CLIMATE GOVERNANCE: RELATIONSHIP BETWEEN THE PORT STATES, THE COASTAL STATES, AND THE FLAG STATES THROUGH THE VENN DIAGRAM.

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Keywords

Maritime Climate Governance, Flag States, Coastal States, Port States, Policy Integration.

Abstract

Climate change poses a unique challenge for global governance, particularly within maritime affairs. This study delves into MARPOL's role in enforcing environmental regulations under international law for effective climate governance. Shipping's substantial greenhouse gas emissions highlight the need for policies that transcend national boundaries, supervised by organizations like the International Maritime Organization (IMO). Port, Coastal, and Flag States each hold distinct responsibilities under international law, creating both challenges and opportunities for climate governance. Visualization through a Venn diagram can reveal overlapping authorities and potential gaps in regulatory coverage. Principles like no more favourable treatment and non-discrimination ensure fair enforcement across States. The complex governance landscape necessitates a deep understanding of international agreements and legal frameworks. Integrating theoretical foundations into a Venn diagram offers insights into relationships among maritime States, aiding in the coordination of climate efforts. Strengthened collaboration among these States is crucial for sustainable maritime climate governance and the protection of marine ecosystems from pollution.

1 INTRODUCTION

Climate change challenges global governance, notably within maritime affairs where environmental impacts intersect with global trade. This sector's significance in global trade and its contribution to pollution highlight the urgency for effective climate governance. Maritime governance is divided among Port, Coastal, and Flag States, each bearing unique but intersecting responsibilities.

UNCTAD (2022, p. xv) recognizes that the maritime sector, accounting for a significant portion of global trade, also contributes to environmental and atmospheric pollution, with international maritime transport, contributing a share of global greenhouse gas emissions. Addressing these emissions involves international policy frameworks and regulatory oversight extending beyond national borders, with entities like the International Maritime Organization (IMO) playing crucial roles.

Port States enforce maritime regulations for vessels in their ports, Coastal States control territorial seas, and Flag States ensure ships comply with international standards including climate change mitigation. This paper examines these roles within the framework of major international agreements like the UNFCCC (1992), Kyoto Protocol (1997), Paris Agreement (2015), MARPOL 73/78/97, and the 2023 IMO Strategy (Resolution MEPC.377(80)).

This study abstains from exploring into the specific technical regulations of Annex VI of MARPOL, focusing instead on the overarching structures of maritime climate governance and the enforcement of standards. It explores the interplay between states' powers, highlighting the complexities of overlapping jurisdictions. The Venn Diagram technique is employed to visualize relationships, identifying areas of synergy and regulatory gaps.

Aiming to enrich maritime governance discussions, this paper seeks to illustrate how coordinated actions among Port, Coastal, and Flag States could better address climate change, suggesting ways to bolster governance and policy effectiveness.

2 CLIMATE EMERGENCY AND THE RESPONSE OF THE INTERNATIONAL MARITIME SECTOR

2.1 The Framework Convention on Climate Change and its Protocols

The United Nations Framework Convention on Climate Change was established on May 9, 1992, and came into force on March 21, 1994, following the 50th instrument of ratification (UNFCCC 1992). The primary aim of the convention is to stabilize greenhouse gas concentrations in the atmosphere to prevent dangerous anthropogenic interference with the climate system, as articulated in Article 2. Presently, the UNFCCC 1992 has 198 Parties, including Niue, the Cook Islands, and the European Union, demonstrating a global commitment to addressing climate change.

In accordance with Article 4(a) of this Convention, there is a requirement for the regular update and public disclosure of inventories detailing anthropogenic emissions and removal of greenhouse gases by sources and sinks not regulated by the Montreal Protocol on Substances that Deplete the Ozone Layer (1987), using methodologies approved by the Conference of the Parties (UNFCCC 1992). The Convention acknowledges the Subsidiary Body for Scientific and Technological Advice (SBSTA) as capable of performing these tasks, offering support to entities like the Intergovernmental Panel on Climate Change (IPCC) (Notes by the Secretariat of the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change, para. 38).

The importance of the UNFCCC is underscored by its integration into Sustainable Development Goal 13 of the UN 2030 Agenda, which highlights the imperative of taking urgent action against climate change. The UNFCCC serves as the primary international forum for negotiating the global response to climate change (GILES 2021, p. 16).

Following the adoption of the Kyoto Protocol during COP3 in 1997, it was decided that emissions from fuel sold to international shipping or aviation should be reported separately and not included in national totals (Kyoto Protocol, 1997, Art. 2(2)). This distinction was instrumental in aligning the legal framework of climate governance with the operations of the IMO. The autonomy granted to the IMO and the International Civil Aviation Organization (ICAO) within the Kyoto Protocol facilitated the development of individual methods for managing emissions from international bunker fuel usage.

There have been differing perspectives regarding the regulation of international maritime transport. Contrary to what was argued by RINGBOM (2021, p. 136) about some contention and ambiguity over the assignment of responsibilities for the maritime transport emissions inventory, the responsibilities assigned to the SBSTA and its support mechanisms are considered robust and integral. As can be seen on the IMO website (IMO 2023), every six months the Organization reports the progress of its initiatives and strategies to the SBSTA, not because it is considered a superior body but because it is understood that it is a common interest, where every progress and contribution adds to the fight against climate change.

The Paris Agreement, adopted during COP21 in 2015, marked a significant step in global climate action. However, there was a missed opportunity to integrate emission reduction targets for international shipping within the final agreement text, as highlighted by MARTINEZ (2016, p. 216) and RINGBOM (2021, p. 136). This omission maybe underscores the need for further integration of the maritime sector into broader climate change mitigation efforts; however, the IMO has directed international maritime transport in a strategy that appears to advance gradually within an ideal decarbonization process that addresses the specificities of the sector.

2.2 State of the Art: The International Maritime Organization's Approaches to Climate Change

In the 1960s and 1970s, attention centred on the marine environment's vulnerability to oil spills, with the 1970s witnessing an average of 79 spills annually, releasing millions of tons of oil (FANO 2019, p. 9; ITOPF 2023). This situation accelerated the adoption of the MARPOL Convention in 1973, aimed at preventing marine pollution, which saw significant development with a 1978 Protocol, becoming effective in 1983.

The 1972 United Nations Conference on the Human Environment (Stockholm Conference 1972) marked a global acknowledgment of environmental no.s, leading to efforts to address air pollution, including the pivotal Vienna Convention for the Protection of the Ozone Layer in 1985. Concerns about ship-related air pollution, particularly regarding marine fuel sulphur content, prompted action from the International Maritime Organization (IMO) (SVENSSON 2014, p. 14, 41-43).

