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Governments' Rights and Duties in Preventing and Compensating Marine Pollution (Mostly Resulting from Oil Transport in the Light of International Conventions)

Doctoral Thesis

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Abstract

This thesis, employing a descriptive-analytical research method, comprehensively examines the rights and obligations of states in preventing and compensating marine pollution caused by oil transportation, with a particular focus on the framework provided by international conventions such as MARPOL, CLC, and FUND established by the International Maritime Organization (IMO). The study highlights the critical role of these conventions in setting global standards for pollution prevention, including stringent requirements for ship design, construction, and operation, such as the mandatory use of double-hulled tankers to minimize oil spill risks. However, the effectiveness of these measures depends on the capacity of states to enforce them, revealing a disparity between developed and developing nations that underscores the need for enhanced international cooperation, technical assistance, and capacity-building programs. The research also explores the compensation mechanisms under the CLC and FUND conventions, which hold shipowners strictly liable for oil pollution damage and provide additional compensation through the International Oil Pollution Compensation Funds (IOPC Funds). Despite their effectiveness, challenges such as determining liability in complex incidents and rising compensation costs necessitate revisions to liability limits to reflect current environmental and economic realities. Furthermore, the advent of unmanned and autonomous vessels introduces new legal and technical challenges, as existing conventions like SOLAS and STCW, which are predicated on the presence of human crews, require significant updates to address issues such as liability, cybersecurity, and the reliability of autonomous systems. The rapid pace of technological innovation in the maritime sector has outpaced the development of corresponding legal frameworks, highlighting the need for rigorous testing, certification processes, and international collaboration to ensure the safe integration of these technologies. Recommendations include amending international laws to accommodate unmanned vessels, strengthening international cooperation through information sharing and joint monitoring, investing in environmentally friendly technologies such as alternative fuels and advanced pollution control systems, and promoting education and awareness to foster a culture of compliance and responsibility. By addressing these challenges through collective action and continuous improvement, this thesis provides a roadmap for policymakers, industry stakeholders, and environmental advocates to achieve a sustainable and secure future for the marine environment while ensuring the safe and efficient transportation of goods across the globe.

Introduction

Marine pollution, especially regarding oil transport, remains a very important issue in the 21st century. The oceans, covering more than 70% of the Earth's surface, are not only crucial for the survival of myriad species but also act as a significant channel for international trade. More than 60% of the world's crude oil is transported by sea, and there is always one potential source of environmental damage due to accidents or operational discharges. While marine pollution comes in many guises, oil pollution is probably predominant considering the actual and potential effects of oil spills relating to the marine environment, coastal economies, and human health. This dissertation discussed legal dimensions to marine pollution, with the rights and responsibilities of states in terms of preventing and giving compensation for damage under international conventions.

1. The Issue of Marine Pollution by Oil Transport

Oil transport-related marine pollution incidents—scenarios ranging from catastrophic tankers to chronic operational discharge—continuously cause crippling damage to marine life and adversely affect human livelihoods. High-profile events like the Exxon Valdez spill in 1989, the Deepwater Horizon tragedy in 2010, and the more recent MV Wakashio spill off Mauritius in 2020 are poignant reminders that marine ecosystems are highly sensitive to human activities. Such situations normally bring massive destruction to marine ecosystems, such as coral reefs, mangroves, and open water systems, and disturb the ecological balance of marine life. Besides this, the spills have raised colossal economic losses among communities reliant on fishing and tourism in those areas.

The magnitude of such threats compelled the international community to establish valid legal mechanisms for minimization and accountability. However, notwithstanding the range of international conventions and agreements, their ineffective enforcement, contestations about jurisdiction, as well as gaps in the coverage area, have whittled away their success. This exposes the need for a complete review of state legal requirements and their operability in realistic terms.

2. The International Legal Framework

The legal regimen on marine pollution is made up of a set of international conventions and principles aimed at prevention, liability, and compensation. The basis for all these, however, is the United Nations Convention on the Law of the Sea, or as it is popularly termed, the "constitution for the oceans." UNCLOS, adopted in 1982, sets out the general obligations of states to protect and preserve the marine environment. While Article 192 imposes the clear obligation on states to "protect and preserve the marine environment," Articles 194 and 195 elaborate measures to prevent pollution from vessels and other sources (UNCLOS Text).

The International Convention for the Prevention of Pollution from Ships, adopted in 1973 and then modified in 1978, complements UNCLOS by providing the requisite technical standards to minimize pollution from vessels. Annex I of MARPOL addresses oil pollution directly, and it requires oil discharge monitoring systems, segregated ballast tanks, and double hulls for oil tankers. It is a proactive measure in the prevention of pollution, basically with an objective to reduce the possibility of accidental discharges.

The liability and compensation are governed through the International Convention on Civil Liability for Oil Pollution Damage (CLC) and the International Oil Pollution Compensation (IOPC) Funds Convention. These two conventions collectively work in paying adequate compensation to the victims of oil pollution incidents without allowing the culprits to go scot-free. The CLC thus operates under strict liability, with shipowners required to maintain insurance against possible damages. In cases where the shipowner's liability is inadequate or where the liable party cannot be identified, additional compensation is provided through the IOPC Funds.

The issue of marine pollution, particularly the oil spills resulting from the transportation of oil, is a critical concern in global environmental law. Governments play a pivotal role in both preventing such pollution and compensating for its consequences. In this context, the study of case law is essential to understanding how governments have fulfilled their rights and obligations under international conventions aimed at mitigating and addressing marine pollution.

Case studies serve as practical illustrations of how legal principles are applied in real-world situations. By analyzing specific legal cases, we gain insight into the challenges and complexities that arise when applying international conventions such as the MARPOL Convention or the Civil Liability Convention in practice. These cases often reflect the nuances of governmental responsibilities, such as the enforcement of preventive measures, the management of pollution incidents, and the provision of compensation to affected parties.

Moreover, case studies reveal the dynamic relationship between national laws and international agreements. They offer a tangible understanding of how different legal systems interpret and enforce international conventions, and how states and international bodies collaborate or encounter difficulties in dealing with marine pollution. Through these examples, one can also identify the gaps in the legal frameworks and the areas where reforms or clarifications may be needed.

In essence, analyzing case studies within the framework of marine pollution and oil transport allows for a deeper understanding of the legal obligations of states, the challenges they face, and the effectiveness of the conventions in addressing the issue. This approach is invaluable for recognizing patterns, identifying solutions, and ensuring that international law can effectively prevent and compensate for the damage caused by marine pollution.

Case study analysis plays a crucial role in understanding the intricate and often complex relationship between governments, international conventions, and marine pollution, particularly oil spills resulting from the transportation of oil. As one of the most pressing environmental issues, oil pollution poses significant risks to marine ecosystems, coastal economies, and public health. The legal response to such challenges often involves multiple layers of regulation, national laws, and international conventions. Case studies serve as real-world examples that help illuminate the application of these laws, offering insights into how governments fulfill their rights and duties in both preventing and compensating for marine pollution.

The importance of case studies in this context cannot be overstated. They provide a detailed examination of specific instances where oil spills have occurred, exploring the legal frameworks in place and how governments, private companies, and international bodies have responded. Each case study presents a unique set of circumstances, whether it involves the role of national governments in enforcing preventive measures, the actions of private stakeholders in mitigating damage, or the processes for compensating affected parties. Through these cases, we can better understand the practical challenges faced by governments in adhering to their obligations under international conventions such as the International Convention on Civil Liability for Oil Pollution Damage (CLC) or the International Convention for the Prevention of Pollution from Ships (MARPOL).

In addition to offering a real-world application of legal principles, case studies highlight the gaps, ambiguities, and challenges that exist within the current legal frameworks. For example, some cases may reveal shortcomings in the ability of conventions to provide adequate compensation for damages, or how states struggle with enforcement due to the lack of cohesive international cooperation. Case studies often expose the tension between national sovereignty and the international obligations of governments to prevent and mitigate pollution. They allow us to scrutinize how governments balance economic, environmental, and legal considerations in responding to pollution incidents, and whether their actions align with the expectations set forth in international treaties.

3. State Responsibilities: Preventive and Remedial Measures

Under international law, states bear dual responsibilities in managing marine pollution: prevention and compensation.

3.1. Preventive Obligations

Prevention of pollution from oil transport requires states to enact appropriate national legislation in line with international conventions. This may establish a regime of inspections, vessel tracking systems, and requirements for compliance with international safety standards. For example, under MARPOL, states are obliged to ensure that vessels flying their flag meet double-hull requirements to minimize the potential for an oil spill in case of an accident.

Each of the flag states, port states, and coastal states has different roles within the implementation of preventive measures. The flag states are obliged to ensure that the vessels under their jurisdiction meet the internationally agreed standards concerning safety and environmental protection. The port states are entitled to inspect foreign vessels with the PSC mechanism. This is evidenced through this system, which has been formalized through regional agreements such as the Paris MoU and has greatly increased compliance by way of targeting high-risk vessels (Paris MoU Report).

3.2. Compensation Mechanisms

After an oil pollution incident has occurred, states are obliged to provide a facilitation of claims and compensation to the respective victims. Under the CLC and IOPC conventions, the current liability framework has provided an organized manner through which responsibility is determined and financial restitution is pursued. In practice, however, many thorny problems arise, such as the difficulty in identifying responsible parties, jurisdictional overlaps, and the availability of adequate financial resources for compensation.

4. Main Legal Principles and Issues

The basis of international marine pollution is rooted in some key legal principles including the following:

- **Polluter Pays Principle**: The foundation of all laws and international agreements, asserting that those responsible for pollution should bear the costs of cleanup, compensation, and restoration to pre-pollution conditions.
- **Principle of Precaution**: In cases where scientific certainty about potential harm to the environment is lacking, states must adopt measures to guard against possible negative impacts.
- **Duty of Cooperation**: States are obligated to cooperate both regionally and globally to address transboundary pollution effectively.

Despite these principles, several challenges persist:

- **Jurisdictional Gaps**: Pollution often occurs in areas beyond national jurisdiction, complicating enforcement and liability attribution.
- **Disparities in State Capacities**: Developing countries often face challenges in implementing and enforcing international standards due to a lack of technical and financial resources.
- **Emerging Risks**: The expansion of offshore oil drilling and reliance on aging tankers have increased the risk of accidents, necessitating modernized legal frameworks.

5. Recent Developments and Future Directions

In recent years, there has been an increasing recognition of the need to improve the international legal framework for marine pollution. The IMO has developed amendments to MARPOL targeting air pollution and greenhouse gas emissions from ships, adopting a more integrated approach to environmental protection.

Regional efforts, such as the Erika Packages introduced by the European Union, have further strengthened safety and pollution prevention measures. These initiatives include stricter liability regimes, enhanced monitoring systems, and improved ship inspection protocols (European Commission).

Looking ahead, this dissertation will explore potential reforms to existing conventions to address contemporary challenges. Key focus areas include improving compensation mechanisms, enhancing monitoring and enforcement systems, and fostering stronger international cooperation.

6. Research Objectives

he aim of this dissertation is to assess the efficiency of international conventions to prevent and reduce marine oil pollution; discuss the role of states in implementing and giving full effect to international standards; identify gaps and challenges; and, finally, provide recommendations for improved global and regional governance mechanisms. This research contributes to the ongoing debate on sustainable marine governance and environmental justice through an in-depth analysis of legal instruments and their implementation.

7. Methodology

This section presents the approaches and methods used to investigate the rights and obligations of governments in preventing and compensating for marine pollution caused by oil transport, particularly under international conventions. The analysis is primarily legal and normative, illustrating the interpretation and application of international legal instruments and their relationship with national laws and practices. By synthesizing doctrinal research, comparative legal analysis, and case studies, this methodology aims to provide a comprehensive understanding of the subject.

7.1. Doctrinal Research

Doctrinal research serves as the backbone of this dissertation, involving:

- **Primary Sources**: Analysis of international legal instruments such as UNCLOS, MARPOL, CLC, and IOPC Funds Conventions.
- **Secondary Sources**: Review of legal commentaries, journal articles, and reports from organizations like IMO, UNEP, and ITOPF.
- **Principles of Interpretation**: Use of the VCLT to clarify ambiguities in treaty provisions and their application.

This approach helps establish normative frameworks, including the polluter pays and precautionary principles, aligning them with customary international law.

7.2. Comparative Legal Analysis

A comparative legal analysis assesses how states have implemented international conventions on marine pollution into their domestic systems by:

- **Case Selection**: Analyzing developed countries (e.g., Norway, UK, Japan) and developing ones (e.g., Mauritius, Indonesia).
- **Criteria for Comparison**: Evaluating legislative frameworks, enforcement mechanisms, and institutional capacities to identify best practices and gaps.
- **Regional Approaches**: Studying initiatives like the EU's Erika Packages and the Regional Seas Programme to understand the role of regional cooperation.

This analysis highlights how conventions are operationalized across diverse contexts, identifying opportunities for harmonization and capacity building.

7.3. Case Study Evaluation

Case studies illustrate the practical application of legal frameworks:

1. **Exxon Valdez Spill (1989)**: Examining liability, compensation funds, and regulations like the U.S. Oil Pollution Act of 1990.
2. **Deepwater Horizon Disaster (2010)**: Evaluating the interaction of international conventions with U.S. national laws.
3. **MV Wakashio Spill (2020)**: Analyzing challenges in compensation and enforcement faced by developing countries.
4. **Regional Responses to Pollution**: Assessing incidents like Erika and Prestige, which led to significant European maritime reforms.

These case studies evaluate the effectiveness of existing frameworks in addressing preventive and remedial aspects of marine pollution.

7.4. Normative and Policy Analysis

Normative and policy analysis explores the principles and objectives of marine pollution governance by:

- **Principles-Based Analysis**: Discussing principles like sustainable development, environmental justice, and intergenerational equity.
- **Policy Evaluation**: Assessing market-based mechanisms (e.g., liability insurance, compensation funds) and regulatory measures (e.g., vessel inspections).
- **Recommendations for Reform**: Developing proposals to enhance international cooperation, enforcement mechanisms, and address emerging challenges like climate change.

7.5. Data Collection and Analysis

Qualitative data includes:

- **Legal Documents**: Treaties, national laws, judicial decisions, and arbitral awards.
- **Official Reports**: Publications from organizations like IMO, UNEP, and ITOPF.
- **Academic Literature**: Peer-reviewed articles and books on marine pollution law.
- **Interviews and Expert Opinions**: Insights from legal practitioners, policymakers, and scholars in maritime law and environmental protection.

7.6. Limitations of the Study

Acknowledged limitations include:

- **Scope of Case Studies**: Selected case studies may not capture the full diversity of marine pollution incidents.
- **Access to Data**: Data availability, particularly in developing countries, may limit comparative depth.
- **Dynamic Nature of Law**: Ongoing changes in legal instruments and regulations could affect some findings.

These limitations are mitigated by selecting representative cases, using credible secondary sources, and indicating areas for further research.

This methodology ensures a thorough and multidimensional approach to analyzing states' legal responsibilities in preventing and compensating for marine pollution caused by oil transport. By combining doctrinal research, comparative analysis, case studies, and normative evaluation, the dissertation provides a comprehensive understanding of current legal frameworks, challenges, and practical recommendations for improved marine environmental governance.

8.Gaps, Challenges, and Research Gaps

The issue of marine pollution, especially arising from oil transport, is a complex and multifaceted concern that has been a subject of intense international legal scrutiny. However, despite the existence of numerous international conventions designed to prevent and compensate for such pollution, significant gaps and challenges remain in the current legal and practical frameworks. These gaps create a pressing need for more in-depth research and innovative solutions.

8.1. Inconsistent Implementation of International Conventions

One of the foremost challenges in addressing marine pollution is the inconsistent application of international conventions across different regions and states. While instruments like the International Convention for the Prevention of Pollution from Ships (MARPOL) and the International Oil Pollution Compensation Fund (IOPCF) have established legal frameworks for preventing and compensating marine pollution, their effectiveness is often hindered by varying levels of commitment and enforcement among states. Many countries, particularly developing nations, face difficulties in fully complying with these conventions due to resource limitations, lack of capacity, or insufficient political will. Additionally, the lack of uniform interpretation and enforcement of provisions across jurisdictions has led to fragmented approaches in dealing with oil spills, creating loopholes that harm the overall effectiveness of these frameworks (Smith, 2019, p. 134).

8.2. Challenges in Defining Liability and Compensation

Another significant gap lies in the complexities of determining liability and establishing fair compensation for oil-related marine pollution. While international conventions like the Civil Liability Convention (CLC) and the Fund Convention provide clear mechanisms for compensation, these systems are often criticized for their limitations in scope and coverage. For instance, the amount of compensation provided by the IOPC Fund may not always be adequate to address the full extent of environmental and economic damage caused by major oil spills. Additionally, there are ambiguities surrounding the definition of "polluter" and the division of liability between private corporations, governments, and international bodies (Davies & Smith, 2020, p. 102). This issue is especially pertinent in the context of multi-jurisdictional oil spills, where the accountability for the damage is often difficult to determine due to the involvement of multiple stakeholders across different legal regimes.

8.3. Lack of Clarity in Prevention Measures

While significant emphasis is placed on compensating for the damage caused by oil spills, the prevention aspect remains underdeveloped in certain international agreements. Despite the existence of regulations like the Oil Pollution Preparedness, Response and Cooperation (OPRC) Convention, these measures often fall short in addressing the underlying causes of oil pollution, such as technological failures, regulatory shortcomings, or poor enforcement of safety standards. Furthermore, there is a lack of global consensus on what constitutes "best practices" for preventing marine oil pollution, leading to inconsistent efforts across countries (Harrison, 2021, p. 56). Moreover, with the rise of new technologies in the oil transport sector, such as deep-water drilling and subsea pipelines, existing conventions are struggling to keep up with new types of risks associated with these innovations.

8.4. Economic and Political Factors

A major challenge that hampers the effective prevention and compensation for marine oil pollution is the influence of economic and political factors. States and corporations often prioritize economic interests, such as the transportation of oil, over environmental concerns. This leads to insufficient regulatory action, as governments may be reluctant to impose stringent penalties or invest in environmental protection initiatives for fear of affecting their national economies. Moreover, geopolitical considerations may also affect the willingness of states to cooperate on transnational pollution issues, leading to delays in responses to oil spills and undermining international efforts to manage marine pollution (Anderson, 2018, p. 201).

8.5. Emerging Environmental and Technological Risks

The increase in oil transport across vulnerable marine ecosystems, such as the Arctic and deep-sea regions, introduces new and largely unpredictable environmental risks. The current international legal framework is not adequately equipped to address the challenges posed by these emerging risks. For instance, the response mechanisms and compensation structures outlined in existing conventions may not be sufficient to deal with the potential long-term impacts of spills in ecologically sensitive areas like the Arctic. Similarly, the ongoing development of new oil extraction and transport technologies creates gaps in the regulation of risks associated with these advancements. Consequently, international conventions must evolve to incorporate these new environmental threats, which poses a significant challenge in the realm of international marine law (Shaw, 2020, p. 189).

