ship-sourced oil pollution covers costs for preventive measures, marine ecological restoration, losses during restoration, and investigation and assessment. Preventive measures include removal, treatment, disposal of contaminants, and recovery of emergency materials.

While eco-environmental damage from ship-sourced oil pollution is a key consideration, it does not directly define the scope of compensation, granting judges considerable discretion. Domestic law enhancements should closely align with the international treaties to which China is a signatory. Exceeding the treaty's scope in domestic law complicates the effective implementation of mandatory liability insurance for ship-sourced oil pollution.

The pollution of fuel oil from ships has the characteristics of extensive diffusivity and persistent pollution, which may lead to serious marine ecological consequences. Based on the tort law, it is difficult to make up all the losses suffered by the victims. China's domestic laws including the Maritime Law is expected to fill the legislative vacancy of the compensation system for ship pollution damages to protect marine environment and the sustainable development of the maritime activities to a certain extent. And China has accordingly undertaken continuous legislative adjustment to align its domestic laws with relevant international treaties including the International Convention on Civil Liability for Oil Pollution Damage and the International Convention on Civil Liability for Bunker Oil Pollution Damage.

Furthermore, compensation scope for damage to marine environments should adhere to the socialization principle. Relying solely on the infringing party is impractical, as their capacity to compensate is limited and insufficient for optimal marine protection. Meanwhile, ship-sourced oil pollution incidents are often unpredictable, with extensive resulting damages. If the responsible party alone bears these risks, it could face overwhelming debts or bankruptcy, which neither protects the marine environment nor promotes participation in marine industries. Over time, the needs of marine economic development cannot be adequately addressed, hindering societal progress. Thus, these issues should be managed collectively by society, with support from social entities, to fairly distribute production-related risks and prevent disruptions to social order and relationships due to excessive costs.

Notwithstanding its contributions, given the fluid and integrated nature of the ocean, defining compensation scope is only one facet of effective marine environmental governance. Ultimately, vigorous enforcement by states is indispensable to achieving tangible pollution prevention and ensuring robust marine environmental protection.

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Supplementary material

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