The 1997 Protocol of the MARPOL Convention, specifically Annex VI, aimed to control and reduce shipborne air pollution, with recent adjustments recognizing the need to address global CO2 emissions from maritime transport (IMO 2020; MP/CONF. 3/35 1997, Resolution 8; TANAKA 2016, p. 333).

The advancements culminated in the 2023 revised GHG Strategy (Resolution MEPC.377(80)) supported on the 2021 amendments for improving ship energy efficiency and reducing emissions (Resolution MEPC.328(76)). The five guiding principles established in the revised GHG strategy emphasize the necessity of a holistic, equitable, and scientifically grounded approach in the global effort to reduce GHG emissions from shipping, ensuring the initiative is as effective and reasonable as possible.

The principle of non-discrimination in combination with the principle of no more favourable treatment	• Guaranteeing that all ships are subject to the same environmental standards, regardless of their national flag and preventing any State from granting favorable conditions to ships under its flag in a way that might undermine the collective environmental objectives.
The principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances	• Recognizing the varying capacities of countries to fight climate change, taking into account the different contributions to global emissions and encouraging international cooperation by respecting different national circumstances and capabilities.
Universality of Implementation	• Requiring all ships to fully implement mandatory measures, irrespective of the flag.
Consideration of Impact on States	• Recognizing the potential impacts of environmental measures on states, particularly on developing countries, Least Developed Countries (LDCs), and Small Island Developing States (SIDS), embodies a principle of inclusivity and fairness.
Evidence-Based and Precautionary Approach	• Advocating for decision-making that is both evidence-based and aligned with the precautionary principle reflects a commitment to sound, pragmatic policy development.

Figure 1: Guiding Principles for the 2023 IMO Strategy on reduction of GHG emissions from ships MEPC.377(80) (Created by the Authors)

These guiding principles are the basis of the three stated objectives, which aim to:

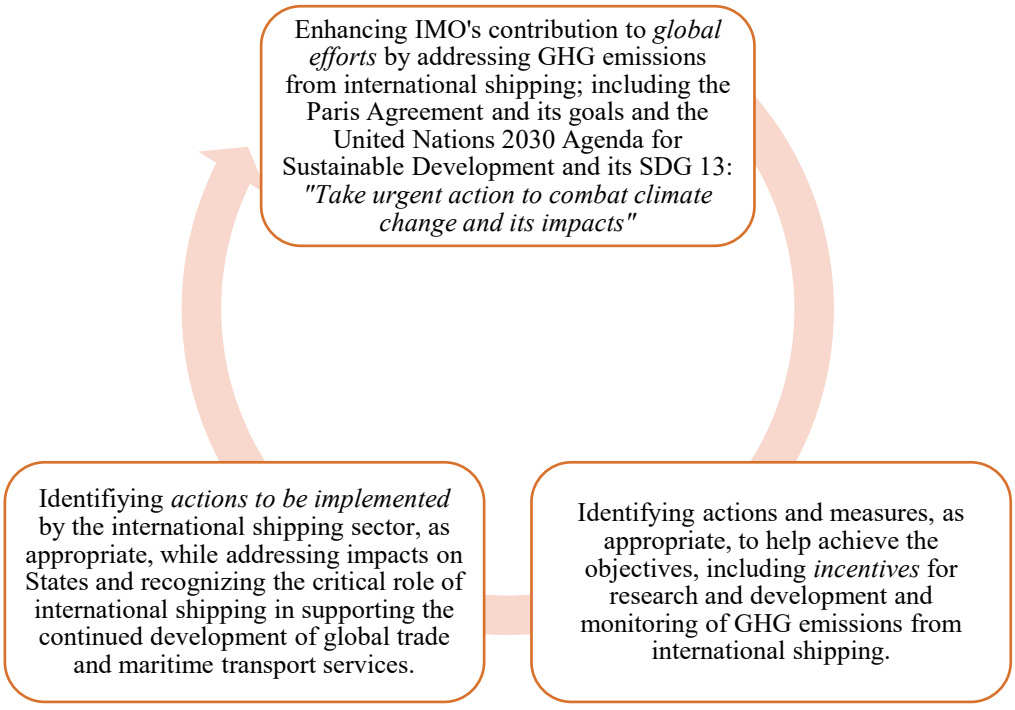

Figure 2: Objectives pursued by the 2023 IMO Strategy on reduction of GHG emissions from ships MEPC.377(80) (Created by the Authors)

And finally, these objectives are aimed at achieving certain levels of ambition, which are the goal of the strategy, established as:

Enhancing the *carbon efficiency* of ships by advancing *energy efficiency* in new vessels and bolstering design requirements to ensure energy conservation.

Committing to a minimum *40% reduction in CO2 emissions* per unit of transport work across international shipping by *2030*, benchmarked against 2008 levels, marking a crucial step towards decreasing the industry's carbon footprint.

Promoting the adoption of *zero or near-zero GHG emission technologies and fuels*. The strategy aims for these innovative energy solutions to constitute *at least 5%,* with an aspirational goal of reaching 10%, *of the energy consumed* by international shipping *by 2030*. This initiative reflects a significant move towards sustainable maritime practices.

Striving to cap GHG emissions from international shipping as swiftly as possible and achieving *net-zero GHG emissions by around 2050*. This goal is set with a nod to variances in national circumstances and is part of a broader effort to eliminate GHG emissions, aligning with the long-term temperature objectives outlined in Article 2 of the Paris Agreement.

Figure 3: Levels of Ambition stated in the 2023 IMO Strategy on reduction of GHG emissions from ships MEPC.377(80) (Created by the Authors)

One additional indicative checkpoint included in the revised GHG strategy, 2023 is to *reduce the total annual GHG emissions* from international shipping *by at least 70%,* striving for 80%, *by 2040*, compared to 2008.

After establishing the "what" and the "why," further clarity is required on the operational aspects of the "how." While a comprehensive strategy is in place and the industry is actively pursuing technological innovations to meet set targets, the precise operational frameworks of financial support for research and development remain undefined. Similarly, the mechanisms for ensuring adherence to regulations governing GHG emissions are yet to be delineated (TANAKA, 2016, p.334). These critical gaps point to the need for regulatory frameworks to be established, particularly in addressing compliance no.s, an area where legislation must play a decisive role.