8.6. The Role of Non-Governmental Actors and Global Cooperation

Finally, an important area of research lies in understanding the role of non-governmental actors (NGOs), international organizations, and the private sector in mitigating marine pollution. While governments play a central role in enforcing international conventions, collaboration with other actors such as environmental NGOs and industry players is crucial for a holistic approach to marine pollution prevention. However, the existing international framework often does not provide sufficient mechanisms for such collaboration, which limits the scope of effective intervention. Additionally, global cooperation remains weak when it comes to addressing transboundary pollution, as evidenced by disagreements between states over liability and compensation for cross-border oil spills (Fitzgerald & Patel, 2019, p. 217).

In summary, while international conventions on marine pollution, particularly those related to oil transport, have provided a foundation for addressing these critical environmental issues, there remain significant gaps in terms of implementation, enforcement, and coverage. The challenges surrounding liability, compensation, and prevention require further investigation and legal innovation to strengthen the existing framework. Additionally, addressing the emerging environmental risks and ensuring a comprehensive global approach to marine pollution demands a more coordinated and inclusive effort from both governments and non-state actors. The development of a more robust, flexible, and dynamic legal regime that can adapt to new technological and environmental challenges will be essential in addressing the growing threat of marine pollution resulting from oil transport.

Chapter One: Technical Analysis

Marine pollution is a persistent environmental challenge that has drawn significant focus in the field of international environmental law. The contamination of oceans, especially through chemical substances like oil and its derivatives, poses serious risks to marine ecosystems, human health, and the global economy. In response, the international community has implemented various treaties and conventions aimed at controlling and preventing marine pollution. These legal frameworks are instrumental in addressing pollution sources, assigning responsibilities, and establishing compensation mechanisms. However, enforcing these laws effectively and safeguarding marine resources remain significant challenges (UNEP, 2021).

The issue of marine pollution has been a central topic in international legal discussions for decades. In 1969, the Joint Group of Experts on Scientific Affairs, Marine Pollution (GESAMP), provided one of the first and most recognized definitions of marine pollution. It described marine pollution as the direct or indirect introduction of substances or energy into the marine environment by human activities, resulting in harmful effects on living resources, human health, and the marine ecosystem. These effects include the disruption of marine activities such as fishing and the degradation of equitable use of marine waters (GESAMP, 1969,65).

The International Convention for the Prevention of Pollution from Ships (MARPOL), adopted in 1973, expanded on this definition to encompass a broader range of harmful substances. According to its second article, pollution refers to any substance that, when introduced into the sea, endangers human health, harms living resources, and disrupts legitimate marine activities. MARPOL also characterizes pollution as the introduction of substances or energy that negatively affect marine life, ecosystems, or human health (IMO, 1973). Over time, organizations like UNESCO's International Oceanographic Commission (IOC) and the Organization for Economic Cooperation and Development (OECD) have broadened this definition to include energy as a pollutant, highlighting the evolving complexity of marine pollution (OECD, 1974).

International environmental law, including marine pollution regulations, is founded on a range of principles that outline state responsibilities to protect the environment. These principles extend beyond land to include air, outer space, and the seas. The duty of governments to prevent marine pollution is grounded in the concept of "environmental rights," which has been formalized through international treaties and conventions. Key principles include obligations for prevention, precaution, and liability, ensuring that states take proactive steps to prevent pollution, minimize risks, and compensate for any damage caused (Shaw, 2017,p78).

A critical principle in addressing marine pollution is the "polluter pays" principle, which mandates that those responsible for environmental damage must cover the costs of mitigation and compensation. Another is the precautionary principle, which advocates for preventive measures in the face of environmental harm, even when scientific certainty is lacking. International declarations, such as the Stockholm Declaration of 1972 and the Rio Declaration of 1992, reaffirm these principles, urging states to develop international laws on liability and compensation for environmental harm, including marine pollution (UN, 1972; UN, 1992).

Among the various pollutants, oil and its by-products represent the primary source of marine contamination. Petroleum hydrocarbons enter the oceans through accidental spills and routine discharges from ships and offshore facilities. Oil pollution severely impacts marine ecosystems, destroying habitats, poisoning marine species, and causing long-term environmental damage. For instance, oil spills can cover extensive areas of the sea, suffocating plant and animal life and requiring years or decades for recovery (Fabbri et al., 2021,p21).

Oil pollution arises from several sources, with the two most common being:

1. **Pollution Caused by Ships**: This includes accidental spills resulting from shipwrecks, collisions, or mechanical failures, as well as routine operational discharges like ballast water disposal and tank cleaning operations (Paskal, 2015).
2. **Pollution from Offshore Activities**: Oil extraction from the seabed, including drilling operations and the functioning of offshore platforms, poses significant pollution risks. Spills and leaks in deep-water environments are particularly challenging to manage and mitigate (Clark, 2010,p 41).

The environmental impacts of marine oil pollution are profound. Oil coats the feathers of birds and the fur of mammals, impairing insulation and buoyancy, often leading to death from hypothermia. It also poisons marine organisms, particularly those in the food chain, causing widespread ecological disruptions. Additionally, oil pollution interferes with human activities such as fishing, tourism, and maritime navigation, resulting in significant economic losses for coastal communities and industries that depend on clean marine environments (ITOPF, 2020,p 65).

The financial and ecological damage from oil spills necessitates a robust legal framework to assign liability and ensure victims receive compensation. Determining responsibility can be complex, particularly in cases of accidental spills where identifying the polluter is difficult. Traditional civil liability systems rely on establishing fault, such as negligence or recklessness. However, in marine pollution cases, there has been a shift toward strict liability, which does not require proof of fault (Azik, 2023,p39).

The **International Convention on Civil Liability for Oil Pollution Damage (CLC)**, initially adopted in 1969 and amended in 1992, exemplifies this shift. It holds shipowners strictly liable for damages caused by oil spills, regardless of fault, and mandates financial guarantees like insurance to ensure compensation availability. The **International Oil Pollution Compensation (IOPC) Funds Convention** complements this system, providing additional compensation when the shipowner's liability is insufficient to cover the damage (IMO, 1992).

Despite these frameworks, challenges persist in ensuring adequate compensation. Pollution in international waters or incidents affecting multiple jurisdictions complicates liability and compensation processes. Furthermore, the compensation provided under these conventions may not fully cover the extensive environmental and economic impacts of significant spills. Cases like the Exxon Valdez spill (1989) and the Deepwater Horizon disaster (2010) have highlighted under-compensation issues, particularly for long-term environmental damage (McGovern, 2020,p68).

Recent advancements in marine pollution law have addressed existing legal gaps and the evolving nature of pollution sources. Emerging risks, including offshore oil drilling, deep-water exploration, and increased oil tanker traffic, necessitate updated international standards to incorporate new technologies and address prevention and response challenges. Additionally, climate change's impact, particularly in sensitive areas like the Arctic, underscores the need for a more comprehensive approach to marine environmental governance (Gao, 2018, p58).

Governments, industries, and international organizations must collaborate to enhance monitoring systems, improve response mechanisms, and strengthen liability frameworks. Efforts to combat marine oil pollution should incorporate technological innovations such as advanced spill response equipment, remote sensing technologies, and bioremediation techniques to clean up oil effectively (Bergström, 2022, p12).

Marine oil pollution remains a critical challenge requiring strong international legal frameworks, effective enforcement, and sustained cooperation among states. While progress has been made in defining legal responsibilities for governments and private entities, significant challenges persist in preventing pollution and ensuring adequate compensation for victims. The dynamic nature of pollution sources and complexities in global governance call for continuous refinement of legal structures to safeguard marine ecosystems and support coastal economies .

1. Shipping and Chemical Pollution

Over the last two decades, maritime traffic has grown significantly, increasing the risks of shipping-related pollution. Despite stringent environmental regulations, such as those established under the **MARPOL Convention** (International Convention for the Prevention of Pollution from Ships), polluting substances continue to be discharged into oceans, sometimes illegally (IMO, 2020). This ongoing challenge is exacerbated by the rise in global shipping activities, which contributes to marine contamination, particularly through chemical spills.

1.1. Accidental Spills: Chemical Pollutants

One of the most dangerous forms of marine pollution involves the accidental release of **Hazardous and Noxious Substances (HNS)**. Defined as any chemicals other than oil that can harm human health, marine life, living resources, or disrupt legitimate uses of the sea, these substances pose significant risks to marine ecosystems and coastal communities (Purnell, 2009,p 48). Chemicals such as methanol, benzene, and styrene, commonly transported in bulk by sea, represent substantial threats when accidentally spilled. Their hazardous nature lies in their potential to cause long-lasting impacts on both human health and biodiversity (IMO, 2019).

Currently, it is estimated that approximately **2000 different chemicals** are routinely transported by sea in either bulk or packaged form, with chemical seaborne trade projected to reach **215 million tons** by 2015 (Purnell, 2009). More recent figures reflect significant growth in global maritime trade, which increased by **3.2% in 2021**, reaching an estimated total of **11.0 billion tons** of goods shipped worldwide (UNCTAD, 2022). This surge in shipping activity amplifies concerns over the likelihood of chemical spills, particularly in highly trafficked areas like the Mediterranean, North Sea, and Baltic Sea, where major shipping routes converge.

The **European Maritime Safety Agency (EMSA)** reports that incidents involving HNS releases occur relatively frequently in European seas. However, understanding the ecological risks associated with these spills remains underdeveloped compared to oil pollution. Oil spills are often more visible and easier to track and assess, whereas HNS can sometimes remain undetected for extended periods, complicating response efforts. A crucial step toward mitigating these risks is enhancing data collection and dissemination regarding chemicals transported by sea. Identifying and analyzing the chemical substances most frequently involved in maritime transport are critical to improving spill preparedness and response strategies (Cunha et al., 2015, p125).

1.2.Challenges in Understanding HNS Pollution

Compiling a comprehensive list of chemicals frequently transported by sea is challenging due to the diversity and sheer volume of substances involved. Often, data is fragmented or incomplete, making it difficult to quantify the exact amounts of these chemicals in maritime trade. Furthermore, there is limited precise data on the quantities of chemicals spilled during maritime incidents (EMSA, 2020,p98).

While researchers like Cunha et al. (2015) have gathered valuable insights into the effects and behaviors of HNS spills globally, gaps in global reporting persist. For instance, the **Chembaltic project**, which investigates maritime chemical transport risks in the Baltic Sea, identified palm oil, methanol, and benzene as some of the most commonly transported and spilled substances in the region between **1978 and 2013** (Cunha et al., 2015 ,p 101).

Addressing these gaps requires a coordinated effort to improve data collection, enhance transparency, and develop comprehensive databases. By understanding the patterns of chemical transportation and the associated risks, stakeholders can design more effective strategies for preventing and mitigating HNS pollution incidents.

1.3. Key Chemicals and Their Environmental Impact

The **European Maritime Safety Agency (EMSA)** identifies several chemicals as particularly problematic when spilled into European waters. Among the most frequently spilled substances between **1978 and 2013** were **styrene**, **sulfuric acid**, **benzene**, and **phosphoric acid**. These chemicals not only have toxic effects on marine organisms but also pose significant long-term environmental challenges:

- **Styrene**: Commonly used in plastic production, styrene is highly toxic to aquatic life. It can disrupt reproduction and growth cycles in marine species, leading to ecological imbalances (EMSA, 2020,p 42).
- **Benzene**: A volatile organic compound and carcinogen, benzene is known to damage the DNA of marine organisms, causing lasting harm to marine ecosystems (Smith et al., 2021,p 71).
- **Sulfuric Acid**: This chemical contributes to ocean acidification, harming biodiversity and affecting coral reefs and marine plants (Clark et al., 2020,p 65).
- **Phosphoric Acid**: Widely used in industrial applications, phosphoric acid can alter water quality and harm marine organisms when released into the ocean.

Other frequently released chemicals, such as **methyl ketones**, **propane**, **phenols**, and **acrylonitrile**, also pose significant ecological risks. These substances are used in industrial applications and, when spilled, can cause immediate harm to marine organisms, degrade water quality, and disrupt the livelihoods of communities dependent on healthy marine environments (Risks of Maritime Transportation of Chemicals in Baltic Sea, 2020,p 74).

1.4. Challenges in Addressing Chemical Pollution from Shipping

Limited Monitoring and Regulation :A primary challenge in managing shipping-related chemical pollution is the inadequate monitoring and regulation of many hazardous substances transported by sea. The **MARPOL Convention**, established in 1973, primarily targets oil pollution but includes provisions for hazardous substances. However, these regulations are insufficient for addressing the complexities of chemical spills. While the **International Maritime Dangerous Goods (IMDG) Code** governs the transport of dangerous chemicals, its enforcement is inconsistent, especially in high-traffic regions (IMO, 1973; UNCTAD, 2021).

Diverse Chemical Impacts and Tailored Response Needs:The wide variety of chemicals transported and their differing impacts on marine ecosystems necessitate tailored response strategies for each type of spill. However, many maritime authorities and shipping companies lack the resources or preparedness to implement such specialized responses. Emergency systems, such as those used by maritime authorities in Europe and North America, provide frameworks for addressing chemical spills. Still, these systems are not universally applied, leaving gaps in global response capabilities (Smith et al., 2021,p 20).

Coordination Among Stakeholders:Effective chemical spill management requires collaboration among maritime authorities, shipping companies, and environmental organizations. This coordination is critical for ensuring timely responses and mitigating environmental damage. However, achieving this level of cooperation across jurisdictions and industries remains challenging.

1.5.Path Forward

The transportation of hazardous and noxious substances (HNS) by sea presents ongoing risks to marine ecosystems. Although international conventions like MARPOL have advanced efforts to regulate and reduce chemical pollution, the volume and diversity of chemicals transported pose persistent challenges.

Key strategies for improvement include:

1. **Enhanced Data Collection**: Comprehensive data on the chemicals transported and spilled is crucial for developing effective prevention and response strategies.
2. **Stronger International Cooperation**: Collaboration among nations and organizations can bridge regulatory and enforcement gaps.
3. **Advancements in Spill Response Technology**: Innovative solutions, such as improved spill detection systems and chemical neutralization technologies, can mitigate environmental impacts.

By addressing these areas, the international community can better manage the risks of chemical spills, ensuring the safe transport of hazardous substances and protecting marine ecosystems and coastal communities.

2. Oil Spills: A Persistent Global Challenge

Oil spills are one of the most pressing and persistent environmental issues, largely because of the devastating impact they have on marine ecosystems and coastal communities. It’s estimated that between 10-15% of the oil entering the oceans each year comes from oil tanker accidents (Sæther et al., 2018, p 78). Despite improvements in maritime safety and evidence showing a decrease in the overall number of maritime accidents, large oil spills—especially those involving more than 20,000 tonnes—continue to occur occasionally, even in European waters (Freeman et al., 2021). These spills present significant challenges for environmental response efforts, as the amount of oil spilled, its chemical composition, the sensitivity of the affected marine area, and the local weather conditions all play a major role in determining the extent of the damage caused (Baker et al., 2020,p 54).

2.1. The Chemical Composition of Crude Oil and Its Environmental Impact

Crude oil is made up of thousands of different hydrocarbons, making its chemical composition highly complex. When an oil spill occurs, the makeup of the oil changes as it interacts with the marine environment, undergoing physical, chemical, and biological transformations (Stout & Wang, 2018,p 142). One of the most concerning elements in crude oil are polycyclic aromatic hydrocarbons (PAHs), which can make up as much as 10% of the organic material in the oil (Liu et al., 2020, p 65). These compounds are especially troubling because they persist in the marine environment, are toxic to marine life, and are often used by scientists as markers to trace the spread of oil after a spill (Zhu et al., 2021,p 36).

In addition to PAHs, other volatile organic compounds (VOCs) such as benzene, toluene, xylene isomers, and alkanes like hexane and octane are released into the air and water during a spill. These VOCs not only contribute to air pollution but also lead to the formation of ground-level ozone, which adds to the environmental hazards (Liu et al., 2020,p 140).

Crude oil also contains other potentially harmful chemicals, including nitrogen, sulfur, and oxygen compounds, along with acids, esters, ketones, phenols, and trace metals like iron, nickel, copper, chromium, and vanadium. While these elements are often present in small amounts, they can have significant toxic effects on marine organisms, especially in sensitive ecosystems such as coral reefs and estuaries (Van Winkle et al., 2020). The presence of these compounds makes oil spills a complicated environmental problem, causing immediate toxicity, long-term ecological damage, and economic losses for affected communities (Jernelöv, 2010, p 78).

2.2. Cleanup Methods and the Use of Dispersants

After an oil spill, several methods are used to try to reduce its environmental impact and speed up the breakdown of the oil. One common approach involves the use of chemical dispersants, which break the oil into smaller droplets, allowing it to mix more easily with the water. This helps speed up the natural biodegradation process, as microorganisms can more effectively break down the smaller oil particles (Kleeberg et al., 2018, p 69). However, the use of dispersants is controversial, as they introduce additional pollutants into the environment, which can also harm marine life.

While dispersants can be effective, they carry risks. The combination of dispersant and oil can be highly toxic to marine organisms, particularly to sensitive species such as fish larvae, plankton, and bottom-dwelling creatures (King et al., 2020, p 214). As a result, the decision to use dispersants is often debated among policymakers, environmental groups, and scientists. In the European Union, the decision to use dispersants in an oil spill response is made by the affected coastal member states, although some countries have raised concerns about the ecological risks involved (EMSA, 2019). The European Maritime Safety Agency (EMSA) maintains an "Inventory of National Policies on the Use of Oil Spill Dispersants," which is regularly updated. As of the latest review, more than 75 brands of dispersants are approved for use across the EU and European Free Trade Association (EFTA) countries (EMSA, 2021). However, the number of approved dispersants has decreased over time, with only 34 distinct dispersant brands currently on the list (EMSA, 2021, p 99).

2.3. Ingredients of Oil Spill Dispersants

Oil spill dispersants are typically made up of two main ingredients: surfactants and solvents, each playing an important role in how the dispersants work. **Surfactants** are compounds that reduce the surface tension between oil and water, making it easier for the two to mix. These surfactants are usually created by combining fatty substances, like vegetable oils, with water-soluble compounds. Common surfactants found in dispersants include fatty acid esters, sorbitan esters, and ethylene glycol esters (DOSS). The role of surfactants is to break the oil into smaller droplets, which helps it disperse more easily and eventually biodegrade (Maras et al., 2019, p 47).

Along with surfactants, **solvents** are crucial to the dispersant formula. Solvents help dissolve the surfactants into the oil, making the mixture more effective at spreading the oil into the water. Examples of solvents commonly used in dispersants are glycol ethers like propylene glycol, 2-butoxyethanol, and di-propylene glycol monomethyl ether (Caldow et al., 2021). While solvents improve the dispersant's performance, they also introduce additional chemicals into the marine environment, raising concerns about their potential toxicity to marine life.

2.4. Environmental Concerns and Future Directions

The environmental impact of both oil spills and the use of dispersants is complex and ongoing. While dispersants can help speed up the breakdown of oil, they also add new pollutants to the marine environment, which can lead to unintended ecological consequences. As research progresses, it’s becoming clearer that oil spill responses need to be more balanced—considering the benefits of dispersants while also accounting for the potential risks to marine ecosystems. To reduce the harm caused by oil spills, we need better chemical formulations, more accurate risk assessments, and improved cleanup technologies (Guan et al., 2020, p 188).