3 INTERNATIONAL PROVISIONS FOR THE SUPERVISION AND CONTROL OF INTERNATIONAL MARITIME TRANSPORT REGARDING GREENHOUSE GAS EMISSIONS

3.1 The International Convention for the Prevention of Pollution from Ships (MARPOL)

3.1.1 Harmonizing Maritime Environmental Protection: The Role and Challenge of MARPOL's Annex VI and its 1997 Protocol

Article 3 of the 1997 MARPOL Protocol, emphasizing a unified approach, mandates the 1973 Convention, its 1978 amendment, and the 1997 Protocol be seen as a single instrument, including Annex VI aimed at preventing air pollution from ships. MARPOL's climate regulations, particularly in Annex VI Chapter 4, address carbon intensity in international shipping, applying to ships over 400 Gross Tonnage (GT) with specific exceptions and recommendations for compliance.

Recent regulations target larger vessels, over 5000 GT, for environmental impact mitigation. Despite MARPOL's wide acceptance, the 1997 Protocol's ratification by 105 states—representing 96.70% of global tonnage—highlights challenges in achieving complete global commitment, due to this figure represents 60% of the Parties to the original 1973 MARPOL Convention. Notably, among the non-ratifiers are key players in international maritime trade, highlighting a crucial lapse in the worldwide pledge towards environmental stewardship within the maritime domain. Moreover, as SHI (2017, p. 47-48) points out, the lack of clear criteria for determining 'substantial contribution' to treaty ratification compounds the no..

The 2011 amendments, adopted without full consensus, reflect these complexities. FITZMAURICE (2023, p. 106) notes the challenge of ensuring compliance, particularly concerning Annex VI breaches, emphasizing the need for international cooperation to support effective maritime governance and protect marine ecosystems.

3.1.2 The Principle of No More Favourable Treatment

A fundamental pillar that guarantees the effectiveness of the MARPOL Convention is the principle of no more favourable treatment, prescribed in its article 5.4, which empowers the Port State to ensure compliance with the Convention's provisions by all ships entering its ports on a voluntary basis, even if the ship is registered under a flag State that is not a party. Annex VI, along with other annexes, embeds this principle in its regulations (Regulation 10.5). In essence, vessels registered under Flag States that are not party to the 1997 Protocol may, under certain circumstances, need to demonstrate compliance with regulations aimed at decarbonizing maritime transport, mirroring those requirements imposed on ships registered under States Parties to the protocol.

At first approach, the principle of no more favourable treatment might appear to contradict the principle *Pacta Tertiis Nec Nocent Nec Prosunt*: [a treaty does not create either obligations or rights for a third State without its consent] (FITZMAURICE 2023, p. 97), as delineated in Articles 34 and 35 of the Vienna Convention on the Law of Treaties of 1969 (VCLT 69). The VCLT 69 asserts that a treaty provides an obligation for a third State only if the "third State expressly accepts that obligation in writing". Moreover, the principle of no more favourable treatment could potentially also conflict with the principle of extraterritorial jurisdiction of the Flag State, as outlined in Articles 92, 94, and 217 of UNCLOS—a principle that will be explored in further detail later on.

Legal precedent has widely recognized the enforcement of international maritime laws on vessels registered in non-party nations as justifiable under customary international law, in order to not violate the *pacta tertiis* principle. As pointed out by FANØ (2019, p. 75), the principle of no more favourable treatment has been acknowledged as a principle of customary international law; this acknowledgment arises from the evolution of international practices that fulfil both the objective (consistent and repeated actions over time) and subjective (a perceived sense of legal obligation) criteria necessary for recognition. However, the application of this principle may differ across the various MARPOL Annexes. Specifically, how it is applied to the mandatory annexes (I and II), the optional annexes (III, IV, and V), and notably Annex VI, which includes regulations aimed at combating climate change, may vary. Consequently, there is at least some uncertainty regarding whether the application of this principle to the Annex VI maintains the requisite level of robustness needed for it to be considered a principle of international custom.

Despite concerns coming from the relatively low number of States that have ratified MARPOL Annex VI, it's important to note that Port States, in exercising their sovereignty, retain the right of residual prescriptive jurisdiction. This allows them to extend their regulatory measures beyond established international norms. While there are instances where MARPOL may limit the discretion of Port States[1], such instances are few. Fundamentally, MARPOL and related conventions underscore the Port State's residual prescriptive jurisdiction, thus implicitly supporting the principle of no more favourable treatment, as noted by MOLENAAR (2007, p.

[1] For instance, the Regulation 15.1 of Annex VI, relating the volatile organic compounds states that 'If the emissions of volatile organic compounds (VOCs) from a tanker are to be regulated in a port or ports or a terminal or terminals under the jurisdiction of a Party, they shall be regulated in accordance with the provisions of this regulation.

231).

3.2 Obligations, jurisdictions, and competencies of States established in UNCLOS that could be valid to achieve effective maritime climate governance.

3.2.1 The Flag States

The purpose of the International Maritime Organization (IMO) is to provide a global regulatory framework and promote governance policies to ensure the continuity of efficient and safe maritime transport, as well as to prevent pollution that maritime operations may generate. In this process, ships are equipped and built following the technical criteria of classification societies, which not only ensure compliance with construction norms and the guidelines of international maritime treaties such as MARPOL, but also verify the correct implementation and operation of various systems and equipment.

States that register their ships under their flag are obligated to ensure that they comply with the international standards of safety and environmental protection stipulated in the conventions of the IMO. Additionally, the prescriptions of Article 94 of the UNCLOS requires that these States must exercise control over their ships, conducting periodic inspections by qualified personnel to confirm their seaworthiness. The process includes ongoing assessments of the ship, commencing with initial inspections before the ship sets sail, and progressing through cyclical evaluations typically conducted every five years (FITMAURICE 2023, p. 105). These cycles involve annual surveys, intermediate surveys (usually in the second or third year of the cycle), and renewal surveys in the fifth year. It is important to note that these timeframes are maximum limits, as the Maritime Authority of each Flag State determines the expiration of each statutory certificate, ensuring compliance within the confines outlined by the IMO Harmonized System of Survey and Certification (IMO Resolution A.1186(33)).

BODANSKY (1991, p. 760, note 206), referencing Hakapää, advises that proposals were put forth during the MARPOL negotiations to permit Port State enforcement of discharge infractions on the high seas. These proposals were rejected due to concerns that such actions would encroach upon the high sea's jurisdiction of the Flag State. Nonetheless, it is significant to note that one of the exceptional circumstances that emerges, providing a measure of constraint to the concept of extraterritoriality and the exclusive jurisdiction of the Flag State, is specifically in cases of pollution, encompassing air pollution.

TANAKA (2023, p. 205) points out that the jurisdiction of the flag state extends to both legislative and enforcement control over its ships in international waters. All elements on board and every individual associated with or affected by its operations are regarded as affiliated with this particular State (ITLOS 1999, p. 48, para. 106), so, apart from the exceptional cases, vessels on the high seas are exclusively subject to Flag State jurisdiction (HONNIBALL 2016, p. 504). This principle is codified in Article 92(1) of the UNCLOS, establishing exclusive Flag State jurisdiction as a standard international norm among UNCLOS member states. Moreover, as noted by HONNIBALL (2016, p. 505), for States not party to the UNCLOS, the principle is recognized as aligning with customary international law.

To manage the certification and recognition of ships, Flag States often rely on Classification Societies, with which they work together to maintain an inspection regime in accordance with the requirements of international conventions, and thus, by delegating functions of the States, contribute to the construction of maritime transport governance, including aspects related to climate governance (RODRIGUEZ 2023, p. 184).

In managing ship operations, MARPOL establishes a framework of regulations that crew members must follow to mitigate, control, or outright eliminate pollution. This framework includes controlled discharge regimes, factoring in vessel speed, sea depth, average discharge volumes / rates, proximity to shore, and the setup of employed equipment, all designed to keep pollution within prescribed limits. Additionally, MARPOL enforces discharge prohibitions in designated "Special Areas" or "Particularly Sensitive Sea Areas" (FITMAURIZE 2023, p. 102-105) as proposed by States and approved by the IMO (IMO Resolution A.982(24)). The efficacy of these measures is supported by manual and/or electronic record-keeping, complemented by satellite monitoring, and the potential for Port State Control or Flag State inspections, comparing onboard pollutant records with actual amounts (MARTEN 2014, p. 45).

However, with respect to Annex VI and specifically GHG emissions, the risk of non-compliance due to crew mismanagement—be it unintentional or intentional—retains a degree of uncertainty. The crew's contribution is primarily focused on operational efficiency, emphasizing best practices to enhance fuel efficiency (such as optimizing vessel speed, planning routes to reduce fuel consumption, and maintaining engines and equipment for optimal performance). They also prioritize energy conservation by minimizing energy waste on board (including actions like turning off lights and equipment when not in use, optimizing heating, ventilation and air condition systems, and utilizing energy-efficient appliances). Additionally, crew members play a crucial role in emission monitoring during operations, ensuring adherence to emission control regulations, accurately recording emission data, and promptly reporting any discrepancies to the appropriate authorities (SCOTT 2017, p. 241).

But ships are built as they are; their systems, designs, and equipment are what they are, and although energy efficiency could enhance their performance in emissions, this is only a palliative into the whole work to be done. The real measures lie in the development and transfer of technology (MANDIĆ et al. 2021, p. 9) and the use of less polluting alternative fuels (BIGILI 2022, p. 352), with proper incentives and rewards for environmentally sustainable practices in marine transport; something that Flag States should consider seriously.

3.2.2 The Coastal States

The International Maritime Organization (IMO) conventions are pivotal in shaping the legal architecture governing Coastal States' authority over marine pollution. They frame international norms and directives designed to mitigate, reduce, and manage pollution caused by ships.

Article 211(6) of the United Nations Convention on the Law of the Sea (UNCLOS) underscores the IMO's responsibility in formulating a comprehensive inventory of potential pollution prevention strategies, from which it selects specific implementations for proposals presented by a Coastal State. This provision also grants Coastal States the flexibility to suggest additional initiatives not encompassed by this inventory, with the limitation of excluding construction, equipment, design and manning (CEDM) standards (ILA 2000, p. 24). The ILA also has observed that domestic laws enacting this clause do not invariably incorporate all aspects of the nuanced compromise underpinning Article 211(6). This indicates that, while IMO conventions and guidelines provide a regulatory framework for Coastal State oversight of marine pollution, the practical application and enforcement of these frameworks continue to encounter considerable difficulties.

RINGBOM and RYNGAERT (2016, p. 383) highlight the Coastal States' "quasi-territorial" jurisdiction, encompassing the territorial sea, contiguous zone, and exclusive economic zone (EEZ) as defined by international law. This jurisdiction, while extending beyond terrestrial borders, is grounded in the State's sovereignty and interests in these maritime zones.

Under UNCLOS, Coastal States possess the authority to enforce stricter pollution prevention measures regarding *innocent passage*, falling within its residual prescriptive jurisdiction. However, this authority faces notable limitations that warrant consideration (KÖNIG 1999 p. 825). Primarily, UNCLOS Article 21(2) outlines an exemption for regulations concerning ships' design, construction, manning, and equipment (CDEM) unless they adhere to 'generally accepted international rules or standards.' The interpretation of this term introduces ambiguity, as noted by IOSELIANI (2016, p. 48). This ambiguity is further compounded by the fact that MARPOL Annex VI Part 4 Regulations encompass aspects of ship design, construction, and equipment, as highlighted by HARRISON (2012, p. 24).

Exercising prescriptive jurisdiction without enforcement authority lacks impact under international law. Mere introduction of rules devoid of enforcement risks international challenge. Clarity between legislative intent and enforcement necessity vital for legitimacy in legal jurisdiction and inter-state relations (MANN 1964, p. 14).

3.2.3 The Port States

The jurisdiction of Port States plays a crucial role, not just in achieving their domestic objectives but also in furthering the broader ambitions of the international community, especially when it comes to protecting the

marine environment from pollutants like ship emissions, a concern highlighted in MARPOL (RODRÍGUEZ 2023, p. 187). MOOLENAR (2007, p. 225) emphasizes the importance of Port States in ensuring that Flag States and their ships adhere to these international regulations, a key element in the fight against environmental degradation. According to TANAKA (2023, p. 584), in a world without a centralized authority for global enforcement, the measures taken by Port States, although based on their own laws, are vital for sustaining international legal norms. This reflects the *'Dedoublement Fonctionnel'* concept introduced by G. Scelle, which advocates for a decentralized approach to international law, driven by the actions of individual nations.

CHURCHILL (2016, p. 445-446) differentiates static conditions, which involve construction, design, equipment, and manning (CDEM) standards that ships must meet globally before arriving at a port, from non-static conditions that govern vessel behaviour specifically within port limits. Static conditions possess an extraterritorial nature, requiring ships to comply with certain standards ahead of time to gain port access, demonstrating the Port State's extraterritorial jurisdiction. Conversely, non-static conditions are enforced territorially, focusing solely on the vessel's actions within the port's geographical confines and do not affect the ship's construction or equipment. This contrast highlights the global pre-arrival compliance requirement of static conditions versus the localized enforcement of non-static conditions within the port's jurisdiction.

The UNCLOS (Article 218) authorizes Port States to exercise jurisdiction over discharges from ships outside the internal waters, territorial sea or EEZ of that state that violate applicable international rules. This suggests that international cooperation through treaties may allow Port States to regulate activities beyond their national borders in certain circumstances.