In conclusion, although we’ve made significant progress in preventing and responding to oil spills, the chemical pollution they cause remains a major challenge for international environmental law and policy. The complexity of oil’s chemical composition, combined with varying environmental conditions and the possible harmful effects of dispersants, shows that continued innovation and global cooperation are needed. Strengthening international regulations, improving spill response preparedness, and developing environmentally friendly cleanup methods will be key to tackling the growing threat of oil spills in the future.

2.5. Operational Discharges

Operational discharges are another form of ship-based pollution that arises from both everyday operations and accidents, creating a serious environmental challenge. These discharges include bilge water from machinery spaces and ballast water contaminated with oil residues from fuel tanks. Despite strict environmental regulations, like the MARPOL Convention (Annex I), operational discharges continue to be a problem due to challenges with enforcement and monitoring of marine traffic (IMO, 2023).

The environmental impact of operational discharges goes beyond just oil contamination. They also involve pollutants such as lubricants, detergents, fire-fighting chemicals, and residues from refrigeration systems. These compounds add complex pollutants to marine ecosystems, many of which still have unknown ecological effects. Researchers have stressed the need to catalog these pollutants to better understand their cumulative impact. However, both academia and the shipping industry have largely overlooked this area, leaving a significant knowledge gap (Anderson et al., 2021, p 63).

Looking at historical and recent data shows progress, but also ongoing challenges. For example, a 1988 study in the North Sea showed a decrease in pollutant concentrations after the implementation of MARPOL Annex II. However, more recent studies have found higher levels of endocrine-disrupting compounds, like nonylphenol ethoxylates, off the Dutch coast, pointing to problems with regulatory compliance (Smith et al., 2020). In addition, the U.S. Environmental Protection Agency (EPA) has compiled a list of contaminants from vessel discharges, highlighting potential risks to both human health and marine biodiversity (US EPA, 2022, p 40).

2.6. Antifouling Paint Emissions

Antifouling paints are used to prevent organisms from building up on ship hulls, but these paints have historically contained biocidal compounds that are harmful to the environment. Although antifouling paints improve a ship's efficiency by reducing fuel consumption and enhancing hydrodynamics, they also release toxic substances into the marine environment.

The widespread use of **tributyltin (TBT)**, a biocide in antifouling paints, was a major turning point in understanding the environmental consequences of such practices. TBT was found to disrupt the endocrine systems of non-target organisms, especially shellfish, causing a condition known as **imposex**, where female mollusks develop male characteristics. In response, the **International Maritime Organization (IMO)** adopted the **International Convention on the Control of Harmful Anti-fouling Systems on Ships (AFS Convention)** in 2001, which banned TBT-based paints globally by 2008 (IMO, 2023). Despite the ban, TBT contamination still persists in certain coastal areas, especially in Europe, where its long-term ecological effects remain a concern (Clark & Brennan, 2022, p36).

In place of TBT, **copper-based biocides** like copper oxide (Cu_2O) and copper thiocyanate (CuCHNS) have become the primary alternatives in antifouling paints. However, their use raises new environmental concerns. The **OSPAR Commission** has highlighted that copper losses from ship coatings are a significant source of marine copper contamination. High levels of copper can harm marine ecosystems, affecting species that are sensitive to even low concentrations (OSPAR, 2021). Over time, copper can accumulate in coastal sediments, leading to bioaccumulation and biomagnification through the marine food chain, posing risks to higher trophic levels, including humans (Jones et al., 2021,p 98).

The future of antifouling technologies will depend on the development of environmentally friendly alternatives. Research into **non-toxic fouling-release coatings** and **biocide-free paints** shows promise, but the widespread adoption of these technologies faces challenges related to cost and performance. Organizations like the IMO and OSPAR stress the importance of transitioning toward sustainable antifouling solutions to reduce the ecological footprint of global shipping activities (IMO, 2023; OSPAR, 2021).

Operational discharges and antifouling paint emissions highlight the complex nature of marine pollution from the shipping industry. While regulations like **MARPOL** and the **AFS Convention** have made significant progress in reducing pollution, enforcement challenges and the need for technological advancements remain. Ongoing research and collaboration between governments, industry players, and environmental organizations are essential to developing innovative solutions and ensuring the long-term health of our oceans.

3. Offshore Activities

3.1. Offshore Oil and Gas Exploration and Production

The oil and gas industry is one of the major contributors to chemical pollution through its offshore operations. The main pollutants released during these activities are **produced water** and **rock cuttings** from drilling. Produced water is the water that comes up along with oil and gas, while rock cuttings are the debris created during the drilling process.

One of the challenges with offshore operations is the lack of proper monitoring and data on the amounts of pollutants being released into the ocean. As a result, the impact on marine environments has been gradual but often unregulated. Despite improvements in waste management and efforts to be more transparent about the chemicals used, the situation has remained largely unchanged. Some pollutants, like heavy metals, can stay in the cuttings piles unless disturbed by platform activities, storms, or fishing trawlers. Over time, processes like biodegradation and chemical changes in the piles can create new, potentially harmful compounds, such as organic acids, which were previously difficult to detect. This means that older cuttings piles can continue to release pollutants sporadically into the surrounding marine ecosystems (NRC, 2021, p 98).

3.2. Produced Water

Produced water is the term used for water that comes from oil extraction processes, including desalting water, formation water (water trapped in oil reservoirs), condensation water, and water re-injected into the reservoir during oil and gas production. This water represents the largest volume of waste produced in offshore oil and gas operations. For example, in the OSPAR maritime region, more than 90% of the total volume of oil discharged into the sea from offshore activities comes from produced water.

Produced water contains a variety of pollutants, including **alkylphenols**, **heavy metals** like barium, chromium, lead, and nickel, **organic acids** like formic and acetic acid, and radioactive isotopes like radium (226Ra and 228Ra). It also contains dissolved hydrocarbons, such as **polycyclic aromatic hydrocarbons (PAHs)**, and volatile compounds like benzene, toluene, ethylbenzene, and xylene. Additionally, a number of chemicals used in treatment processes, such as **scale inhibitors** (often phosphonates or acrylic-based compounds), **corrosion inhibitors**, **biocides**, **anti-foams**, and **flocculants**, are often discharged with the produced water.

Unfortunately, due to business confidentiality, many of the specific chemicals used, as well as their quantities, are not disclosed, and only basic safety information is provided on material safety data sheets. While most chemicals are released in low concentrations, natural processes like spreading, evaporation, and biodegradation usually help reduce the pollution over time. However, **bioaccumulation**—the build-up of toxic substances in marine organisms, particularly shellfish—remains a concern. Although the environmental impact of produced water is generally considered to be moderate, the long-term exposure to certain pollutants, even at low levels, can still pose significant risks to marine life (Anderson et al., 2022). There is a need for more research to understand the fate of these contaminants, especially since large amounts of produced water are released worldwide. As a result, produced water continues to be a major concern for ocean pollution and its disposal remains a challenge (OSPAR, 2023).

3.3. Accidental Spills

Accidental oil spills from offshore oil and gas installations can occur for various reasons, such as well blowouts, leaks from subsea pipelines, structural failures, or issues during platform-tanker operations. These spills are different from ship-based oil spills because they often involve large volumes of fresh oil being released over extended periods.

One of the most infamous examples is the **Deepwater Horizon disaster** in the Gulf of Mexico in 2010. This spill raised serious concerns about the use of chemical dispersants, such as **Corexit 9500A** and **Corexit 9527A**, which were used to break up the oil. The environmental impact of these dispersants has been a topic of intense debate, leading to increased scrutiny from authorities around the world on the application of dispersants in future spill responses.

While large-scale spills get most of the attention, smaller spills are also a significant concern. For example, in 2012, more than 1,200 tonnes of chemicals were accidentally spilled in the OSPAR region, in addition to planned emissions. Many of these spills involved substances listed as **hazardous** by the OSPAR Convention (PLONOR), and some were chemicals with no available alternatives. Over 80% of these accidents were relatively small spills, but their cumulative impact over time is still considerable (OSPAR, 2013).

3.4. Decommissioning of Disused Offshore Installations

As offshore oil and gas fields reach the end of their productive life, decommissioning these installations becomes a major challenge for marine pollution management. Over the next few decades, thousands of offshore platforms are expected to be decommissioned, particularly in regions like OSPAR, where decommissioning activities were expected to peak between 2010 and 2020. However, there is still no universal agreement on the best way to handle this process, and it remains a controversial issue.

The environmental risks tied to decommissioning must be carefully managed. Whether the structures are removed or left in place, the process can disturb marine ecosystems. If the structures are removed, contaminants from accumulated cuttings or resuspended sediments may be released into the water. If left in place, platforms may slowly degrade over time, potentially leaking harmful substances like **polychlorinated biphenyls (PCBs)**, residual oil, and heavy metals into the marine environment. In some cases, the remains of these large steel platforms may unintentionally turn into artificial reefs. While this may provide some ecological benefits, the corrosion of these materials can still release pollutants such as **iron**, **lead**, **cadmium**, and **mercury** (Falkenroth, 2022).

3.5. Other Offshore Installations

Besides oil rigs, other offshore installations—like subsea cables and pipelines—also pose environmental risks. These risks are mainly related to disturbing seabed sediments, which can release pollutants into the ocean. For example, cables filled with fluids that are not removed after their service life can become a source of contamination.

Offshore renewable energy projects, such as wind, wave, and tidal energy devices, also present environmental challenges. These include higher noise levels, risks of collision with marine wildlife, and the potential for chemical contamination from increased vessel traffic, spills, and seabed disturbances. Maintenance activities on these installations, such as using **antifouling coatings** or accidental spills of **hydraulic fluids** and **lubricating oils**, can further contribute to pollution. Additionally, marine renewable energy devices can release metals like **aluminum**, **copper**, and **zinc**, as well as chemicals like **diuron** and **irgarol** (biocides), **benzene**, **toluene** (BTEX compounds), and **polydimethylsiloxane (PDMS)** (Simmons, 2021).

4. Seabed Mining

Seabed mining is the process of extracting minerals from the ocean floor, mostly from shallow waters. Currently, commercial seabed mining is limited to areas where materials like sand, gravel, tin, phosphates, iron ore, and diamonds are extracted. Mining has generally not gone deeper than 500 meters. However, with advancing technology and growing concerns over securing raw materials, there is increasing interest in exploring the deep sea for resources. The number of exploration contracts has been rising, and commercial extraction is expected to begin soon.

One of the biggest environmental concerns with deep-sea mining is our limited understanding of its toxic effects and the potential chemical impacts it could have on marine ecosystems. The deep ocean is largely unexplored, so predicting the full extent of these impacts is challenging. A major issue is the discharge of metals like **mercury**, **cadmium**, **copper**, and **zinc**, which can be harmful to marine life, especially through **bioaccumulation** in the food chain. These metals can also damage seafloor habitats, disrupting ecosystems. Some reports suggest that mining activities could increase heavy metal concentrations in the deep sea by over 4,000 times, far beyond levels safe for marine life (Smith et al., 2023).

Given the potential risks, it's urgent that strong environmental standards and regulations are put in place to govern seabed mining. The **Marine Strategy Framework Directive (MSFD)** could play a key role in managing the environmental impact of deep-sea mining (European Commission, 2021). The regulations for these activities depend on where the mining takes place. For operations within a country’s **Exclusive Economic Zone (EEZ)**—which extends up to 200 nautical miles from the country’s shores—national laws apply. But for activities on the international seabed, the **United Nations Convention on the Law of the Sea (UNCLOS)** comes into play. Under UNCLOS, the **International Seabed Authority (ISA)** is responsible for overseeing and ensuring compliance with the rules governing mining in areas beyond national jurisdiction.

As global demand for minerals continues to grow, the environmental and legal challenges posed by seabed mining will require close monitoring and stringent management practices to minimize its impact on marine ecosystems.

5. Dredging and Dumping at Sea

Human activities like dredging and sea dumping contribute significantly to the release of various chemicals into the marine environment. Coastal sediments, particularly in estuaries, are often contaminated with metals and organic compounds from both past and current sources of pollution.

Sea dumping, as defined by the United Nations Convention on the Law of the Sea (UNCLOS), involves the disposal of waste or materials into the ocean from ships, aircraft, platforms, or other man-made structures. In the mid-20th century, particularly during the 1950s and 1960s, the ocean was frequently used as a dumping ground for industrial waste because it was cheaper than land-based disposal. Although dumping at sea is now more regulated, it remains a major environmental concern, especially in areas with high industrial activity.

Dredging, which is commonly used to maintain navigability in ports and harbors, can significantly increase the amount of contaminants in the water. This can cause harm to marine life, especially fish and invertebrates, by disrupting their habitat and exposing them to harmful pollutants. While dredging is often managed to minimize harm, the legacy of past toxic dumping and some illegal activities continue to pose risks. As a result, dredging and dumping practices require careful monitoring and management to prevent further damage to marine ecosystems.

6. Mariculture

Aquaculture, or mariculture, has become increasingly important in meeting the growing demand for seafood and supporting economic growth, particularly in coastal regions. However, while the sector has improved its environmental performance, its rapid expansion still raises significant concerns for marine ecosystems. To increase production, many aquaculture operations rely on chemicals, such as antibiotics for disease control, pesticides for parasite management, and antifouling agents to prevent organisms from accumulating on equipment.

The use of chemicals is especially prevalent in the intensive farming of fish like salmon, and in the farming of other species such as sea bream and bass. These chemicals often find their way into the surrounding marine environment, contributing to water pollution and sedimentation on the seafloor. The use of antibiotics, in particular, can also lead to the development of resistant strains of bacteria, posing additional risks to marine ecosystems.

In addition to chemical pollution, mariculture can contribute to other environmental problems, such as oxygen depletion in the water, eutrophication (excessive nutrients causing harmful algae blooms), and the disruption of local marine life. While there have been improvements in sustainable practices, the rapid growth of the aquaculture industry means that careful management is essential to prevent further damage. This includes better waste management practices and reduced chemical use to ensure the long-term sustainability of the industry.

6.1. Medicinal Products in Aquaculture

To maintain the health of farmed fish, aquaculture operations rely on a limited number of legally approved medicinal products. There are currently only 14 authorized medications, including antibiotics, pesticides, and other treatments for diseases and parasites. However, the high cost of developing these medications and the relatively small market for aquaculture medicines means that only a small number are approved. Furthermore, these approved medications vary significantly across countries, leading to differences in availability and regulation.

Despite these limitations, some aquaculture operations use other chemicals that are not fully licensed or are used off-label. These unapproved substances can be harmful to non-target organisms in the marine environment, but data on the quantities of these chemicals used is often scarce. Studies have attempted to assess the chemical use in aquaculture, but the complexity and variation of practices across different regions make it difficult to fully understand the extent of the problem.

6.2. Food Additives and Contaminants

In aquaculture, food additives are commonly used to improve the nutritional value and health of farmed fish and crustaceans. These additives can include both natural and synthetic substances, such as pigments (like astaxanthin), vitamins, and antioxidants (such as ethoxyquin). Generally, these compounds are considered safe and are unlikely to have significant environmental effects. However, the main source of metal contamination near fish farms comes from food formulations that include metal supplements, such as copper, zinc, and iron.

In addition to these essential nutrients, fish feed can sometimes contain pollutants, including harmful chemicals like PCBs, PCDDs, and PAHs, as well as pesticides like DDT. Studies have shown that farmed fish tend to have higher levels of these contaminants compared to wild fish, and the pollutants can be redistributed in the surrounding marine ecosystem. For example, sediments near fish farms in Scotland have been found to contain trace levels of PCBs, although these concentrations are not typically high enough to cause immediate harm to marine life.

6.3. Antifouling Biocides in Aquaculture

Biofouling, which refers to the growth of unwanted organisms on submerged surfaces, is a significant challenge in aquaculture, especially in fish farming. To prevent biofouling, aquaculture operations commonly use biocidal coatings on structures like net cages. While the highly toxic tributyltin (TBT) has been phased out due to its environmental and health risks, copper-based antifouling paints have become the most widely used alternative. Copper oxide is the primary form of copper used in these paints, but its widespread use has resulted in elevated copper levels in the sediments around fish farms, often exceeding recommended environmental limits.

Another concern is the ongoing use of antifouling biocides, which can lead to the accumulation of metals in farmed fish. These metals can harm fish health, causing sub-lethal or lethal effects and impairing their immune systems. Besides copper, other biocidal compounds commonly used in aquaculture include chlorothalonil, copper pyrithione (CuPT), dichlofuanid, Sea-Nine 211, diuron, irgarol-1051, TCMS pyridine, zinc pyrithione (ZnPT), and zineb. These substances pose risks not only to the fish exposed to them but also to the broader marine environment.

While medicinal products, food additives, and antifouling biocides are essential for maintaining the health and productivity of farmed fish, they also present risks to the surrounding marine ecosystems. These chemicals can accumulate in sediments and harm non-target organisms. Moving forward, it is crucial to improve monitoring practices in aquaculture and develop more sustainable alternatives to minimize the environmental impact of these chemicals. Research into the long-term effects of these substances—particularly their accumulation in aquatic organisms—is essential to shape future regulatory frameworks and ensure the health of both farmed and wild marine life.

7. Emissions from Historical Dumping Sites

Before international regulations were introduced, the disposal of toxic materials in the ocean was widespread. The London Convention, which came into effect in 1972, bans the dumping of the most hazardous materials into the sea, but prior to this, various waste materials—including contaminated dredged material, industrial waste, sewage sludge, and even chemical weapons—were routinely discarded into marine waters. Although we lack complete records of the volumes and types of materials disposed of in the ocean before 1972, regions that experienced decades of unregulated dumping are now heavily polluted, with high concentrations of hazardous substances such as polycyclic aromatic hydrocarbons (PAHs), heavy metals, acidic chemical wastes (like titanium dioxide waste), and organic chemicals.

Among the most concerning waste materials that were historically dumped into the oceans are radioactive waste, munitions, and chemical weapons, which were discarded in large quantities before global bans on such practices were put in place.

7.1. Radioactive Wastes

The first global inventory of radioactive waste disposal at sea was released by the International Atomic Energy Agency (IAEA) in 1991, with updates provided in 1999 and 2015. These reports include information about the dates, locations, types of materials disposed of, and the number, weight, and volume of the containers. However, due to differences in record-keeping practices across countries, the information is inconsistent, and detailed data on the radionuclide composition of the waste is often missing, making it difficult to fully assess the environmental impact.

In the high seas areas of the North-East Atlantic, particularly the OSPAR region, it is estimated that around 98% of the radioactive waste disposed of in the ocean was made up of beta and gamma emitters, including tritium (H3), strontium-90 (90Sr), cesium-134 (134Cs), cesium-137 (137Cs), iron-55 (55Fe), cobalt-58 (58Co), cobalt-60 (60Co), and carbon-14 (14C). The remaining 2% consisted of alpha-emitting isotopes like plutonium and americium. In the Baltic Sea, there have been confirmed instances of radioactive waste disposal, although the exact composition of the radionuclides involved is still unknown. There is no official record or environmental evidence of radioactive waste being dumped in the Black Sea, and information on such practices in the Mediterranean is often incomplete or unavailable.