By imposing regulations to control marine and atmospheric pollution as mandated by MARPOL, Port States not only highlight the importance of compliance from foreign vessels but also strengthen the framework of international environmental governance. As TANAKA (2016, p. 341) elaborates, this enforcement strategy showcases the pivotal position of Port States in executing marine and atmospheric pollution controls effectively, thus aiding in the achievement of global environmental protection goals.

Effective performance during the control of the Port State is only achieved with high commitment and responsibility. MOOLENAR (2007, p. 246) refers to the notion of the "responsible Port State", describing it as "a State committed to making the fullest possible use of its jurisdiction under international law in furtherance of not just its own rights and interests, but also those of the international community".

As highlighted by RINGBOM and RYNGAERT (2016, p. 380), the practice of Port State jurisdiction over foreign-flagged vessels, especially when the states under whose flag the vessels operate fail to adequately regulate or enforce the applicable law, may be viewed as a necessary subsidiary role for give effect to applicable international rules and standards, or simply apply their own laws in the protection of global common interests.

4 VENN DIAGRAM ANALYSIS OF INTERRELATIONS

4.1 Criteria for Comparative Analysis

As noted by FITZMAURICE (2023, p. 10), Flag, Coastal and Port States enjoy different type of enforcement jurisdiction over vessels which breach discharge and construction, design, equipment, and manning (CDEM) standards. Through our examination, it is clear that under Article 94.1 of the UNCLOS, the Flag State holds jurisdiction and oversight over its vessels in technical, administrative, and social matters. Concurrently, MARPOL Annex VI in the Chapter 2 (Regulations 5 to 11), details the technical and administrative controls essential for mitigating air pollution from ships. These controls articulate the application of the jurisdiction granted by UNCLOS. As such, it is anticipated that the Flag State, serving as the principal authority, would formulate and implement regulations for its ships and levy penalties in instances of non-compliance. However, empirical evidence points to a contrasting scenario where certain Flag States exhibit a lack of commitment to monitoring vessels registered under their flags effectively.

Broadly speaking, one might inquire: What actions are available to the Port State upon discovering a violation during its monitoring activities on the High Seas? While acknowledging the paramount jurisdiction of the Flag State, the solution may lie in robust Port State controls, imposing significant fines to deter such

activities, detaining vessels until restitution bonds are paid for damages incurred. Certain States implement criminal sanctions, including imprisonment for culpable crew members, and restrict ship access to their ports.

The secondary defensive line encompasses the Coastal State and the Port State. However, the constraints specified by the UNCLOS define the jurisdiction of the Coastal State, limiting it to specific types and circumstances that consider the location of potential transgressions, thus defining the scope of its involvement. In contrast, the Port State holds relatively more authority, particularly in the utilization of residual prescriptive jurisdiction in accordance with the UNCLOS and, by extension, MARPOL, remaining to the previously mentioned limitations. Through a system of supervision and control, the Port State ensures the efficiency of its regulatory framework. Regrettably, in this scenario, practical experiences reveal Port States with limited interest in effective supervision and control, opting for convenience (ports of convenience) or even lacking in conformity with the provisions of Annex VI of MARPOL due to the non-ratification of the 1997 MARPOL Protocol.

In 1994, GRIFINN (p. 500-502) outlined three enforcement strategies for MARPOL, which are relevant also to Annex VI: (a) inspection for technical standard adherence; (b) compliance monitoring with discharge regulations; and (c) penalizing standard violations. Effective implementation of these strategies for the current air pollution standards demands solid commitment from all Flag States and advanced technology to enhance Flag, Coastal, and Port States' ability to detect violations. These three mechanisms, rooted in theoretical foundations, facilitate the construction of an Inter-State Maritime Climate Governance approach using the Venn diagram model.

4.2 Building the Venn Diagram based on the Inter-State Maritime Climate Governance

In inter-state maritime climate governance, diverse theoretical foundations shape strategies for climate change in the maritime sector. Integrating principles like extraterritorial jurisdiction, non-more favourable treatment, non-discrimination, common but differentiated responsibilities and respective capabilities, cooperation and precautionary approach in response to the commitment made under the Kyoto Protocol, ensures fair regulation and emissions management.

Visualizing these theories in a Venn diagram underscores their integration and interconnectedness, emphasizing the collaborative approach needed for effective maritime climate governance, fostering fairness, cooperation, and shared responsibility among states.

The delineation of rights and obligations concerning Jurisdiction, Enforcement Actions, Commitment and Cooperation expectations, and the Regulatory Framework is outlined below as the groundwork for constructing the Venn diagram.

4.2.1 Flag States:

- Have jurisdiction over their vessels as per UNCLOS Article 94, ensuring compliance with international safety and environmental standards.
- Conduct regular inspections to confirm ship seaworthiness and enforce regulations to penalize non-compliant vessels, especially concerning MARPOL standards.
- Manage certification processes and ship recognition, often through Classification Societies, to uphold international standards and mitigate emissions.
- Hold the primary responsibility for overseeing and regulating their vessels' adherence to MARPOL and other relevant international agreements.

4.2.2 Coastal States:

- Exercise jurisdiction over marine pollution within their territorial seas, contiguous zones, and exclusive economic zones (UNCLOS).
- Can enforce stringent pollution prevention measures under UNCLOS Article 211(6), in line with international rules and standards.
- Uphold sovereignty over maritime areas and cooperate with international bodies to manage

pollution effectively.

- Have authority to suggest additional pollution prevention initiatives beyond agreed frameworks, subject to international standards, except in matters of ship design, construction, equipment, and manning.

4.2.3 Port States:

- Enforce compliance with international maritime regulations for vessels entering their ports, as outlined by MARPOL and other relevant agreements.
- Conduct inspections on foreign-flagged vessels to ensure adherence to environmental regulations, with the power to detain, fine, or sanction non-compliant ships.
- Exercise extraterritorial jurisdiction over ship activities and enforce regulations related to discharge and pollution control measures, playing a critical role in preserving the marine environment.
- Implement strategies for monitoring and controlling marine and atmospheric pollution, aligning their actions with international norms and standards to enhance global environmental protection efforts.
- Exercise jurisdiction over discharges from ships outside their internal waters, territorial sea, or exclusive economic zone that violate applicable international rules as per UNCLOS Article 218, enabling them to regulate activities impacting their marine environment beyond their immediate maritime zones.