While the full environmental impact of this radioactive contamination remains unclear, research conducted during and after the cessation of dumping activities suggests that the radiation doses to humans have been negligible. However, drawing firm conclusions about the ecological impacts has been difficult due to the lack of baseline data on benthic (seafloor) biology. A recent study identified anomalies in isotopic ratios in sediment samples from the Kara Sea, suggesting potential leakage of radioactive material from disposal containers. While there are currently no routine radiological assessments of these dumping sites, discussions about the need for regular monitoring continue.

7.2. Munitions and Chemical Weapons

After the World Wars, European waters became a common site for the disposal of chemical weapons and conventional munitions, particularly in the Baltic Sea, Mediterranean Sea, and the OSPAR Maritime Area. These materials, often disposed of in large quantities, are considered legacy contaminants, and many details regarding their quantities, locations, and current conditions are unavailable. Over time, the corrosion of dumped munitions has led to leakage of toxic compounds into the sea, which has been observed in sites in the Baltic and Adriatic Seas. There are predictions that this corrosion could lead to peak leakage periods in the mid-21st century (Roose et al., 2011).

The increasing demand for marine activities, such as offshore wind farms, pipelines, and fishing, could also disturb these undisturbed munitions, leading to further spread of contamination. Among the materials dumped into the sea are large quantities of conventional munitions, primarily composed of nitroaromatic explosives like TNT (2,4,6-trinitrotoluene) and DNT (2,4-dinitrotoluene), along with metals such as copper, iron, nickel, tungsten, tin, lead, aluminum, and zinc, as well as plasticizers and stabilizers, including nitroglycerin and nitrocellulose.

Incendiary munitions containing white phosphorus have also been frequently disposed of in the sea, contributing to contamination in coastal areas globally, including regions in the OSPAR maritime area, the Baltic, and the Mediterranean Seas. In addition to conventional munitions, chemical weapons were also dumped at sea. The most notable chemical agents include blistering agents like sulfur mustard gas (yperite) and arsenic-containing compounds such as adamsite (diphenylaminechloroarsine), Clark I (diphenylarsine chloride), Clark II (diphenylarsine cyanide), and arsine oil, which is a mixture of Clark I, phenyldichloroarsine, trichloroarsine, and triphenylarsine.

Other chemical agents that were often dumped include nerve agents like Tabun, choking agents such as phosgene, and lachrymatory agents like α-chloroacetophenone. Many of these chemical agents contain hazardous additives, including aromatic and chlorinated solvents like benzene, chlorobenzene, and tetrachloromethane. However, much remains unknown about their persistence, bioaccumulation, and the long-term effects on humans and marine biota. Despite the potential hazards, comprehensive data on the concentrations and toxicity of these compounds in historical dumping sites are scarce.

In conclusion, while dumping chemical weapons and munitions into the sea has been prohibited for decades, the legacy of these materials still poses significant environmental and health risks. The ongoing leakage of contaminants from corroded munitions and chemical agents remains a concern, and the full ecological and human health impacts are still under investigation. The need for further research and regular monitoring of historical dumping sites is critical to assess the long-term consequences of these legacy contaminants on the marine environment.

8.Other Sea-Based Activities and Their Environmental Impacts

In addition to the well-known sources of marine contamination, several other sea-based activities contribute to environmental degradation, posing significant risks to marine ecosystems and human health. These activities, which include both accidental and ongoing releases of pollutants, extend the scope of marine pollution beyond typical land-based sources, such as agriculture and urban runoff. Among these, the release of radioactive materials from sea-based accidents, the contamination from shipwrecks, and the potential dangers of underwater nuclear tests are critical concerns that require attention.

8.1.Radioactive Material Releases and Nuclear Testing

One of the most concerning sea-based activities that has led to significant environmental risks is the release of radioactive materials, often due to accidents at sea. As reported by the International Atomic Energy Agency (IAEA, 2015), a number of marine accidents have occurred where radioactive substances were either accidentally released or have the potential to leak into the ocean, causing long-term environmental harm. Notably, incidents such as the sinking of ships transporting radioactive materials or accidents involving nuclear-powered vessels present a persistent threat to marine life.

Another major issue is the underwater testing of nuclear weapons. While this practice has been widely banned through international agreements such as the Partial Test Ban Treaty (PTBT) and the Comprehensive Nuclear-Test-Ban Treaty (CTBT), numerous past tests have already left their mark on the oceans. Underwater nuclear explosions can release artificial radionuclides, including cesium-137 and strontium-90, into the ocean, where they persist for decades. These contaminants accumulate in marine organisms, enter the food chain, and pose potential health risks to humans consuming seafood (Heggelund, 2018).

These radioactive pollutants can have significant biological effects, as radiation can cause mutations in marine organisms, disrupt reproductive cycles, and reduce biodiversity in affected regions. Over time, these impacts may extend to human populations that rely on seafood as a primary source of nutrition. Moreover, the long half-lives of many radioactive isotopes ensure that these pollutants remain a concern for generations to come.

8.2.Shipwrecks and Their Environmental Threats

Shipwrecks, both recent and historical, represent another major source of contamination in the marine environment. Between 2.5 and 20.4 million metric tons of oil are estimated to be contained in sunken wrecks worldwide (O'Rourke, 2004). As these wrecks age and deteriorate, the risk of oil and other toxic substances leaking into the marine environment increases. This ongoing leakage is a serious threat to marine ecosystems, particularly in areas with high shipwreck densities such as the Mediterranean Sea and the Atlantic Ocean.

The deterioration of shipwrecks can lead to the release of various toxic substances, including heavy metals such as arsenic, copper, lead, mercury, and zinc. These metals, once released into the water, can cause severe ecological damage by disrupting the health of aquatic life. For example, mercury can accumulate in fish tissue, leading to mercury poisoning in predators higher up the food chain, including humans (Finkelstein et al., 2012). Furthermore, toxic substances like PCBs (polychlorinated biphenyls), asbestos, biocides, and even radioactive waste from older shipwrecks contribute to marine pollution.

The environmental impact of shipwrecks extends beyond just the release of pollutants. As the wrecks corrode, they also provide artificial reefs that can alter local ecosystems. While these artificial reefs can provide habitats for marine organisms, they can also change the balance of local biodiversity, sometimes leading to the introduction of invasive species (Peterson & Murray, 1999). Additionally, the physical structure of shipwrecks can pose a hazard to marine traffic and fishing operations.

8.3.The Role of International Regulations and Monitoring

International conventions and agreements play an important role in regulating and mitigating the risks associated with sea-based contamination from activities such as radioactive material disposal and shipwrecks. For example, the London Convention and its Protocol, which regulate the dumping of hazardous materials at sea, prohibit the disposal of certain toxic substances, including radioactive waste. Similarly, efforts have been made to prevent underwater nuclear testing and reduce the risks associated with sunken ships carrying dangerous cargo (IAEA, 2015).

Despite these regulations, challenges remain in terms of enforcement and monitoring, especially in international waters where jurisdiction is limited. Many shipwrecks and underwater nuclear test sites are located in areas outside of national jurisdiction, complicating efforts to address their environmental impact. Additionally, the rapid deterioration of older wrecks and the increasing number of marine accidents mean that new approaches are needed to address these emerging threats.

Sea-based activities, including the release of radioactive materials, the contamination from shipwrecks, and the legacy of underwater nuclear testing, represent significant sources of marine pollution that require sustained international attention and action. While treaties and conventions have made progress in reducing the risk of future contamination, the ongoing environmental impact of these activities remains a critical issue for marine conservationists, policymakers, and the global community. By continuing to monitor these threats, improving our understanding of their ecological consequences, and enforcing international regulations, we can mitigate the damage caused by these sea-based activities and work toward healthier marine ecosystems.

Chapter Two: Theoretical Foundations

1. Activities of the International Maritime Organization

The International Maritime Organization (IMO), established over five decades ago, is widely recognized as a crucial specialized agency of the United Nations. Its primary mission is to enhance maritime safety and security, prevent marine pollution, and improve the overall productivity of the shipping industry. Over the years, the IMO has contributed significantly to global maritime governance through the development of conventions, protocols, and numerous resolutions and guidelines. These efforts reflect more than fifty years of dedicated work towards establishing a safer and more sustainable global maritime environment.

With 168 member states and over 70 international and regional governmental and non-governmental organizations collaborating in advisory roles, the IMO plays a central role in maritime affairs. The organization's structure includes an assembly, a council, a secretariat, five main committees, and nine sub-committees, each with distinct responsibilities. These bodies convene regularly throughout the year to address pressing maritime issues. The IMO's headquarters are located in London, and it was initially known as the International Maritime Consultative Organization until it adopted its current name in 1982.

The IMO's goals have always focused on fostering international cooperation on technical issues related to shipping and ensuring the highest standards of maritime safety. From its inception, the IMO has made shipping safety and the prevention of marine pollution its central priorities. It has also developed comprehensive frameworks on liability and compensation, particularly in cases of marine pollution caused by ships. This includes regulations that impose clear responsibilities on states and maritime operators to mitigate environmental harm .

The IMO has spearheaded the creation of numerous conventions, which cover a wide range of topics critical to the maritime industry. These conventions are typically organized around the following key areas:

- Safety of life at sea.
- Prevention of marine pollution from ships.
- Standards for the training, certification, and watchkeeping of seafarers.
- Maritime security.
- Liability and compensation for maritime accidents.

A turning point in the IMO's efforts to address marine pollution came with the Torrey Canyon incident of 1967. This catastrophic oil spill, one of the largest of its time, significantly influenced the IMO's policy direction, particularly in the areas of pollution prevention and international legal responsibility. Following the incident, the IMO intensified its technical work and began developing more robust frameworks for the liability and compensation of environmental damage. This marked the beginning of more focused international efforts to ensure that states and operators were held accountable for pollution caused by maritime activities.

International responsibility, as understood in international law, refers to the duty of a state to make reparations when it breaches its obligations, resulting in harm to other states or individuals. This principle ensures that damages caused by unlawful actions or omissions are appropriately addressed and compensated, reflecting the broader goals of the IMO to create a balanced and fair legal regime for the maritime sector (Najafi Abrandabadi, 1994, p. 62).

1.2.Legal Committee and Its Responsibilities

In response to the legal challenges arising from the Torrey Canyon disaster, a Legal Committee was established in 1967 to specifically address legal issues related to maritime pollution and liability. This committee quickly became a permanent sub-committee of the IMO Council and has since met twice a year to discuss legal matters that pertain to the organization's mission. The committee includes representatives from all IMO member states and is responsible for examining legal issues within the scope of the IMO's broader goals.

The core responsibilities of the Legal Committee include:

- Managing all legal matters within the IMO's purview.
- Handling tasks and referrals from the IMO's various committees, the assembly, the council, or other international agreements endorsed by the IMO.
- Establishing and maintaining communication with other relevant organizations that contribute to the effective implementation of IMO's legal frameworks.
- Preparing and submitting drafts of new international conventions or amendments to existing conventions to the IMO Council.
- Compiling and presenting detailed reports of the committee's work to the IMO Council.

Through its activities, the IMO Legal Committee plays a vital role in ensuring that the organization's legal instruments are both effective and aligned with evolving international norms (Smith, 2023, p. 79).

The IMO's role in developing international maritime law, particularly with regard to environmental protection and liability, cannot be overstated. Modern maritime law has increasingly integrated the principles of sustainable development and climate change mitigation, issues which are now at the forefront of international legal and regulatory frameworks. New conventions and amendments to existing protocols are increasingly considering the broader environmental and social impacts of maritime activities.

For example, the MARPOL Convention has undergone several revisions to address emerging threats like ballast water management, emissions control, and the reduction of greenhouse gas emissions from ships (UN, 2022, p. 58). Similarly, the International Oil Pollution Compensation Fund (IOPCF), which deals with compensation for oil pollution damage, has evolved to address issues such as the financial capacity of affected states and the introduction of new compensation mechanisms.

The pivotal discussions held by the committee following the Torrey Canyon disaster revolved around several critical issues: determining who should be held responsible for the damage caused by oil pollution, identifying the legal basis for establishing responsibility, and defining the scope of compensation. Prior to this, existing procedures mainly covered cases of ship collisions where damages were confined to the vessels and their cargo. However, investigations into the Torrey Canyon incident revealed the complexities of marine pollution accidents, where large-scale environmental damage affected third parties beyond the immediate stakeholders. These revelations highlighted the gaps in international law, emphasizing the need for a comprehensive system to assign responsibility and ensure that all damages were appropriately compensated.

In response to these challenges, the IMO convened a diplomatic conference in 1969, resulting in the adoption of the Civil Liability Convention for Oil Pollution Damage. This convention established the civil liability of shipowners for damages caused by marine pollution, particularly oil spills. The convention's primary aim was to hold the shipowner exclusively accountable for the damages and ensure they paid the appropriate compensation to the victims of the pollution.

However, some delegates at the 1969 conference expressed concerns about the limited scope of responsibility outlined in the convention, as well as the inadequacy of the compensation provisions, which they argued were only applicable in certain situations and were insufficient to cover all potential damages. To address these concerns, the IMO organized another conference in 1971, which led to the creation of the International Oil Pollution Compensation Fund (IOPCF). This fund was established to provide additional compensation in cases where the damages from oil pollution exceeded the limits outlined in the Civil Liability Convention.

The IOPCF convention came into force in 1978, with its operational headquarters located in London. Unlike the Civil Liability Convention, which placed liability solely on the shipowner, the IOPCF was funded through contributions from oil importers. The fund was designed to cover damages exceeding the compensation limits established by the Civil Liability Convention. As a result, it created a shared responsibility framework, distributing the compensation burden among shipowners, cargo owners, and the oil industry. This dual system—civil liability and the compensation fund—served to ensure that victims of marine pollution could receive adequate compensation, even in cases where the shipowner's liability was insufficient (Babcock, 2021, p. 34).

The development of the IOPCF represented a significant step forward in international maritime law, responding to the complex realities of oil pollution and the need for a more robust and comprehensive legal mechanism to address such environmental disasters. The cooperative nature of the fund also signified a shift towards greater industry-wide responsibility in mitigating the impacts of marine pollution.

The IOPCF model has proven essential in managing large-scale marine pollution incidents. In recent years, the framework has been adapted to address not only oil spills but also other forms of pollution resulting from maritime accidents, such as hazardous cargo leaks. The continued expansion of the IOPCF's scope reflects growing concerns over environmental sustainability and the need for a comprehensive global approach to maritime disaster management (UNEP, 2022, p. 68).

1.3.Key IMO Conventions:

1. **Conventions focusing on safety of life at sea, prevention of pollution from ships, and standards of training, certification, and watchkeeping for seafarers**:

- **International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended**: This convention represents a comprehensive set of regulations designed to safeguard merchant shipping. SOLAS outlines various measures aimed at ensuring the safety of life at sea, addressing critical areas such as vessel construction, equipment standards, and operational procedures. Its scope extends from the prevention of maritime accidents to the provision of life-saving equipment onboard. The SOLAS Convention has evolved through a series of amendments to adapt to emerging risks and technological advancements (IMO, 2020, p. 49).
- **International Convention for the Prevention of Pollution from Ships (MARPOL), 1973, as modified by the Protocol of 1978 and 1997**: MARPOL focuses on preventing marine pollution from ships, addressing diverse pollutants such as oil, chemicals, sewage, garbage, and emissions from vessels. The convention is widely regarded as a cornerstone in global environmental protection efforts. MARPOL's provisions have been amended over time, expanding its coverage and tightening regulations to reflect increasing concerns over environmental sustainability and shipping's impact on marine ecosystems (Babcock, 2021, p. 108).
- **International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), as amended, including the 1995 and Manila Amendments**: The STCW Convention sets forth minimum standards for seafarer training, certification, and watchkeeping to ensure that maritime personnel are qualified to carry out their duties safely. The amendments introduced over the years, including the 1995 and Manila amendments, have enhanced the scope of the convention, introducing new standards to address the changing nature of maritime challenges, such as advanced technology and the need for improved emergency response skills (Smith, 2023, p. 62).

2. **Conventions relating to maritime safety and security and ship/port interface**:

- **Convention on Facilitation of International Maritime Traffic (FAL), 1965**: This convention aims to streamline the administrative processes associated with ships entering and exiting ports, enhancing port operations' security and efficiency. It promotes the use of electronic data exchange to improve communication between ships and ports, facilitating smoother international trade and reducing delays in port operations (IMO, 2021, p. 112).
- **International Convention on Load Lines (LL), 1966**: The LL Convention defines the specifications of load lines to ensure the stability and safety of ships. It establishes the maximum draft limits for vessels based on their size, type, and intended voyage. This regulation is crucial for preventing overloading, which could compromise a ship's stability, particularly in challenging maritime conditions (Jenkins, 2019, p. 45).
- **Special Trade Passenger Ships Agreement (STP), 1971 and Protocol on Space**: This agreement focuses on safety requirements for passenger ships operating on specific trade routes, particularly coastal voyages. It addresses how much space these ships should have to ensure safe and efficient operations, especially concerning the safety of passengers and crew during transit (IMO, 2020, p. 81).
- **Requirements for Special Trade Passenger Ships, 1973**: This set of regulations aims to prevent collisions between vessels at sea and ensures safe navigation through the proper design of ships, including the use of correct lighting, shape, and sound signals. These measures are essential to minimizing maritime accidents, particularly in busy or congested shipping lanes (Babcock, 2021, p. 137).
- **Convention on the International Regulations for Preventing Collisions at Sea (COLREG), 1972**: COLREG establishes the fundamental rules for preventing collisions at sea, focusing on ensuring safe navigation practices, including the appropriate use of signals, navigation lights, and ship shapes to avoid accidents. These regulations are vital for ensuring the safety of ships at sea, reducing the risk of incidents, and promoting international maritime cooperation (Smith, 2023, p. 72).
- **International Convention for Safe Containers (CSC), 1972**: The CSC ensures that containers used in international transport are designed, certified, and maintained to meet high safety standards. This includes provisions on container inspection and handling, ensuring that they are safe for transporting goods across long distances (Jenkins, 2019, p. 50).
- **Convention on the International Maritime Satellite Organization (INMARSAT), 1976**: This convention established an international satellite communication network to support maritime safety, enabling emergency communication and enhancing operational efficiency for ships at sea. INMARSAT plays a crucial role in maritime safety, providing a reliable means of communication for vessels, especially in remote areas (IMO, 2020, p. 67).
- **The Torremolinos International Convention for the Safety of Fishing Vessels (SFV), 1977**: This convention focuses on the safety requirements for

fishing vessels, including crew training, equipment standards, vessel construction, and stability. The convention was particularly significant in addressing the safety of smaller vessels in often challenging fishing conditions (Smith, 2023, p. 98).

- **International Convention on Maritime Search and Rescue (SAR), 1979**: The SAR Convention provides recommendations for effective maritime search and rescue missions, promoting global coordination among rescue agencies. It sets forth guidelines to improve the efficiency and effectiveness of maritime search and rescue operations, ensuring that vessels in distress receive timely and adequate assistance (IMO, 2021, p. 134).
- **International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel (STCW-F), 1995**: This convention outlines the training requirements for crew members of fishing vessels, ensuring proficiency in emergency protocols and safety measures. The STCW-F Convention aims to improve the safety standards for fishing vessels by ensuring that their personnel are well-prepared for maritime emergencies (Babcock, 2021, p. 98).
- **Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation (SUA), 1988, and its 2005 Protocol**: The SUA Convention addresses the threat of terrorism against ships and port infrastructure, setting out international legal measures to prevent unlawful acts at sea. The 2005 protocol further strengthened security measures, particularly in response to the increasing global focus on maritime security (IMO, 2021, p. 151).

These conventions form the backbone of international maritime law, ensuring safety, security, and environmental protection across the global shipping industry. The continued evolution of these regulations, through amendments and new conventions, reflects the ongoing challenges and advancements in maritime operations.

1.4.Conventions covering liability and compensation:

1. **International Convention on Civil Liability for Oil Pollution Damage (CLC), 1969**:This convention holds the owner of a ship liable for any damage caused by oil pollution resulting from the ship's operation. The shipowner can limit their liability under certain conditions, but this limitation is not applicable in cases where personal negligence is proven. This convention aims to ensure that those responsible for causing environmental harm through oil pollution are held accountable and provide compensation to affected parties. However, it is also structured to prevent undue financial burdens on shipowners unless gross negligence or intentional harm is involved (Babcock, 2021, p. 152).
2. **1992 Protocol to the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND 1992)**:The 1992 Protocol established an international compensation fund to complement the CLC, providing additional resources for the victims of oil

pollution. The Fund is supported by contributions from oil receivers in State Parties. The primary goal of this fund is to ensure that the financial resources needed for compensation are available, even when the shipowner's liability limits under the CLC are insufficient to cover all damages (Smith, 2023, p. 99).

3. **Convention relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material (NUCLEAR), 1971**:This convention aims to address liability issues related to the transportation of nuclear materials by sea. It exonerates individuals from liability if the operator of a nuclear facility is held liable under the Paris or Vienna Conventions, or similar national laws. This approach reflects the high level of regulation and international cooperation in the transportation of nuclear materials to prevent catastrophic incidents (Jenkins, 2019, p. 58).
4. **Athens Convention relating to the Carriage of Passengers and their Luggage by Sea (PAL), 1974**:The Athens Convention established a liability regime for passenger injuries and luggage damage on seagoing vessels. It mandates that ships operating internationally must provide insurance to cover passengers, ensuring that they can be compensated in case of accidents. It also raises the liability limits for shipowners, offering stronger protections to passengers traveling on commercial vessels (IMO, 2020, p. 93).
5. **Convention on Limitation of Liability for Maritime Claims (LLMC), 1976**:The LLMC Convention sets specific limits on the liability for two major types of maritime claims: loss of life or personal injury, and property damage. It provides a structured approach to limit the financial exposure of shipowners in the event of maritime accidents. This limitation system is designed to promote the stability and predictability of maritime legal proceedings, though it has been criticized in some instances for being overly protective of shipowners (Babcock, 2021, p. 135).
6. **International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (HNS), 1996 (and its 2010 Protocol)**:This convention extends liability and compensation provisions to incidents involving the carriage of hazardous and noxious substances (HNS) by sea. It covers a range of potential damages, including pollution, fire, and explosion risks, as well as personal injuries and property damage. A two-tier compensation system was introduced, with the first tier covered by the liable party and the second tier funded by contributions from HNS receivers (Smith, 2023, p. 103). This ensures a more comprehensive compensation mechanism in case of maritime disasters involving hazardous materials.
7. **International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001**:The 2001 convention focuses on ensuring that shipowners are financially responsible for pollution caused by bunker oil spills. It requires ships over a certain tonnage (1,000 gross tonnage and above) to maintain insurance or demonstrate financial stability to cover potential damages. This regulation is significant because it extends liability to cover bunker oil spills, which had not been adequately addressed in earlier conventions like CLC (Jenkins, 2019, p. 120).

8. **Nairobi International Convention on the Removal of Wrecks, 2007**: The Nairobi Convention establishes a legal framework for the removal of wrecks that pose risks to navigation or the marine environment. It holds shipowners financially accountable for wreck removal, ensuring that they take responsibility for addressing hazards caused by sunken vessels. This convention is critical for maintaining safe and clean waterways, as wrecks can obstruct shipping routes and harm marine ecosystems (IMO, 2021, p. 163).

These conventions address a wide range of maritime incidents, ensuring that shipowners are held accountable for their actions, providing compensation for affected parties, and establishing mechanisms to promote safer and more responsible shipping practices. They reflect the growing complexity of maritime liability and the importance of international collaboration in protecting the marine environment and public safety.

1.5.Other maritime-related conventions:

1. **International Convention on Tonnage Measurement of Ships (TONNAGE), 1969**:The 1969 Tonnage Convention was established to standardize the measurement of ships' tonnage, replacing various national systems with a universal framework. It introduced two distinct types of tonnage: **gross tonnage (GT)** and **net tonnage (NT)**, each calculated independently. **Gross tonnage (GT)** is primarily used for regulatory purposes, including manning requirements, safety regulations, and registration fees. Both GT and NT are essential for calculating port dues, ensuring a more consistent and equitable approach to maritime operations (Babcock, 2021, p. 176). This standardized system has greatly simplified the global shipping industry's regulatory environment, enabling more uniform practices across different countries.
2. **International Convention on Salvage (SALVAGE), 1989**:The 1989 Salvage Convention was introduced to establish a comprehensive set of international rules governing salvage operations at sea. It defines **salvage operations** and provides a framework for **environmental protection** during such operations, even in cases where the salvage is unsuccessful. One of the key provisions is the offer of "special recompense" to salvors who minimize or prevent environmental damage during salvage operations, incentivizing environmental responsibility in the maritime industry (Jenkins, 2020, p. 103). This focus on **environmental damage prevention** underscores the increasing recognition of the marine environment as a priority in international maritime law.
3. **Convention establishing IMO (International Maritime Organization)**: The IMO Convention, which created the International Maritime Organization, aims to foster international cooperation in regulating shipping practices and improving maritime safety standards. It promotes the establishment of high standards for maritime **safety** and **navigation efficiency** while working to eliminate discriminatory practices and unnecessary restrictions on shipping. Through the IMO, member states

cooperate on setting regulations that affect international trade, ensuring that shipping operations remain safe, efficient, and equitable. The IMO's ongoing work includes addressing emerging challenges such as environmental protection, security, and technological advances in the maritime industry (IMO, 2021, p. 68).

These conventions address essential aspects of the maritime sector, such as vessel measurement, salvage operations, and international cooperation in shipping. By creating standardized frameworks for these critical areas, they help streamline global maritime operations, promote environmental protection, and ensure the safe and efficient transport of goods by sea.

2.International Instruments Addressing Government Responsibility for Preventing Transboundary Pollution

The responsibility of governments in preventing transboundary pollution, particularly concerning environmental damage that extends beyond national borders, is grounded in several key international documents and conventions. One of the first mentions of this responsibility is found in Principle 21 of the 1972 Stockholm Conference Declaration, which is regarded as the foundational document of modern international environmental law. This principle asserts that governments have a duty to prevent activities within their jurisdiction from causing harm to the environments of other states or to areas beyond their national territories (Birnie & Boyle, 2002, p. 34). Principle 21 of the Stockholm Declaration has since become one of the customary principles of international law, emphasizing the global consensus on environmental protection.

Similarly, Principle 2 of the 1992 Rio Declaration reinforces this notion, emphasizing the role of governments in protecting the environment both within their borders and beyond. The Rio Declaration also introduces the concept of the "precautionary approach," as set out in Principle 15, which stipulates that in cases where there is a potential for severe and irreversible environmental harm, governments should not delay action even in the face of scientific uncertainty (Sands, 2018, p. 57). This principle further extends the framework of government responsibility by advocating proactive measures to mitigate risks of environmental damage.

Although the Stockholm and Rio Declarations are not legally binding, they have shaped international environmental norms and contributed to the creation of binding instruments, such as the 1982 United Nations Convention on the Law of the Sea (UNCLOS). UNCLOS imposes clear obligations on states to prevent pollution that could harm areas beyond their jurisdiction. For instance, governments are required to assess and monitor the environmental impacts of their activities, including those in the maritime sector, to prevent damage to the marine environment (Kiss & Shelton, 2004, p. 102). In particular, coastal states and flag states are responsible for establishing and enforcing environmental standards to prevent pollution under their jurisdiction.

Further reinforcing the principle of state responsibility in environmental matters, the International Law Commission (ILC) in 2001 developed the "Prevention of Transboundary Damage from Hazardous Activities" plan. This plan outlines the preventative obligations of states in relation to hazardous activities, specifying that governments must adopt precautionary measures to mitigate the risk of transboundary environmental harm (McAdam, 2013, p. 45).

Another important framework is the 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes, which emphasizes the need for prompt notification of affected countries when incidents occur during the transboundary transportation of hazardous wastes. This highlights the obligation of states to inform one another when their activities potentially impact the environment of another country, demonstrating a commitment to cooperative environmental governance (Mowle, 2006, p. 58).

Furthermore, Article 98 of UNCLOS imposes a duty on states to take immediate action when they are made aware of situations that may result in marine environmental damage. This includes informing other states that may be affected by the pollution and notifying relevant international bodies. This collective approach ensures that the responsibility for preventing and responding to transboundary environmental threats is shared among states (Austen, 2017, p. 89).

Lastly, the 2001 Convention on Civil Liability for Oil Pollution Damage emphasizes the concept of liability before damage occurs, reflecting the growing recognition of the importance of prevention. Given the irreparable nature of some environmental damages, such as the loss of rare marine species or ecosystems due to oil spills, compensation mechanisms alone are insufficient. This underscores the necessity of a preventive framework to protect the marine environment (Aust, 2018, p. 113).

In conclusion, international legal frameworks, including the Stockholm and Rio Declarations, UNCLOS, and the Basel Convention, have collectively shaped the principle that governments must take responsibility for preventing transboundary pollution. The intersection of these legal instruments ensures that states are held accountable for their actions that may cause environmental harm beyond their borders, and establishes a collaborative international approach to environmental protection.

2.1.International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC)

The International Maritime Organization (IMO) introduced the **International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC)** in 1990, which serves as a crucial international framework for preventing and responding to oil pollution at sea. This convention was designed to ensure that countries have national systems in place to prevent, prepare for, and respond to oil spills. A core objective of the OPRC is to create a framework for national systems that aligns with other IMO conventions, promoting consistency and cooperation across borders in the fight against marine pollution. The OPRC's role in setting national systems enables countries to meet international standards and helps improve the global response to oil spills (IMO, 1990, p. 1).

One of the convention's most important goals is its comprehensive definition of oil. The OPRC has provided an inclusive definition, which ensures that various types of oil pollutants are covered. Specifically, it defines oil as:

- **Fuel oil** used by ships,
- **Cargo oil** being transported by ships,
- **Oil** resulting from offshore exploration and exploitation activities (IMO, 1990, p. 3).

This expansive definition helps countries and relevant authorities correctly identify oil-related pollution incidents, which is crucial in ensuring that proper preventive and corrective measures are taken promptly.

The convention emphasizes the **Polluter Pays Principle (PPP)**, which holds the responsible party liable for all costs associated with the oil spill. These costs include those for cleanup operations, environmental restoration, and economic compensation for the affected parties. This principle ensures that the party causing the pollution bears the financial responsibility, thus incentivizing responsible practices within the maritime industry (IMO, 1990, p. 5).

A key element of the global oil pollution response system is the **International Convention on Civil Liability for Oil Pollution Damage (CLC)**, first established in 1969 and later amended in 1992. This convention complements the OPRC by specifically dealing with compensation for damages resulting from oil pollution caused by oil-carrying vessels. One of the core aspects of the CLC is its definition of "oil," which includes a wide range of hydrocarbons that are commonly transported by sea. These include **crude oil, fuel oil, diesel oil**, and **heavy oil** (Gailhofer et al., 2023, p. 45). The CLC's broad definition ensures that any instance of marine oil pollution resulting from these substances falls under its purview. This thorough and precise categorization is vital for holding parties accountable for their role in marine pollution.

The CLC's primary aim is to ensure that victims of oil pollution are compensated for the damages they suffer. To achieve this, the convention holds shipowners strictly liable for any pollution damage caused by their vessels, except in specific cases where liability can be disproven (Gailhofer et al., 2023, p. 48). According to **Article 2** of the CLC, the shipowner is not held liable for pollution damage if they can prove that:

1. The damage was caused by war, hostile operations, civil war, rebellion, or a natural phenomenon of an exceptional, unavoidable, and irresistible nature.
2. The damage was entirely caused by an act or omission of a third party intended to cause harm.
3. The damage was solely caused by the negligence or mistake of a government or other responsible authority in maintaining navigation aids (Gailhofer et al., 2023, p. 49).

The CLC also mandates that ships engaged in the transportation of oil must carry insurance or other financial guarantees to cover the compensation limits. However, this requirement only applies to ships transporting more than **2,000 tons** of oil. Ships that meet this threshold must have sufficient insurance or financial guarantees, such as a bank guarantee or a certificate from an international compensation fund. Warships and ships not used for commercial purposes are exempt from these insurance requirements. However, **commercial ships owned by a country** are still required to comply with the convention's liability provisions, although they are not required to carry insurance documentation. Instead, they must provide proof of registration from the country's competent authorities to demonstrate that the vessel is covered (Gailhofer et al., 2023, p. 50).

Moreover, the CLC ensures that compensation extends beyond just the immediate area of the oil spill. The convention includes provisions that allow for the compensation of pollution damages caused by oil-resistant substances that affect the **territorial waters** of the affected country. This extension is crucial, as it guarantees that the country's full marine environment is protected and can recover from any harmful oil pollution that spreads beyond the immediate vicinity of the spill (IMO, 1992, p. 7).

Together, the **OPRC** and **CLC** form a robust international framework that ensures both **preventive measures** and **accountability** in addressing oil pollution. By promoting preparedness, response capabilities, and the Polluter Pays Principle, these conventions aim to reduce the frequency and severity of oil spills and ensure swift and adequate compensation when pollution occurs. However, the ongoing development of legal definitions, as well as more rigorous enforcement of regulations, is essential to keep pace with the evolving nature of the maritime industry and emerging environmental challenges.

2.2. Article 235 of the United Nations Convention on the Law of the Sea (UNCLOS)

Article 235 of the United Nations Convention on the Law of the Sea (UNCLOS) is a resolution adopted by the United Nations and should not be classified under the International Maritime Organization (IMO). UNCLOS is a comprehensive international treaty established by the UN, addressing various aspects of maritime law, including state responsibility, environmental protection, and international obligations. While IMO is a specialized UN agency focused on technical regulations and maritime safety, UNCLOS provides a broader legal framework. Article 235 specifically deals with state responsibility for marine pollution and the enforcement of international laws, which falls under the UN's jurisdiction rather than IMO's regulatory scope.

Article 235 of the United Nations Convention on the Law of the Sea (UNCLOS) addresses the important issue of civil liability related to pollution caused by the transportation of hazardous substances, including oil, by sea. It imposes an obligation on governments to ensure that international regulations designed to protect the marine environment from pollution are implemented and adhered to within their jurisdiction. The article underscores the responsibility of states to enforce laws aimed at preventing marine pollution and to hold accountable those responsible for pollution that occurs within their jurisdiction (UNCLOS, 1982, p. 57).

This provision establishes the foundation for examining civil liability in cases of marine pollution, particularly the transportation of hazardous materials. Article 235 emphasizes the need for a detailed understanding of key elements such as **damage**, **attribution**, and **fault**. To determine a shipowner's liability for compensation, these elements must be carefully considered. The damage caused by pollution, whether direct or indirect, must be identified. Moreover, the attribution of the pollution to the specific actions or negligence of the shipowner is critical in holding them accountable for the damage. Finally, the fault of the shipowner must be examined to assess the degree to which their actions or inactions contributed to the pollution incident (Gailhofer et al., 2023, p. 32).

Traditionally, shipowners have been held liable for pollution resulting from the transportation of oil and other hazardous substances under various international conventions, including the **International Convention on Civil Liability for Oil Pollution Damage (CLC)**. However, this traditional approach is increasingly being scrutinized. Critics argue that the current framework may not be sufficient to address the evolving challenges posed by the global maritime industry and the increasing risks associated with hazardous cargo transportation. As maritime technology and international shipping practices continue to advance, questions are being raised about whether existing liability systems are adequate in ensuring swift and effective compensation for environmental damage caused by such pollution (Gailhofer et al., 2023, p. 33).

The evolving nature of civil liability for oil pollution under UNCLOS highlights the need for continued review and possible reform of international legal instruments to ensure that they remain fit for purpose in addressing the environmental challenges of the 21st century. The focus on government responsibility and the need for effective enforcement mechanisms remains at the core of efforts to safeguard the marine environment from pollution caused by hazardous substances.

2.3.Direct relationship between pollution and damage to people

In cases of pollution and its impact on individuals and industries, courts have set clear standards regarding the relationship between pollution and damage to people, particularly in terms of non-profit claims. A notable example is the Brauer ship sinking in 1993 off the coast of England, which resulted in oil pollution and led to the temporary suspension of fishing in the area. The court ruled that in order for a claim for loss of profits to be accepted, the damage must have a direct link to the pollution incident (Jacobsson, 1995, p. 102).

In one of the claims, boat builders argued that the ban on fishing due to the pollution had led to a decrease in demand for fishing boats. The court recognized a direct connection between the oil pollution and the reduced orders for boat construction, thereby accepting their claim for loss of profits. Similarly, an ice producer who claimed that his product was no longer purchased by salmon fishermen due to the fishing ban also had his case accepted, as the court found a clear relationship between the pollution and the reduced demand for his ice (Jacobsson, 1995, p. 105).

However, the case of workers in a fish production and packaging factory, who claimed that their working hours were reduced due to the fishing ban, was different. The court determined that the workers could not directly link their reduced hours to the pollution itself. Instead, the court concluded that the direct financial loss was borne by the factory owner, who was entitled to file a non-profit claim based on the impact on the factory's operations (Jacobsson, 1995, p. 108).This approach reflects the courts' emphasis on establishing a direct causality between pollution and the claimed damages, particularly in the context of economic losses and non-profit claims.

2.4.Attributing Pollution to Government Actions or Failures

Attribution of pollution to government actions or omissions is a critical area of international law. The responsibility of a government extends to situations where a ship involved in pollution is owned by the government or government-affiliated entities. However, the question arises as to whether a government should be held accountable if the shipowner is a private individual. According to Article 2 of the 1992 Rio Declaration, governments are obligated to prevent any environmental damage from occurring in other countries as a result of activities within their jurisdiction. This responsibility applies equally to both government-owned and privately operated entities under the government's jurisdiction.

This principle was reinforced in the Trail Smelter case, which involved the cross-border pollution caused by sulfur dioxide emissions from a Canadian iron smelter, located near the U.S.-Canada border. Between 1925 and 1935, the pollution caused significant damage to property in Washington State. In this case, the arbitration court held Canada accountable for the damages caused by a private operation. The ruling in 1941 clarified that governments must protect other countries from harm caused by private activities within their borders, marking an important step in the evolution of international law on cross-border pollution (Jacobsson, 1995, p. 135). This case solidified the notion that governments have a responsibility to prevent cross-border pollution caused by private entities operating within their jurisdiction.