State Type	Jurisdiction	Enforcement Actions	Commitment & Cooperation	Regulatory Framework
Flag States	Global	Inspection, Certification, Penalization	Requires commitment for monitoring and technology for detection Incentive Programs	UNCLOS MARPOL
Coastal States	Territorial Seas EEZ	Pollution Prevention Measures Monitoring	Sovereignty over maritime zones Requires commitment for monitoring and technology for detection. Proposal of Special Areas / Particularly Sensitive Sea Areas Incentive Programs	UNCLOS MARPOL Specific environmental measures
Port States	Ports	Prohibiting cargo operations and / or port services, Denial of access to ports (banning), Compliance Inspection, Detainment, Fines	Enforcement of maritime regulations Requires commitment for monitoring and technology for detection. Proposal of Special Areas / Particularly Sensitive Sea Areas Incentive Programs	MARPOL Local laws

Table 1: Roles and Responsibilities of Flag, Coastal, and Port States in Maritime Environmental Governance (Created by the Authors)

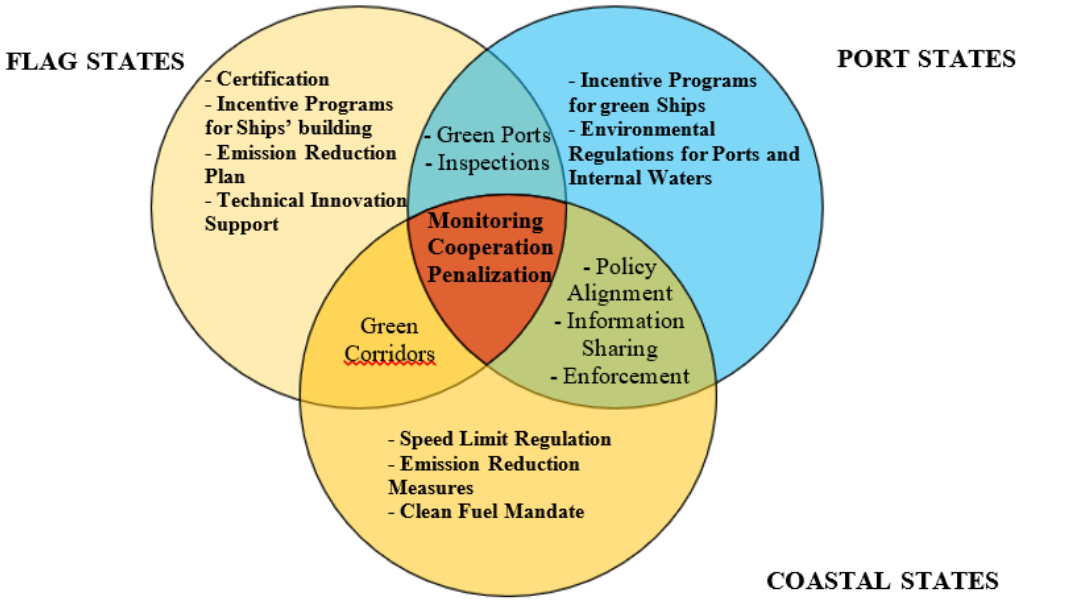

Figure 4: Venn Diagram based on the Inter-State Maritime Climate Governance (Created by the Authors)

5 CONCLUSIONS

In conclusion, by incorporating these foundational theories and visualizing their intersections through a Venn diagram, policymakers, researchers, and stakeholders can gain a holistic understanding of inter-state maritime climate governance and work towards collaborative and effective strategies to mitigate climate change impacts within the maritime industry.

Based on the detailed discussion of the rights and obligations of each State within maritime governance for climate change, several key points stand out. Port States play a critical role in enforcing compliance with international maritime regulations, emphasizing the importance of a robust penalty system for vessels that violate regulations. Coastal States, with their quasi-territorial jurisdiction, have the authority to suggest additional pollution prevention initiatives and establish green corridors to mitigate pollution. Flag States are tasked with ensuring compliance with international environmental standards, and they can drive incentive initiatives for ships' building to promote sustainable practices in maritime operations.

Incentive plans can encourage ships to adopt eco-friendly measures by rewarding compliance with environmental regulations. Green corridors established by Coastal States provide designated routes that prioritize environmental protection, reducing emissions and pollution in sensitive areas. Green ports, supported by governing Port States, serve as hubs for sustainable maritime activities, promoting eco-friendly practices and technologies to reduce the environmental impact of port operations.

To achieve effectiveness in maritime climate governance, constant monitoring, strong cooperation among states, and an effective penalty system for vessels that violate regulations are imperative. Regular monitoring is essential to ensure compliance with environmental standards and track progress towards emission reduction goals. Cooperation among Port, Coastal, and Flag States is crucial for harmonizing efforts, sharing best practices, and achieving collective climate objectives. An effective penalty system for non-compliant vessels serves as a deterrent, reinforcing the importance of following regulations and promoting a culture of environmental responsibility in the maritime sector.

6 REFERENCES

Bigili, Levent. A discussion on alternative fuel criteria for maritime transport. In: *Marine Science Technology Bulletin* [online]. 2022. vol. 11, no. 3, p. 352-360. [Accessed: 05 March 2024]. eISSN 2147–9666. Available at: https://doi.org/10.33714/masteb.1145994

Bodansky, Daniel M. Protecting the marine environment from vessel source pollution: UNCLOS III and beyond. In: *Ecology Law Quarterly* [online]. 1991. vol. 18, no. 4, p. 719-779. [Accessed: 05 March 2024]. ISSN 0046-1121. Available at: http://www.jstor.org/stable/24113087

Churchill, Robin. Port state jurisdiction relating to the safety of shipping and pollution from ships—What degree of extra-territoriality? In: *The International Journal of Marine and Coastal Law* [online]. 2016, vol. 31, no. 3, p. 442-469. [Accessed: 15 March 2024]. eISSN 0927-3522. Available at: https://doi.org/10.1163/15718085-12341409

Fitzmaurice, Malgosia. The International Convention for the Prevention of Pollution from Ships (MARPOL). In: Borg, Simone, [et al.]. *Research Handbook on Ocean Governance Law* [online]. United Kingdon: Edward Elgar Publishing, 2023, p. 91-108. eISBN 978-18-3910-769-6. Available at: https://www.e-elgar.com/shop/gbp/research-handbook-on-ocean-governance-law-9781839107689.html

Griffin, Andrew. MARPOL 73/78 and vessel pollution: a glass half full or half empty. In: *Indiana Journal of Global Legal Studies* [online]. 1994, vol. 1, no. 2, p. 489-514. [Accessed: 15 March 2024]. Available at: https://www.repository.law.indiana.edu/ijgls/vol1/iss2/10

Harrison, James. Recent developments and continuing challenges in the regulation of greenhouse gas emissions from international shipping. *Edinburgh School of Law Research Paper* [online]. no. 2012/12. [Accessed: 05 March 2024]. Available at: http://dx.doi.org/10.2139/ssrn.2037038