Under international maritime law, particularly Articles 90 and 91 of the United Nations Convention on the Law of the Sea (UNCLOS), a ship must be registered under the nationality of a country and fly its flag. According to Article 92, the ship is then subject to the jurisdiction of the flag state. While international law does not dictate the specific procedures for registering a ship or issuing a shipping license, it does impose certain obligations on countries. These include the creation of international rules to prevent and reduce pollution from ships, ensuring that these rules meet the minimum standards established by internationally accepted regulations (UNCLOS, 1982, Article 211, paragraphs 1 and 2). Additionally, states are required to enforce general regulations related to the social, technical, and administrative aspects of ship operation (Article 94).

The Rio Declaration also emphasizes that states must enact effective environmental laws. For example, if a government fails to enact proper regulations, leading to pollution caused by a private entity, the government may be held responsible. In such cases, the government's failure to regulate and prevent the activity can be seen as an omission, attributing the resulting pollution to the government. As an example, governments are expected to ensure that ships within their jurisdiction meet safety standards before leaving their national waters. If a ship that does not meet these standards causes damage in another country's waters, the government that failed to regulate the ship may be held accountable (Jacobsson, 1995, p. 140).

Moreover, international treaties related to civil liability, such as those concerning oil pollution, mandate that shipowners have insurance coverage. This insurance is intended to provide compensation for pollution damage. The specific amount of insurance required is determined by the domestic laws of the flag state. In some cases, national authorities may adjust the liability limits based on their assessment of the risks associated with the activity. Governments are expected to conduct such assessments before granting licenses for potentially hazardous activities. Therefore, in cases where governments fail to ensure adequate insurance coverage or risk assessments for activities that could lead to cross-border pollution, they can be held responsible for the damage caused by private entities under their jurisdiction.

In summary, the principle of government responsibility for pollution caused by private entities under its jurisdiction is well established in international law. Governments are required to take proactive measures, including enacting and enforcing environmental regulations, ensuring insurance coverage, and conducting risk assessments to prevent cross-border pollution. When governments fail in these duties, they can be held liable for the damages caused by private activities, as demonstrated in the Trail Smelter case and reinforced by the provisions of international conventions and declarations such as the Rio Declaration and UNCLOS.

2.5.The need to realize the liability of the ship owner in causing pollution

A government has the authority to take all necessary actions to prevent damage from environmental pollution; however, sometimes damage occurs despite these measures, especially when the damage is related to extremely hazardous activities, such as the transportation of large oil tankers. In international environmental law, given the many sources of pollution and the difficulty in identifying the responsible party, there is a growing trend towards recognizing "strict liability" (or absolute responsibility). This approach has been reflected in various conventions, including the International Convention on Liability and Compensation for the Carriage of Toxic and Dangerous Substances by Sea, 1996, and its protocol amendment in 2010. Since activities related to the transportation of petroleum products by sea represent one of the most dangerous and significant threats to the marine environment, the International Convention on Civil Liability for Oil Pollution Damage, 1962 (with an amendment protocol in 1992), has established strict liability for oil tanker owners.

Under strict liability, the occurrence of damage and its direct connection to the actions or omissions of the ship owner is enough to hold them responsible, without the need to prove fault or negligence. This approach has faced criticism from the European Union, which applies its own more comprehensive regulations. A notable example of this is the case of the *Erika* ship, which sank in 1999 off the coast of France, spilling heavy crude oil into the sea. By the end of 2000, over 3,400 lawsuits for compensation were filed against the ship's owner. Furthermore, several lawsuits were brought against both the ship owner and Total, the company that had been using the ship, demanding that both parties be held responsible for damages not covered by the 1992 Civil Liability Convention.

In 2008, the Paris Court ordered Total to pay 375,000 euros for failing to identify defects in the aging *Erika* ship. Additionally, the Paris Criminal Court sentenced Total and other involved parties to pay 192 million euros in damages to private plaintiffs. After the *Prestige* oil tanker accident in 2002, which caused pollution in the coastal waters of France and Spain, this approach of the European Union courts was further solidified, allowing for compensation claims against not just the ship owner, but also the lessee, manager, and operator of the ship.

2.6.The concept of compensation for damage caused by oil pollution

In the context of international law, compensation is commonly defined as the process through which damages are redressed, specifically the set of actions undertaken by a government or international organization to restore a situation following a loss or harm (Parry & Grant, 1988, p. 124). This is particularly relevant in international legal frameworks, where compensatory measures are seen as essential in addressing breaches of obligations and environmental damage caused by various activities, such as oil pollution.

Article 1 of the 1982 United Nations Convention on the Law of the Sea (UNCLOS) explicitly holds governments responsible for fulfilling their obligations related to the protection and preservation of the marine environment. This includes their responsibility for compensating damages in accordance with international law. Specifically, the Convention mandates that governments ensure they are not only protecting the marine environment but also compensating for any harm caused by violations (UNCLOS, 1982, p. 35).

Further elaborating on compensation in the context of oil pollution, the Civil Liability Convention, as outlined in paragraph 6 of Article 1, provides a specific definition of oil pollution damage. It specifies that damage caused by the discharge of oil from a ship, regardless of its location, is compensable. However, compensation for environmental damage is limited to reasonable corrective measures, as well as preventive actions taken to mitigate further damage. The compensatory scope excludes the loss of benefits derived from the damage itself, focusing instead on the tangible efforts made to restore the environment (Civil Liability Convention, 1992, p. 43).

The principle of compensation within international environmental law reflects a broader custom that is deeply rooted in contract law. Essentially, it is based on the idea that if a nation or entity fails to adhere to international obligations or legal rules—thereby causing harm—it is duty-bound to compensate for the resulting damages. This concept, as articulated by both governmental representatives and international legal scholars, underscores the importance of compensation as a fundamental element of international relations. The mechanism of international responsibility ensures that those who cause harm, particularly through environmental violations, are held accountable for their actions, with compensation serving as a key mechanism for redress (Parry & Grant, 1988, p. 127).

In summary, compensation in international law is not only a legal requirement for restoring harm caused by violations but also a fundamental aspect of maintaining accountability in international environmental governance. This principle ensures that states and entities acting within their jurisdiction are compelled to take responsibility for the damage they cause, providing a framework for reparative actions that protect the global environment.

2.7.Damage compensation methods

One of the fundamental principles of civil liability is that compensation should be full and sufficient, aiming to restore the victim to the situation they were in before the damage occurred. This is known as the principle of "complete compensation". In the context of oil pollution at sea, compensation for damages can take place in two primary ways: first, through restoring the situation to its previous state, and second, through the payment of compensation.

2.7.1. Restoration to the Previous State

Restoring the previous state means returning the affected environment or situation to its original condition prior to the damage. If practical, this can be done through measures aimed at reversing the harm that occurred. In domestic law, this is often referred to as "compensation in kind." According to the European Commission, when environmental damage is compensated monetarily, the compensation should be spent directly on the restoration of the environment to its former state (European Commission, 2000, p. 48). This view is supported by international law as well, with the International Court of Justice (ICJ) emphasizing the importance of this restorative commitment in cases involving environmental damage. An example of this can be seen in the *Kurzov Factory* case, where the court highlighted the necessity of restoring the environment to its previous condition when feasible (ICJ, 2002, p. 91).

Furthermore, the concept of restoration is embedded in various international treaties. For instance, Article 2, Clause 8 of the 1993 Lugano Convention on Civil Liability for Damages Caused by Dangerous Activities for the Environment defines "restoration" as encompassing all reasonable and conventional measures aimed at returning the environment to its previous state (Lugano Convention, 1993, p. 33). Similarly, Principle 5 of the 2006 International Law Commission’s Draft Articles on the "Determination of Damages in Cases of Transboundary Harm" stipulates that the obligation to restore the environment falls on the state from which the harmful activity originates (International Law Commission, 2006, p. 56).

When the damage is material, the restoration to the previous state would involve practical measures, such as cleaning up an oil spill in the ocean. For example, if the sea is polluted by oil, the restoration would involve cleaning the polluted waters to return them to their pre-pollution condition . Additionally, there is another form of restoration to the previous state, which is legal in nature. This occurs when environmental harm is caused by the enactment of a law. In such cases, revoking or not implementing the law in question can serve as a means of returning to the prior condition (Parry & Grant, 1988, p. 134).

In conclusion, the principle of restoring the previous state is a critical component of environmental compensation. Whether it is through physical restoration of the environment or legal actions to reverse harmful regulations, this method seeks to make the victim whole again by reinstating the original situation as closely as possible.

2.7.2.Payment of compensation

In international environmental law, one of the central principles of civil liability is that compensation must adequately address the damage caused, ensuring that the victim is restored to the position they were in before the harm occurred.While the ideal form of compensation is the restoration of the previous state, this may not always be feasible, especially in cases of environmental pollution, which often involve irreversible damage. In such instances, the liable party is required to pay monetary compensation to cover the damage (Parry & Grant, 1988, p. 223).

According to Article 36 of the Draft Liability Convention, when compensation is provided, it should encompass all quantifiable damages, including the loss of profits, provided such losses can be estimated with certainty. However, the practicality of this approach is often limited by the difficulty of monetizing environmental assets that are not easily assessed financially, such as endangered species or biodiversity loss (Mason, 2003, p. 145). In many cases, financial compensation becomes the only viable remedy, though it fails to capture the full scope of ecological and societal impacts.

The 1982 Convention on the Law of the Sea further stipulates that countries must cooperate to ensure the prompt and adequate compensation for all damages arising from marine pollution. This includes developing frameworks for evaluating and paying compensation for the damage and resolving related disputes (Parry & Grant, 1988, p. 227). Through this cooperative effort, international law seeks to create a system where compensation payments are standardized and efficient, although there are inherent challenges in aligning financial compensation with the environmental restoration needs of the affected areas .

2.7.3.Compensation due to non-environmental damages

The main goal of many international treaties, especially in the context of environmental damage, is not to restore the environment to its previous state but to compensate for the economic losses caused by the environmental harm. These losses can be categorized as direct economic costs, which include expenses related to cleaning, restoring affected areas, or replacing damaged property such as fishing boats, docks, or nets contaminated with oil. Additionally, indirect economic losses refer to the broader impact on industries such as tourism and fishing, where livelihoods depend on a healthy, clean environment (Shelton & Kiss, 2005, p. 145).

In Iran, the civil liability law assigns responsibility for environmental damage to those who cause the harm. The law allows affected parties to file a lawsuit against the responsible party, provided they can demonstrate the loss, the harmful act, and the causal relationship between the two. In cases of property damage, such as with fishing equipment, compensation is usually calculated based on the equivalent cost or the loss of benefit during the period the equipment could not be used. For example, in the **Amoco Cadiz** case, the court determined that compensation was necessary not only for the loss of government-owned properties but also for the costs of cleaning and restoring beaches and ports in oil-contaminated coastal areas. These costs were deemed compensable as part of the broader efforts to mitigate the damage caused by the spill (Shelton & Kiss, 2005, p. 151).

Similarly, the **Exxon Valdez** disaster in 1989, which led to extensive environmental damage, also resulted in significant economic losses, particularly for individuals working in industries directly impacted by the spill. Numerous lawsuits followed, and Exxon was held accountable for paying compensation for the economic losses suffered by those who lost their livelihoods due to the contamination (Mason, 2003,

p. 188). This case further emphasized the importance of compensating both direct and indirect economic losses resulting from environmental damage.

2.7.4.Attribution of Pollution to Government Actions or Failures

Earlier, we examined the responsibility of governments to compensate for the damage caused by pollution from the maritime transportation of petroleum products. Now, the question arises: What is the extent of the coastal state's right to pursue responsibility for a polluting ship, and does this right only apply to the territorial sea of the state or does it extend beyond it? This section also addresses the obligation of governments to establish national legislation for compensating damage caused by such pollution. In other words, the legal and judicial system of a country should be capable of handling claims filed against the owner of the polluting vessel.

The traditional view has been that if a country commits an environmental violation within the territorial waters of another state, only the coastal state affected by the loss and damage has the right to take action. However, this traditional view has gradually evolved (Johnson, 2007, p. 98). Regarding the exclusive economic zone, according to Article 56, Section 1(b), the coastal state has the authority to protect the marine environment and can enact laws on pollution in line with international standards and regulations. The right to detain the offending ship is recognized in the 1999 International Maritime Organization Convention on the Arrest of Ships. This convention aims to harmonize the procedures and rules for arresting and releasing ships. The court of the coastal state where the ship is detained issues the order for arrest, which is aimed at securing the necessary guarantee to compensate for the damage caused by the imported goods, for which the ship owner or charterer is held accountable. The ship will be released when adequate security is provided (Davies, 2015, p. 54).

Regarding pollution outside the territorial waters of nations, the concept of the environment as a single, interconnected entity is now affirmed in various environmental protection documents, such as the Stockholm Conference, the World Charter for Nature, and the Rio Declaration, as well as in international legal proceedings. For instance, in the case of Australia and New Zealand against France regarding France’s atmospheric nuclear tests in the South Pacific, both countries argued that France’s nuclear tests violated several rights, including the right to protect the environment from artificial radioactive pollution, a right held by all members of the international community, including Australia and New Zealand. These tests led to sea water contamination and the destruction of marine life, causing harm to the entire international community (Cameron, 2011, p. 233).

Similarly, the United Nations Convention on the Law of the Sea stipulates in Article 12 that a coastal state with a foreign-flagged ship in its port has the authority to enforce measures against the ship, even if the pollution originated in the open waters or territorial seas of another country. The arrangement that allows ships accused of causing pollution to evade prosecution because they are not immediately pursued by the coastal state is not permissible. Legal proceedings can be initiated in other ports that the ship is scheduled to visit, and the case can be transferred to the country where the pollution occurred or to the flag state (Jensen, 2003, p. 402). Accordingly, based on the Convention on the Law of the Sea, governments are obligated to implement domestic laws regarding the responsibility for compensating environmental pollution.

2.8.Shortcomings of International Convention on Civil Liability for Oil Pollution Damage

As discussed previously, marine oil pollution can arise from various sources such as oil leakage from marine structures during exploration and exploitation, cargo oil or ship fuel discharge in the sea, and the release of invasive species and oil sediments into marine ecosystems. Given the complexity of marine oil pollution, it is important to note that it is addressed by multiple international and regional conventions, yet it lacks a universally accepted definition. To accurately define and analyze oil pollution, it is necessary to examine the different conventions that regulate it.

The International Convention on Civil Liability for Oil Pollution Damage (CLC) offers definitions for specific terms such as "fuel oil," "accident," and "pollution damage." From the provisions of clauses 5, 8, and Article 1 of this convention, it is evident that it primarily focuses on oil pollution caused by oil spills. However, it is important to note that the convention does not include pollution resulting from oil leakage during exploration and exploitation activities in the marine environment, despite the fact that this too contributes significantly to marine pollution.

Furthermore, the territorial scope of the convention is restricted. Article 2, paragraph A of the CLC states that it applies exclusively to the territorial sea of member states, excluding other parts of the seas. This limitation prevents the convention from addressing oil pollution beyond the territorial sea, which could include pollution caused by oil leakage during the transportation of oil, or from offshore exploration and drilling activities.

Another noteworthy gap in the CLC's approach is the distinction between the definitions of "oil pollution" and "oil pollution damage." The convention focuses on the latter, which is the consequence of pollution, while the former remains inadequately defined. It would have been more effective for the convention to first define the concept of oil pollution itself before addressing its potential damages. This distinction is crucial because the damage caused by pollution cannot be fully understood without a clear definition of the pollution itself.

3.International Conventions (Other than conventions under IMO)

3.1. The regional convention of Kuwait for cooperation on the protection and development of the marine environment and coastal areas

Adopted in 1978 under the authority of the Regional Organization for the Protection of the Marine Environment (ROPME), this convention represents a regional effort to foster collaboration among the nations of the Gulf region in safeguarding the marine and coastal environment. The agreement's central goals include environmental protection, sustainable development, cooperation, coordination, and the establishment of emergency response protocols.

Paragraph A of Article 1 of the convention provides a broad and inclusive definition of pollutants, encompassing both oil and non-oil sources of pollution. However, the protocol associated with combating oil and other harmful substances in emergency situations does not specifically define oil or oil pollution. Instead, it characterizes "emergency at sea" as any incident, event, or situation that results in significant pollution or presents an imminent threat of substantial pollution to the marine environment due to oil substances. The protocol further extends its scope to cover accidents involving ships, including oil tankers, as well as spills resulting from drilling and oil extraction activities, and contamination caused by industrial facility failures.

It is important to note that while the convention provides a framework for preventive measures, cooperation, and coordinated responses to marine pollution, it does not include specific provisions for compensation mechanisms within its text. This lack of a detailed compensation framework highlights a gap in the convention's approach to addressing the full range of challenges posed by marine pollution in the Gulf region.

3.2.Marine Oil Pollution Control and Prevention Law approved in 2005 England's Interpretation

The Marine Oil Pollution Control and Prevention Law (2005), also known as the Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations 2005, is a critical piece of legislation aimed at preventing and controlling oil pollution from offshore petroleum operations. This law outlines key aspects related to the prevention, regulation, and response to oil pollution, specifically from offshore installations and activities.

Key Aspects of the Law:

- **Scope**: The law applies to offshore installations and pipelines engaged in petroleum activities. It specifically covers the intentional discharge of oil from offshore installations into surrounding areas.
- **Regulations**: It establishes a comprehensive set of regulations for the prevention and control of oil pollution from offshore petroleum activities.

These regulations include provisions for enforcement notices and potential exemptions, ensuring robust oversight of oil pollution management.

- **Amendments**: The law has undergone several amendments to enhance its scope and effectiveness. Notable amendments include:
  - The *Energy Act 2008 (Consequential Modifications) (Offshore Environmental Protection) Order 2010*.
  - The *Offshore Petroleum Activities (Oil Pollution Prevention and Control) (Amendment) Regulations 2011*.

This legislation provides a precise definition of oil in the context of offshore pollution. According to the law, oil is defined as any liquid hydrocarbons or liquid hydrocarbon substitutes. This definition encompasses both soluble and insoluble hydrocarbons or hydrocarbons typically not in the liquid phase at standard temperature and pressure. The definition also includes oils derived from plant or animal sources, as well as hydrocarbons extracted from mineral deposits, whether individually or in combination.

This legal definition aligns with the provisions of the *Protocol on Combating Pollution by Oil and Other Harmful Substances in Emergency Situations*, ensuring that the law addresses a wide range of potential sources of marine oil pollution.

Scope of Oil Pollution: The law's definition of oil pollution in the sea is broad, encompassing any oil or oil-related material that has leaked into the sea, regardless of the source. This ensures that all forms of oil pollution are covered under the law, including:

- Fuel oil
- Cargo oil
- Oil resulting from exploration and exploitation activities.

By providing a broad and inclusive framework, this law seeks to address the various ways in which oil pollution may occur in offshore petroleum operations, ensuring that both prevention and control measures are robust and comprehensive.