Honniball, Arron N. The exclusive jurisdiction of flag states: a limitation on pro-active port states?. In: *The International Journal of Marine and Coastal Law* [online]. 2016, vol. 31, no. 3, p. 499-530. [Accessed: 05 March 2024]. eISSN 1571-8085. Available at: https://doi.org/10.1163/15718085-12341410

International Law Association London Conference (ILA). Committee on Coastal State Jurisdiction relating to Marine Pollution. *Final Report 2000* [online]. November 2000 [Accessed: 27 March 2023]. Available at: https://www.ila-hq.org/en_GB/documents/conference-report-london-2000-7

International Maritime Organization. International Convention for the Prevention of Pollution from Ships (MARPOL 1973, as modified by the Protocols of 1978 and 1997). Consolidated edition. London: IMO, 2022. ISBN 978-92-801-1743-1

International Maritime Organization. *Conference resolution 8: CO2 emissions from ships. Annex* [online]. MP/CONF. 3/35 22, p. 96. [Accessed: 21 February 2024]. Available at: https://wwwcdn.imo.org/localresources/en/MediaCentre/PressBriefings/Documents/MP%20CONF.3%2035%20Resolution%208%201997%20CO2.pdf

International Maritime Organization. *Fourth IMO GHG Study 2020* [online]. London: IMO, 2021. [Accessed: 21 February 2024]. [executive study and full record]. Available at: https://www.imo.org/en/ourwork/Environment/Pages/Fourth-IMO-Greenhouse-Gas-Study-2020.aspx

International Maritime Organization. *IMO at COP 28* [online]. London: IMO, 2023. [Accessed: 21 February 2024]. Available at: https://www.imo.org/en/OurWork/Environment/Pages/IMO-at-COP-28.aspx

International Maritime Organization. *Status of IMO Treaties* [online]. London: IMO, 2024. [Accessed: 28 March 2024]. Available at: https://tuit.cat/pAlNj

International Maritime Organization. Marine Envieronment Protection Committee. *Report of the Marine*

Environment Protection Committee on its sixty-second session. [online], 26 July 2011. MEPC 62/24. 62nd session Agenda item 24. [Accessed: 25 February 2024]. Available at: https://tuit.cat/x9zK2

International Maritime Organization. *Resolution A.982(24). Adopted on 01 December 2005 (Agenda item 11). Revised guidelines for the identification and designation of particularly sensitive sea areas* [online]. 6 February 2006. A 24/Res.982. Assembly 24th session. Agenda item 11. [Accessed: 07 February 2024]. Available at: https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/A24-Res.982.pdf

International Maritime Organization. *Resolution A.1186(33). Adopted on 06 December 2023 (Agenda items 11 and 13). Survey guidelines under the Harmonized System of Survey and Certification (HSSC), 2023* [online]. 11 December 2023. A33/Res. 1186. Assembly 33rd session. Agenda items 11 and 13. [Accessed: 07 February 2024]. Available at: https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/AssemblyDocuments/A.1186(33).pdf

International Maritime Organization. Marine Envieronment Protection Committee. *Resolution MEPC. 203 (62). Amendments to the Annex of the Protocol of 1997 to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 Relating Thereto* [online]. Adopted on 15 July 2011. [Accessed: 07 February 2024]. Available at: https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/MEPCDocuments/MEPC.203(62).pdf [Inclusion of regulations on energy efficiency for ships in MPARPOL Annex VI]

International Maritime Organization. Marine Envieronment Protection Committee. *Resolution MEPC.328(76). Adopted on 17 June 2021. Amendments to the Annex of the Protocol of 1997 to Amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 Relating Thereto* [online]. 2021 Revised MARPOL Annex VI [Accessed: 25 February 2024]. Available at: https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/MEPCDocuments/MEPC.328(76).pdf

International Maritime Organization. *Resolution MEPC.377(80). Adopted on 7 July 2023. 2023 IMO Strategy on Reduction of GHG Emissions from Ship* [online]. MEPC 80/17/Add.1 Annex 15, p. 1 [Accessed: 07 February 2024]. Available at: https://tuit.cat/ZpM9j

International Tanker Owners Pollution Federation Limited. Tanker spill statistics 2022. In: *ITOPF* [online]. ITOPF, 11 January 2023. [Accessed: 28 February 2024]. Available at: https://tuit.cat/21aCi

International Tribunal for the Law Of the Sea (ITLOS). The M/V "SAIGA" (No. 2) Case (Saint vincent and the Grenadines V. Guinea). In: *Internatiuonal Tribunal for the Law Of the Sea* [online]. Judgment on 01 July 1999. [Accessed: 29 April 2024]. Available at: https://www.itlos.org/en/main/cases/list-of-cases/case-no-2/

Ioseliani, Tamara. *Generally accepted international rules, regulations, procedures and practices" in accordance with the United Nations Convention on the Law of the Sea 1982 and the IMO Mandatory Instruments in Regards Maritime Safety* [online]. The United Nations. Nippon Foundation of Japan Fellowship Programme 2015-2016 [Accessed: 05 March 2024]. Available at: https://www.un.org/oceancapacity/sites/www.un.org.oceancapacity/files/tamara_2015-12-18_final.pdf

Fanø, Jesper Jarl. *Enforcing International Maritime Legislation on Air Pollution trough UNCLOS*. London: Hart publishing, 2019. ISBN 9781509927760.

Giles Carnero, Rosa. *El Régimen jurídico internacional en materia de cambio climático: dinámica de avances y limitaciones* [online]. Pamplona: Aranzadi, 2021. [Accessed: 29 April 2024]. ISBN 9788413455563. Available at: https://hdl.handle.net/10272/22959

König, Doris. Erik Jaap Molenaar, coastal state jurisdiction over vessel-source pollution. In*: Yearbook of International Environmental Law* [online]. 1999, vol. 10, no. 1, p. 823–826. [Accessed: 05 March 2024]. ISSN 0965-1721. Available at: https://doi.org/10.1093/yiel/10.1.823

Final act of the Conference of Plenipotentiaries on the Protocol on Chlorofluorocarbons to the Vienna Convention for the Protection of the Ozone Layer. In: *Montreal Protocol on Substances that Deplete the Ozone Layer* [online]. Montreal, 16 September 1987. vol. 2, chapter XXVII. [Accessed: 07 February 2024]. Available at: https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-a&chapter=27&clang=_en

Marten, Bevan. *Port state jurisdiction and the regulation of international merchant shipping* [online]. Switzerland: Springer International Publishing, 2014. eISBN 9783319003511. Available at: http://doi.org/10.1007/978-3-319-00351-1

Martinez Romera, Beatriz. The Paris agreement and the regulation of international bunker fuels. *Review of European Community & International Environmental Law (RECIEL)* [online]. July 2016. vol. 25, no. 2, p. 215-227. [Accessed: 05 March 2024]. eISSN 2013-9845. Available at: https://onlinelibrary.wiley.com/doi/epdf/10.1111/reel.12170

Mandić, Nikola, [et al.]. Multicriteria analysis of alternative marine fuels in sustainable coastal marine traffic. In: *Applied Sciences* [online]. 2021. vol. 11, no. 6, 2600. [Accessed: 05 March 2024]. eISSN 2076-3417. Available at: https://doi.org/10.3390/app11062600

Mann, Frederick Alexander. The Doctrine of Jurisdiction in International Law. In: Académie de Droit International de la Ha. *Recueil des Cours, Academy of International Law*. The Hague: Brill. 1964, vol. 111. ISBN: 9789028614826.