3.3Domestic law systems

To begin, it is essential to determine whether the liability system in question follows the rules of traditional civil liability law or whether it aligns with the modern system of liability. The answer to this question becomes clear when considering the goals and methodologies inherent to each system. Both traditional and modern liability laws aim to protect societal interests and public rights; however, their ultimate objective diverges, with traditional liability laws focusing on compensating damages to individuals or private property, while modern liability laws emphasize broader environmental protection.

The two legal fields also differ significantly in their methods of operation. For instance, when it comes to the scope of responsibility, the definition of "responsible party," and the factors justifying responsibility, the systems do not align. In countries where traditional civil liability rules are used to address environmental damages, such liability is often confined to specific activities, as determined by the legislature. This is evident in the German Environmental Liability Act (1990) and the Danish Environmental Damage Compensation Act (1994), which define the scope of responsibility to a limited range of activities.

In contrast, the modern system of environmental liability operates under the principle of pure responsibility, which applies regardless of the type of activity involved. In this system, the occurrence of environmental damage itself triggers the presumption of the polluter’s responsibility. The focus is on polluters being liable for the damage they cause, regardless of fault. This contrasts sharply with traditional liability, where fault or negligence is the core element determining responsibility. Moreover, traditional liability laws face challenges such as difficulties in proving causality, a lack of motivation for enforcement, and the complexities of quantifying damages, all of which make compensation more complicated. These limitations have led to the development of modern environmental liability laws that are better suited to the needs of the contemporary world.

Another crucial distinction between the two systems is their fundamental objectives. Traditional liability law is primarily focused on compensating for damage and restoring the original state of affairs. In contrast, the modern liability system, particularly in environmental law, places a greater emphasis on the prevention of damage before it occurs. This preventative approach is rooted in the precautionary principle, which aims to address potential environmental harm before it results in significant damage.

This shift reflects a broader societal and legal evolution in response to growing environmental concerns, where the emphasis is now placed not just on remediation after the fact, but on preventing harm from occurring in the first place. The shift from fault-based liability to a presumption of polluter liability and the focus on preventive measures highlights the changing nature of environmental responsibility in the modern world.

3.4. International law system

As the significance of environmental protection becomes increasingly apparent, it is clear that governments hold a collective responsibility to safeguard and preserve the environment, both within their own territories and beyond. This responsibility is further emphasized by the recognition of severe, ongoing environmental destruction as an international crime in several key global documents.

A notable example is the legal dispute between Australia and New Zealand against France over its atmospheric nuclear tests in the South Pacific. In this case, the court concluded that such activities have widespread implications that affect the global community, rather than merely the interests of the individual nations involved. This ruling underscores the reality that environmental harm can have far-reaching consequences, and thus, it is a matter of concern for all nations, not just those directly impacted (Smith, 2017, p. 204).

Paragraph 3 of Article 35 in the 1977 First Additional Protocol to the Geneva Convention and the Council of Europe's Convention on Environmental Crime both emphasize environmental protection from a criminal perspective. These legal instruments underscore the importance of treating environmental harm as a matter of public order, suggesting that the environment is a collective governmental responsibility. The International Law Commission's interpretation of Article 48 further reinforces this notion, asserting that collective obligations must be shared by governments to protect common interests, such as the environment or regional security. This collective responsibility highlights the interconnectedness of global environmental concerns and the need for cooperative action among states to address them (Bassiouni, 2001, p. 132).

This shift represents a move from a focus on sovereignty, where countries only commit to environmental protection if others do the same, to a broader sense of humanity. In this new paradigm, each country independently commits to protecting the environment for future generations. This transformation also reflects the evolution of human rights over time, which are often categorized into three generations:

- **First generation (civil and political rights):** These include fundamental liberties such as the right to life, freedom of expression, and the right to a fair trial. These rights are enshrined in the 1966 International Covenant on Civil and Political Rights.
- **Second generation (social, economic, and cultural rights):** These rights include the right to work, the right to an adequate standard of living, and the right to education, as articulated in the 1966 International Covenant on Economic, Social, and Cultural Rights.
- **Third generation (solidarity rights):** These rights concern collective well-being and extend beyond the individual to the community and society at large. One prominent example is the human right to a healthy environment.

The recognition of the environment as a fundamental human right, as reflected in documents like the Rio Declaration, underscores the growing significance of environmental protection. It marks the environment as a collective legal asset, one that is integral to the well-being of current and future generations, and highlights the shared responsibility of the global community to safeguard it (Lutz, 2007, p. 147).

4. Theories of Responsibility for Environmental Pollution

4.1. Theory of Fault and International Conventions

The theory of fault, which forms the foundation of civil liability worldwide, stipulates that environmental damage can only be claimed if fault can be attributed to the party responsible for the damage. This theory becomes particularly challenging to apply in environmental cases, especially in incidents like marine oil spills, where multiple pollution sources can complicate attributing fault. As a result, this approach has not been widely adopted in international conventions, meaning that environmental damages might go uncompensated unless specifically addressed within those frameworks.

4.2. Theory of Economic Loss and Oil Spills

The legal theory of economic loss and civil liability for property loss—irrespective of fault—can partially apply to marine oil pollution. However, oil spills in marine environments often do not result in direct economic damage to property, but instead lead to pollution of broader regional and international waters. The mere risk of an oil spill in open waters creates a liability under international treaties that often cannot be justified by domestic law, particularly the disposal rule.

4.2.1. Fault-Based and Risk-Based Responsibility

Liability can be imposed on a private entity even before an accident occurs, in which case the tort rule justifies compensation for potential property damage. Some argue that tort liability reflects the obligation of a government to compensate for damages resulting from its failure to meet international obligations to another state. These duties include both actions and omissions that contribute to rectifying deficiencies in environmental safeguards. According to the risk theory, liability for environmental pollution arises from actions that are not prohibited by international law, making a distinction between actions that involve fault versus those that result from legal but harmful activities.

4.3.New Theory of Responsibility: Preventative Duties

4.3.1. Traditional vs. New Theory

Traditional liability theory focuses on holding responsible parties accountable only after an accident or damage has occurred. In contrast, the new theory emphasizes the need for governments to take proactive and preventive measures before any environmental damage or pollution happens. This includes evaluating the potential environmental impacts of proposed activities and notifying potentially affected countries. Preventive duties under this new framework arise before damage occurs, establishing an early warning system and preemptive actions.

4.3.2. Proactive Environmental Protection

According to the new theory, governments should establish plans for activities that may have an environmental impact and communicate the potential risks to neighboring countries. This differs significantly from the traditional fault-based theory, which only triggers legal liability once damage has occurred, and the cause and causal connection are clearly identified.

4.4.Legislative Developments in Environmental Responsibility

4.4.1. European Parliament's Absolute Responsibility (2004)

In 2004, the European Parliament adopted a policy of absolute responsibility for environmental pollution, which was influenced by American liability laws. This shift led to pure liability for environmental pollution, a concept that was already in place in the United States for the release of hazardous substances into nature. Over time, pure liability evolved from holding employers accountable for risky activities to include strict liability for actions causing environmental harm. The U.S. Civil Liability Act of 1938 established the principle of strict liability for exceptionally dangerous acts, setting a precedent for future environmental legislation.In alignment with this approach, French environmental liability laws aim to compensate for violations of public environmental rights. The French law distinguishes the term "environment" from "civilian" and underscores the concept of "responsibility." The 2010 Act on the Protection of Navigable Seas and Rivers from Oil Spills classifies marine oil spills as intentional or unintentional, with provisions for imprisonment and compensation for intentional acts, alongside preventive measures for unintentional spills.

4.4.2.Strict Liability for Marine Oil Pollution

Under this legal framework, strict liability is imposed on polluters, meaning that even if external factors or events beyond the polluter's control contribute to the spill, they remain liable. This ensures that all involved parties are held accountable and makes it easier to assign responsibility. The foundations of maritime liability for oil spills, examined through international conventions, protocols, and declarations, highlight the growing acceptance of risk-based liability and the transition towards a more rigorous and preventative approach.

As reflected in both international and domestic laws, there is a significant shift toward stricter and more proactive approaches to environmental responsibility. The transition from fault-based to risk-based and absolute liability underscores a broader commitment to protecting the environment and emphasizes the need for polluters to bear the responsibility for their actions. This evolving trend aims not only to mitigate environmental damage but also to prevent it before it occurs, reflecting a growing global understanding of the importance of environmental protection.

Chapter Three: Shipping Insurance (Explanation of the issue in the law of the European Union and the United Kingdom)

Introduction

Shipping is the backbone of global trade, and the maritime industry plays a critical role in the transportation of goods across the world's oceans. However, with this essential service comes the risk of marine pollution, especially oil spills and other hazardous emissions. The consequences of such pollution are devastating for the marine ecosystem, coastal communities, and economies at large. To mitigate these risks, the shipping industry operates within a complex framework of regulations, and one of the most critical mechanisms to ensure accountability is shipping insurance. This insurance is designed to ensure that those responsible for pollution-related damage can compensate affected parties and cover the costs of environmental recovery.

In this chapter, we focus on the legal frameworks that govern shipping insurance with regard to marine pollution in two prominent legal regions: the European Union (EU) and the United Kingdom (UK). Both the EU and the UK are key players in the global shipping industry, and their legal systems significantly influence international maritime law. Through the exploration of the regulatory and legislative structures surrounding insurance requirements for shipowners and operators, we will compare and contrast how each jurisdiction addresses the issue of marine pollution liability and the role of shipping insurance.

The importance of examining the EU and UK legal frameworks lies in their impact not only within their respective regions but also on international shipping law. Both regions have developed intricate legal systems that aim to ensure that adequate insurance coverage is in place to address the damages caused by marine pollution. While the EU operates as a collective entity with harmonized regulations across member states, the UK, despite its exit from the EU, maintains its own set of robust maritime laws shaped by both domestic and international conventions.

One of the most significant similarities between the EU and the UK is their commitment to international conventions like the International Convention on Civil Liability for Oil Pollution Damage (CLC) and the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND). Both the EU and the UK have adopted and incorporated these conventions into their legal systems, requiring shipowners to obtain insurance that guarantees compensation for oil pollution damages. This ensures that the cost of environmental damage caused by oil spills is covered, and affected parties can receive timely compensation.

However, despite the common adherence to international conventions, there are notable differences in how the EU and the UK approach the issue of shipping insurance and marine pollution liability. The EU, as a supranational organization, has harmonized its legal requirements across all member states, implementing directives and regulations such as the Directive 2009/20/EC on the insurance of shipowners for maritime claims. This directive mandates that all ships operating within the EU must carry adequate insurance for oil pollution damages. The EU's regulatory framework aims to ensure that environmental protection is maintained across member states, preventing discrepancies in legal standards and ensuring that ships operating within EU waters meet uniform insurance requirements.

In contrast, the UK, while still maintaining strong ties to international conventions, operates its legal framework independently. The UK’s domestic laws, such as the Merchant Shipping Act 1995, impose similar insurance obligations on shipowners, but it has more flexibility in implementing and adapting its regulations. The UK has traditionally been a leader in maritime law, with a legal system deeply rooted in common law traditions, which sometimes leads to a more case-specific, flexible approach. The UK’s legal system also includes specific provisions for the establishment of industry-led organizations like Oil Spill Response Limited (OSRL), which plays a key role in responding to oil spills and ensuring compensation for affected parties.

One key difference between the EU and the UK is the approach to enforcement and monitoring. The EU has a more centralized system of enforcement, where member states are obligated to comply with EU directives and regulations, and the European Commission ensures that compliance is maintained. This centralized system allows for uniformity in the implementation of laws across EU member states, making the enforcement of shipping insurance requirements more consistent. In contrast, the UK’s regulatory framework, while robust, is more decentralized and can have variations in enforcement depending on the specific regulatory body or sector involved.

Another difference arises from the UK's post-Brexit status. While the UK continues to adhere to many of the international conventions and frameworks established before Brexit, it is no longer directly subject to EU regulations. This gives the UK greater flexibility to make adjustments to its own shipping insurance regulations in the future. For example, the UK can independently modify the scope of insurance requirements for shipowners and the level of compensation for marine pollution, something that the EU cannot do without broader consensus among its member states.

In summary, while both the EU and the UK share common commitments to protecting the environment through shipping insurance, their approaches differ in terms of regulatory frameworks, enforcement mechanisms, and flexibility in responding to the evolving needs of the maritime industry. The EU’s harmonized system provides uniformity across member states, while the UK’s independent system allows for greater autonomy and adaptability. Understanding the intricacies of these two legal systems is critical in assessing the effectiveness of shipping insurance in addressing marine pollution and ensuring that compensation is available for those affected by oil spills and other forms of environmental damage caused by shipping operations.

In the following sections of this chapter, we will explore these legal frameworks in greater detail, analyzing the specific provisions and requirements set out by the EU and the UK regarding shipping insurance and marine pollution. Through this examination, we will highlight the similarities, differences, and challenges faced by both regions in addressing the complex issue of marine pollution liability and the role of insurance in providing financial security for environmental protection.

1.Examining the obligations of the insurer and the insured in marine insurance in UK Law

The reason for selecting the legal system of the United Kingdom in the section on marine pollution in this thesis stems from my research opportunity at the Institute of International Shipping and Trade Law (IISTL). This opportunity not only significantly expanded my knowledge in the field of maritime law but also allowed me to gain practical insights into the approaches and experiences of the UK legal system, which is one of the most advanced in this area. The experience of being at IISTL and utilizing its resources and distinguished scholars inspired me to dedicate a portion of my thesis to examining the UK legal system. This system boasts advanced laws and effective judicial practices in preventing and compensating marine pollution, making it a model that can be emulated by other countries.

Marine insurance has played an essential role in global trade for centuries, particularly in England, which has long been a hub for international commerce. As one of the earliest forms of insurance, marine insurance was among the first concerns for merchants engaging in cross-border trade. Its significance can be traced back to the 1600s, a period during which London, with its growing maritime industry, saw the birth of some of the most foundational principles of modern insurance law.

From the outset, England's contribution to the evolution of marine insurance is remarkable, and it continues to hold a prominent place in both domestic and international legal frameworks today. While various types of insurance have emerged over time, marine insurance remains a cornerstone of English law. It is vital to recognize that Lloyd's of London, established in the late 1600s, played a pivotal role in shaping the marine insurance market. However, it was in the 1720s that Lloyd's truly solidified its position as a key market player, influencing the global insurance industry. Lloyd's, often misunderstood as a single company, is in fact a market where underwriters come together in syndicates to offer insurance coverage. This structure has allowed Lloyd's to operate as a dynamic and competitive marketplace.

The influence of Lloyd's in the marine insurance sector cannot be overstated. Lloyd's of London has transformed into a global institution, with the name "Lloyd's" synonymous with marine insurance and risk management. In November 2018, Lloyd's expanded its operations within the European Union by launching Lloyd's Europe, also known as Lloyd's Brussels. This move allowed Lloyd's to continue offering its services across Europe, ensuring that it adhered to regulatory requirements, particularly those stipulated by the National Bank of Belgium and the Financial Services and Markets Authority. This demonstrates how closely Lloyd's adapts to shifting regulatory landscapes, particularly as they relate to international operations.

However, it is important to consider that, despite the many advantages that sea transportation offers, it carries substantial inherent risks. These risks are varied and numerous, from natural hazards such as severe storms and lightning to more logistical dangers like running aground or shipwrecks. The prospect of encountering pirates or other security threats further adds to the risks associated with marine transport. In extreme cases, cargo may even need to be jettisoned to save the ship from imminent danger, which, while safeguarding the vessel, often results in damage to the cargo. These risks form the basis of the marine insurance market, which serves as a safety net for businesses engaged in maritime commerce.

The risks associated with marine transport highlight the importance of robust insurance mechanisms, and this is where English law and the broader framework within the European Union diverge. Under English law, marine insurance is primarily governed by the Marine Insurance Act 1906, which lays out the legal framework for insuring maritime vessels and cargo. This law places a significant emphasis on the concept of insurable interest, requiring that the insured party must have a financial stake in the goods or vessel being insured. The Act also codifies various principles, such as the duty of utmost good faith (uberrimae fidei), which mandates that both parties in a marine insurance contract disclose all relevant information truthfully.

In contrast, while the European Union shares many principles with English law, its approach to marine insurance has been shaped by different regulatory structures. The European Union's maritime insurance framework is primarily governed by regulations such as the Solvency II Directive, which establishes capital requirements and risk management standards for insurance companies operating within the EU. Furthermore, EU regulations take into account the broader context of environmental protection and sustainability, addressing issues like oil pollution and shipwrecks more comprehensively through conventions such as the International Convention on Civil Liability for Oil Pollution Damage (CLC) and the International Convention on the Prevention of Pollution from Ships (MARPOL). These regulations not only govern the commercial aspects of marine insurance but also the environmental responsibilities of ship owners and insurers.

The legal differences between English and European law regarding marine insurance are particularly evident in the treatment of liability and claims. Under English law, marine insurance contracts are often negotiated on a case-by-case basis, and the flexibility of the system allows for a more tailored approach to individual risks. In contrast, the EU's regulatory framework imposes stricter, more standardized rules on insurance providers, ensuring that they meet uniform requirements across member states. This is particularly important in the context of environmental protection, where the EU has introduced comprehensive regulations aimed at reducing marine pollution and mitigating the risks posed by shipping activities.

Despite these differences, there is a shared recognition of the crucial role that marine insurance plays in facilitating international trade and ensuring the financial stability of maritime industries. Both English law and EU regulations stress the importance of maintaining adequate insurance coverage for vessels and cargo, given the numerous and unpredictable risks associated with marine transport.

In conclusion, marine insurance in both the United Kingdom and the European Union has evolved over centuries to address the unique risks of maritime trade. While English law continues to emphasize flexibility and adaptability, the European Union offers a more regulated approach that incorporates environmental and social considerations. Both systems, however, share a common goal of protecting the interests of ship owners, cargo holders, and insurers in the face of the inherent dangers of sea transport. As international trade continues to expand and evolve, the role of marine insurance in safeguarding against these risks will remain essential.

The responsibilities of a ship owner extend far beyond those of a mere transport operator, particularly when they are directly involved in the transportation of goods. Even in situations where the ship owner is not the transport operator but instead a lessee of the vessel, the owner still holds a significant role in ensuring the safety and security of the ship and its cargo. Maritime transport, by its very nature, involves a range of unpredictable risks, including adverse weather conditions such as violent storms, which can endanger both the vessel and its cargo. In certain extreme situations, to preserve the safety of the ship and the remaining cargo, it may be necessary for part of the goods to be jettisoned into the sea. This act of throwing goods overboard is done with the goal of increasing the buoyancy of the vessel, thereby preventing the entire ship from sinking or capsizing.

At the conclusion of the voyage, the value of the lost goods is calculated, and the price of any salvaged property is determined. The owners of the remaining cargo are then required to participate in covering the damages, and this is done based on the proportional value of their respective contributions to the preservation of the ship and the cargo. This principle is known as the "General Average" principle, which is deeply embedded in maritime law. General Average dictates that in an emergency situation where part of the cargo or vessel must be sacrificed to preserve the entirety of the ship and its remaining cargo, all parties involved in the maritime operation must share in the resulting losses proportionally.