Molenaar, Erik Jaap. Port state jurisdiction: toward comprehensive, mandatory and global coverage. *Ocean Development & International Law* [online]. 2007, vol. 38, no. 1-2, p. 225-257. [Accessed: 05 March 2024]. eISSN 1521-0642. Available at: https://www.tandfonline.com/doi/pdf/10.1080/00908320601071520

Montreal Protocol on Substances that Deplete the Ozone Layer [online]. Montreal, 1987. United Nations Treaty Series, no. 1522, p. 3. [Accessed: 10 February 2024]. Available at: https://treaties.un.org/doc/Treaties/1998/09/19980921%2004-41%20PM/Ch_XXVII_07_ap.pdf

Paris Agreement [online]. Paris, 2015. United Nations Treaty Series, no. 3156, p. 79. [Accessed: 07 February 2024]. Available at: https://treaties.un.org/doc/Publication/UNTS/Volume%203156/Part/volume-3156-I-54113.pdf

Ringbom, Henrik; Ryngaert, Cedric. Introduction: port state jurisdiction: challenges and potential In: *The International Journal of Marine and Coastal Law* [online]. 2016. vol. 31, no. 3, p. 379-394. [Accessed: 15 March 2024]. eISSN 1571-8085. Available at: https://doi.org/10.1163/15718085-12341405

Ringbom, Henrik. Regulating greenhouse gases from ships: some light at the end of funnel? In: Johansen, Elise [et al.]. T*he law of the sea and the climate change: solutions and constraints*. United Kingdon: Cambridge University Press, 2021, p. 129-159. ISBN 978-11-0884-226-6. Also available at: https://doi.org/10.1017/9781108907118.007

Rodríguez Luna, Óscar. El Convenio Internacional para Prevenir la Contaminación por los Buques (MARPOL): un instrumento vivo a través de los acuerdos y la práctica ulteriores. In: Giles Carnero, Rosa. *Construyendo la gobernanza internacional: la interpretación de los tratados a través de la práctica ulterior*. Madrid: Dykinson, 2023, p. 177-194. ISBN 978-84-1170-694-0

Rodríguez Luna, Óscar. Prácticas desarrolladas tras la implementación del Anexo VI del Convenio MARPOL en Europa y América Latina. In: Mónica, E. F.; Hansen, G. L.; Díaz L., J.; Guinea L., M. (eds.). *Actas IV Congreso Internacional Globalización, Ética y Derecho: October 2020*. Madrid: Universidad Complutense de Madrid. Universidad Federal Fluminense, 2020, 2311 p. ISSN: 2695-8597. Also available at: https://tuit.cat/epWjp

Scott, Joanne [et al.]. The promise and limits of private standards in reducing greenhouse gas emissions from shipping. In: Journal of Environmental Law [online]. July 2017, vol. 29, no. 2, p. 231-262. [Accessed: 08 March 2024]. eISSN 1464-374X. Available at: https://doi.org/10.1093/jel/eqw033

Shi, Yubing. *Climate change and international shipping: the regulatory framework for the reduction of greenhouse gas emissions*. [online]. Series: Legal Aspects of Sustainable Development, vol. 23. Leiden: Brill Nijhoff, 2016, 480 p. ISBN: 9789004329317 [Accessed: 28 February 2024]. Available at: https://doi.org/10.1163/9789004329317

Svensson, Erik. *Sulphur regulations for shipping – why a regional approach?: scientific and economic arguments in IMO documents 1988-1997* [online]. Doctoral Thesis, Chalmers University of Technology, Department of Shipping and Marine Technology, 2014. [Accessed: 28 February 2024]. Available at: https://core.ac.uk/download/pdf/70608891.pdf

Tanaka, Yoshifumi. *The international law of the sea*. United Kingdon: Cambridge University Press, 2023. ISBN 9781009016414. Also available at:-https://doi.org/10.1017/9781009025393

Tanaka, Yoshifumi. Regulation of greenhouse gas emissions from international shipping and jurisdiction of states. In: *Review of European Community & International Environmental Law (RECIEL)* [online]. November 2016, vol. 25, no. 3, p. 333 – 346. [Accessed: 05 March 2024]. eISSN 2013-9845. Available at: https://onlinelibrary.wiley.com/doi/full/10.1111/reel.12181

United Nations Conference on Trade and Development (UNCTAD). *The Review of Maritime Transport 2022* [online]. New York: United Nations, 2022. [Accessed: 10 February 2024]. eISBN: 9789210021470. Available at: https://unctad.org/system/files/official-document/rmt2022_en.pdf

United Nations Conference on the Human Environment. *Report of the United Nations Conference on the Human Environment, Stockholm, 5-16 June 1972* [online]. New York : United Nations, 1973. [Accessed: 28 February 2024]. Available at: https://digitallibrary.un.org/record/523249?ln=es&v=pdf#files

United Nations Convention on the Law Of the Sea (UNCLOS) [online]. Montego Bay, 1982. United Nations Treaty Series, no. 1833, p. 3; 1834, p. 3; 1835, p. 3. [Accessed: 07 February 2024]. Available at: https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf

United Nations Framework Convention on Climate Change (UNFCCC) [online]. New York, 1992. [Accessed: 07 February 2024]. Available at: https://treaties.un.org/doc/source/recenttexts/unfccc_eng.pdf

Vienna Convention for the Protection of the Ozone Layer [online]. Vienna, 1985. United Nations Treaty Series, no. 1513, p. 293. [Accessed: 28 February 2024]. Available at: https://treaties.un.org/doc/Treaties/1988/09/19880922%2003-14%20AM/Ch_XXVII_02p.pdf

Vienna Convention on the Law of the Treaties [online]. Vienna, 1969. United Nations Treaty Series, no. 1155, p. 331. [Accessed: 28 February 2024]. Available at: https://treaties.un.org/doc/Treaties/1980/01/19800127%2000-52%20AM/Ch_XXIII_01.pdf