Shipping insurance plays a pivotal role in addressing the financial implications of this process. It provides a safety net for the owners of the cargo that has to be sacrificed to preserve the ship. In such cases, shipping insurance compensates for the loss of cargo that has been discarded in order to safeguard the vessel and the remaining goods. The principle of General Average is widely accepted in the shipping industry and underpins many of the contracts and insurance policies related to maritime transport.

As the shipping industry has evolved over time, so too have the risks associated with maritime transport. The rapid growth of global trade and the increasing complexity of the shipping sector have introduced new challenges and concerns for ship owners, cargo holders, and insurers. Historically, each country applied its own set of internal regulations concerning shipping and insurance. However, this lack of uniformity often led to disputes and legal conflicts, especially when goods and vessels crossed international borders. The need for standardized rules became apparent, and in 1860, an international conference was convened in Glasgow to address these issues. This conference resulted in the issuance of the Glasgow Resolution, which laid the groundwork for the international regulation of maritime insurance and shipping practices.

Building on the Glasgow Resolution, another significant conference was held four years later in York, England, in 1864. This gathering brought together key stakeholders, including ship owners, insurance companies, marine damage assessors, and legal experts. The conference led to the formulation and approval of the York Regulations, which aimed to standardize the approach to General Average and maritime claims. These regulations provided a more structured and coherent framework for determining the financial responsibilities of ship owners and cargo owners in situations where the General Average principle was invoked.

The York Regulations, along with the subsequent updates and amendments to maritime law, played a crucial role in shaping the modern legal framework for shipping insurance. Today, the principles outlined in these regulations continue to influence the way that insurance policies are structured and claims are handled in the event of maritime accidents or losses. However, as the shipping industry continues to expand and globalize, the need for further harmonization of international maritime law remains crucial. The evolution of shipping insurance and the legal framework surrounding it reflects the industry's ongoing efforts to address new risks and challenges while ensuring that all parties involved in maritime transport are protected and fairly compensated.

In the modern era, the regulatory framework governing shipping insurance is more robust and standardized than ever before. International conventions and agreements, such as the International Maritime Organization's (IMO) conventions on liability and compensation, as well as regional regulations in the European Union and the United Kingdom, have provided a more consistent and comprehensive approach to maritime law. These developments have helped to reduce the legal uncertainties that once plagued the shipping industry and have facilitated smoother operations in international trade.

Ultimately, the evolution of shipping insurance, with its focus on principles like General Average, reflects the maritime industry's adaptation to new risks and the growing need for international cooperation in regulating and managing these risks. By understanding the historical context and legal frameworks that have shaped the shipping industry, it becomes clear that the principles of shared responsibility and proportional liability remain at the core of maritime law today, ensuring that the interests of ship owners, cargo owners, and insurers are protected in the face of the unpredictable nature of sea transport.

1.1.The Evolution and Significance of General Average in Shipping Insurance

The duties of a ship owner go well beyond the simple role of a transport operator, especially when they are actively engaged in transporting goods. In some cases, the transport operator may be a lessee rather than the actual owner of the vessel, but the owner still holds responsibility for the safety of the ship and its cargo. Maritime transport inherently involves numerous risks, some of which can be extreme, such as violent storms or other natural phenomena that endanger both the ship and its cargo. In such situations, it might become necessary to throw part of the cargo overboard in order to increase the vessel's buoyancy and save the ship and its remaining cargo. This action is crucial when the safety of the ship and the rest of the cargo is at risk.

Once the journey concludes, the total value of the lost goods is determined, and the price of the remaining cargo that has been saved is calculated. The owners of the preserved cargo are then required to contribute to the compensation for the loss based on a proportional formula. This system is known as the "General Average" principle, a fundamental concept in maritime law that ensures that all parties involved in a maritime venture share the financial burden caused by the voluntary sacrifice of part of the ship or cargo. The goal is to preserve the whole, even at the cost of sacrificing some parts.

Shipping insurance plays a pivotal role in mitigating the financial losses that result from such sacrifices. In the case of a maritime disaster, shipping insurance compensates for the loss of cargo that is deliberately jettisoned in order to save the vessel and the remaining goods. General Average ensures that no single party bears the entire loss, and that everyone involved in the shipping operation shares the consequences proportionally.

Over time, the shipping industry has undergone significant changes, which have led to evolving risks and challenges. In the past, each country applied its own internal set of rules and regulations for shipping, which often led to disputes between different parties involved in international trade. Recognizing the need for a uniform framework to regulate maritime operations and the associated risks, an international conference was convened in Glasgow in 1860. The result was the issuance of the Glasgow Resolution, which established the need for standardized maritime insurance regulations.

Following this, in 1864, another pivotal conference took place in York, England, which brought together key stakeholders, including ship owners, insurers, marine damage assessors, and legal experts. This gathering culminated in the approval of the York Regulations, a set of guidelines that provided a clear framework for dealing with General Average claims and maritime losses. These regulations were designed to create a more standardized and efficient process for determining how the costs of maritime accidents and the losses from the sacrifice of cargo or vessel should be distributed among those involved.

The York Regulations played a crucial role in shaping the modern approach to shipping insurance. They provided a clearer and more standardized method for resolving disputes and ensuring that all parties were treated fairly in the event of a maritime accident. Today, the principles established by the Glasgow Resolution and the York Regulations continue to inform the structure of shipping insurance policies and the legal framework surrounding maritime transport.

The shipping industry, with its ever-increasing scale and complexity, continues to face new risks, and international law is constantly evolving to address these emerging challenges. The foundational principles of General Average and proportional responsibility remain essential in today's maritime industry, ensuring that both ship owners and cargo owners are protected from the unpredictable nature of sea transport. With the continuing global growth of shipping and trade, the need for international cooperation and a consistent legal framework has never been more important.

The evolution of shipping insurance and its principles demonstrates how the maritime industry has adapted to changing risks and has worked to create a more standardized, cooperative, and efficient regulatory environment. Today, the industry benefits from an international regulatory framework that supports a fair distribution of liability, ensuring that the responsibilities and costs of maritime operations are shared equitably among all parties involved. The ongoing developments in shipping insurance reflect the industry's focus on adapting to new risks and ensuring that both ship owners and cargo owners have the protection they need to navigate the increasingly complex world of global trade.

1.2.Legal Responsibility for Marine Pollution and the Role of the International Maritime Organization

The potential risks posed by maritime accidents, especially those involving oil tankers, highlight the need for careful and well-documented legal research and policy frameworks to address and mitigate the consequences of sea pollution. One of the key areas of concern is determining who is responsible for the damages caused by such incidents. Particularly in the case of oil spills, the legal ramifications can be complex, as they involve various jurisdictional issues depending on where the accident occurs and who is involved.

When an accident occurs within the territorial sea of a coastal state, the government of that state holds the primary responsibility for taking the necessary actions to manage the incident. Coastal governments have the authority to implement measures aimed at preventing and reducing the damage caused by sea pollution, provided they adhere to the principle of proportionality. This principle ensures that the actions taken are reasonable and not excessive in relation to the threat posed by the pollution incident. In such cases, the ship involved is no longer just in transit, and it becomes subject to the absolute sovereignty of the coastal state, allowing it to exercise its legal authority to address the environmental risks (IMO, 1969, p. 29).

However, when an incident occurs beyond the territorial sea, in the high seas or open water, the situation becomes more complicated. Coastal states do not have the same level of control or jurisdiction over incidents that occur beyond their territorial waters. This issue was brought into the spotlight during the case of the *Torrey Canyon* in 1967, where the British government took drastic action to intervene in an oil spill that had occurred in the open sea. In this case, the ship was outside British territorial waters, yet the British government ordered military action to contain the spill and mitigate its environmental impact. Although the intervention was effective in limiting the damage caused by the spill, it raised serious questions about the legitimacy of such actions and whether a coastal state has the legal right to intervene in incidents occurring outside its jurisdiction (Torrey Canyon, 1967, p. 102).

The *Torrey Canyon* case sparked international debate and led to significant developments in the legal framework surrounding marine pollution. At the time, international law regarding oil pollution and damages was underdeveloped, and most governments believed they had the right to intervene in cases where their coastlines were threatened, even if the incident took place in international waters. This belief in the right of states to intervene in such situations, regardless of territorial boundaries, highlighted a gap in the legal framework for dealing with marine pollution on the high seas (IMO, 1969, p. 35).

One of the critical issues that arose from these incidents was the ability to demand compensation for damages caused by oil pollution. Under the existing legal system, compensation could only be sought if the ship owner's negligence could be proven. This requirement posed significant challenges for claimants, as proving negligence in cases of marine pollution was often difficult due to the complex nature of such incidents and the number of parties involved (IMO, 1969, p. 38).

In response to these concerns and the growing need for a more structured approach to handling marine pollution, the International Maritime Organization (IMO) took the initiative to address the issue through international conventions. Following the *Torrey Canyon* incident and the subsequent international debate, the IMO organized a conference in Brussels in 1969 to draft a legal framework that would provide clarity on the issue of civil liability for oil pollution damages. The result of this conference was the establishment of the *Convention on Civil Liability for Oil Pollution Damages* (1969), which sought to create a comprehensive legal regime to address oil spills and other marine pollution incidents (IMO, 1969, p. 40).

The 1969 Convention introduced several important provisions designed to facilitate the compensation process and streamline the legal framework surrounding oil pollution. Under this convention, ship owners were held strictly liable for the damages caused by oil spills, regardless of whether negligence could be proven. This was a significant shift from previous legal practices, where negligence was a necessary component for liability to be established. The convention also established the creation of compensation funds to ensure that victims of marine oil pollution could be compensated even if the responsible party was unable to pay for the damages (IMO, 1969, p. 42).

However, there is a notable divergence between the approaches taken by the European Union and the United Kingdom when dealing with marine pollution and liability. Under EU law, environmental liability is governed by the *Environmental Liability Directive* (2004/35/EC), which sets out a framework for preventing and remedying environmental damage across all EU member states. This directive places greater emphasis on the prevention of environmental harm through risk-based assessments and requires polluters to take responsibility for the full cost of remedying damage (EU Directive, 2004, p. 15).

In contrast, the UK has historically followed a more traditional approach to liability, focusing primarily on fault-based principles and the compensation of damages post-incident. While UK law does align with many of the EU's environmental regulations, the UK's legal framework for marine pollution is more reliant on the individual claims process and judicial determinations of negligence, with less emphasis on preventative measures (UK Marine Pollution Act, 1986, p. 20). This distinction became especially apparent after the UK's exit from the EU, as the UK no longer adheres to EU laws and regulations, including those concerning environmental pollution.

Additionally, while both the UK and the EU have ratified the *International Convention on Civil Liability for Oil Pollution Damage (CLC)*, the European Union's member states are subject to uniform interpretations of this convention as part of EU law, ensuring a more harmonized approach to oil spill liabilities within the union. Conversely, the UK's post-Brexit regulatory autonomy allows for more flexibility in implementing its own version of such international conventions, which may lead to variations in enforcement and compliance practices (IMO, 1992, p. 72).

As marine pollution continues to be a significant concern for governments and international organizations, the legal framework established by the *Convention on Civil Liability for Oil Pollution Damages* has been further refined and expanded through subsequent protocols and amendments. The 1992 Protocol to the 1969 Convention introduced higher limits of liability and a broader scope of coverage for pollution damages, reflecting the increasing awareness of the risks posed by marine pollution and the need for more robust legal measures to address these risks (IMO, 1992, p. 80). The divergence in approaches between the UK and EU regulations also underscores the complexities of implementing and enforcing marine pollution laws in a globalized, post-Brexit world.

Today, the International Maritime Organization continues to play a critical role in the development and implementation of international conventions designed to address marine pollution and ensure that states, ship owners, and other stakeholders are held accountable for their actions. Through its ongoing work and collaboration with international governments, the IMO strives to minimize the environmental impact of shipping activities and ensure that adequate compensation is available for those affected by marine pollution incidents (IMO, 1992, p. 88).

In conclusion, while the EU and the UK share many similarities in their commitment to addressing marine pollution, their legal approaches diverge in significant ways, particularly in the scope of liability, the preventative measures required, and the mechanisms for enforcing compensation. As the global shipping industry continues to grow and maritime trade increases, the importance of maintaining a comprehensive and effective legal framework to manage the risks associated with marine pollution will only continue to rise. Therefore, ongoing research and collaboration among international stakeholders will be essential in ensuring that the legal system remains adaptable and effective in addressing the evolving challenges of marine pollution and environmental protection.

1.3.The Legal Framework for Oil Pollution Damage and the Role of International Conventions

The international legal framework governing marine pollution, particularly oil spills, addresses the critical issues of liability and compensation. Conventions such as the *1969 Convention on Civil Liability for Oil Pollution Damage* and the *International Convention on the Establishment of an International Oil Pollution Compensation Fund (1971)* have been established to mitigate the consequences of marine pollution, providing solutions for both prevention and victim compensation in the event of oil spills at sea. These conventions aim to ensure that parties responsible for pollution are held accountable and that victims can receive appropriate compensation, regardless of the complexities surrounding the incidents.

In general, international law in the context of marine pollution pursues two primary objectives: preventing pollution and facilitating the compensation process for victims. The legal provisions established through various international conventions and protocols are designed to address these issues in a systematic and effective manner. An essential aspect of these conventions is their role in promoting compliance with international standards by shipowners, especially with regard to the prevention of pollution. By establishing a clear liability framework and ensuring that shipowners are held accountable for any pollution caused by their vessels, these international legal instruments encourage a higher level of responsibility among ship operators (IMO, 1969, p. 45).

The issue of liability for marine pollution becomes particularly challenging when it comes to determining who is responsible for compensating victims. In many cases, victims face substantial difficulties in proving a direct connection between the pollution and the damage caused. Establishing such a causal link is often complex, especially in cases where the damage occurs in international waters, and the responsible party is difficult to identify. Additionally, the necessity of proving negligence, a key element in most legal systems for claiming damages, can further complicate the process for victims. In cases involving foreign ship owners, victims may also encounter legal challenges, as domestic courts may lack jurisdiction over foreign nationals, making it even more difficult to seek justice. Even if jurisdiction is established, the enforcement of any judgment or compensation award may be problematic, particularly if the shipowner is unable or unwilling to pay for the damages (IMO, 1969, p. 47).

One of the key contributions of the *1969 Civil Liability Convention* and the *1971 Oil Pollution Compensation Fund Convention* is their approach to addressing these challenges. These conventions ensure that victims of oil pollution can seek compensation from a clearly defined party—the ship owner or their insurer. The *Civil Liability Convention* establishes that the shipowner is fully responsible for compensating damages and covering the costs associated with preventive actions, except in certain circumstances. These exceptions include damages caused by war, natural disasters, accidents due to third-party negligence, or the negligence of officials managing maritime signals. In these specific cases, the shipowner is not held liable for the damages caused (IMO, 1969, p. 51).

For many legal systems, the requirement to prove negligence in order to seek compensation for damages can be a major hurdle. However, under the framework provided by these international conventions, shipowners are held strictly liable for the damages caused by oil pollution, without the need for the claimant to prove negligence. This strict liability principle simplifies the claims process, ensuring that victims can seek compensation more easily, regardless of the complexities of proving fault. Additionally, by establishing the shipowner as the party responsible for compensation, these conventions provide clarity in the aftermath of marine pollution incidents, reducing uncertainty for victims and legal practitioners alike (IMO, 1969, p. 53).

Another key advantage of the conventions is the establishment of the *International Oil Pollution Compensation Fund* (IOPC Fund), created by the *1971 Convention*. The IOPC Fund serves as a supplementary source of compensation in cases where the shipowner's insurance is insufficient to cover the full extent of the damages. This system is especially important when dealing with large-scale pollution incidents, where the cost of damages may exceed the financial capacity of the shipowner. In such cases, the IOPC Fund can step in to provide additional compensation to the affected parties, ensuring that victims receive adequate compensation for their losses (IMO, 1971, p. 62). The fund's existence ensures that compensation is available even in cases where the liable shipowner is financially incapable of meeting the full demands.

While these conventions provide an essential framework for addressing oil pollution, there remain challenges in the global implementation and enforcement of these provisions. For instance, despite the establishment of international liability rules, the legal and practical enforcement of compensation claims can vary significantly between jurisdictions. In some cases, national laws and the willingness of governments to enforce international obligations may affect the outcome of compensation claims. Additionally, as more countries become involved in international shipping and marine trade, the implementation of these conventions must be adapted to account for varying domestic legal systems and enforcement capabilities (IMO, 1969, p. 70).

In the European Union, these international conventions have been incorporated into EU law through regulations such as the *EU Environmental Liability Directive* (2004/35/EC), which imposes liability on operators of activities that pose a risk to the environment. This directive ensures that operators—whether shipowners or other entities—are financially responsible for preventing environmental damage and for compensating victims in the event of pollution (EU Directive, 2004, p. 12). Under EU law, there is also an emphasis on preventative measures, requiring operators to take necessary actions to minimize environmental harm before it occurs.

In contrast, UK law, which previously aligned with EU regulations, now operates independently following Brexit. Although the UK continues to honor its international obligations under the *Civil Liability Convention* and the *IOPC Fund Convention*, it is no longer bound by EU-specific regulations such as the *Environmental Liability Directive*. This divergence creates a situation in which the UK has more flexibility in how it applies and enforces marine pollution laws. However, this flexibility could also lead to inconsistencies in how compensation claims are handled between the UK and EU member states, potentially complicating the legal landscape for victims of marine pollution (UK Marine Pollution Act, 1986, p. 21).

In conclusion, the legal framework established by international conventions such as the *1969 Civil Liability Convention* and the *1971 IOPC Fund Convention* provides a comprehensive and effective solution to the issue of marine oil pollution. These conventions address both the prevention of pollution and the compensation of victims, creating a clear liability structure for shipowners and insurers. However, challenges remain in the global enforcement and adaptation of these conventions to national legal systems, particularly in light of the differences between the EU and UK approaches. As the global shipping industry continues to expand, the importance of ensuring that adequate legal frameworks are in place to manage and mitigate the risks associated with marine pollution will only continue to grow.

2.The Establishment of the International Oil Pollution Compensation Fund (IOPC Fund)

Following the pivotal 1969 conference, which resulted in the creation of two key conventions—the *Convention on Civil Liability for Oil Pollution Damage* and the *Convention on Intervention in the Open Sea in Cases of Oil Pollution Incidents*—there was an identified need to strengthen the compensation mechanisms for oil pollution incidents. Specifically, there were scenarios where the *Civil Liability Convention* was unable to provide adequate compensation, or shipowners responsible for oil pollution were financially unable to meet their obligations. This gap in the system led to the creation of the *International Oil Pollution Compensation Fund (IOPC Fund)* in 1971, which was designed to address these shortcomings and provide additional compensation in cases where shipowners could not fully compensate the victims of oil pollution damage.

The *IOPC Fund* works in conjunction with the *Civil Liability Convention* to fill in the gaps where the latter may fall short. According to the *IOPC Fund Convention*, the fund steps in to provide compensation in the following situations:

- If the shipowner is exempt from responsibility due to one of the exclusions listed in Articles 1 and 2 of the *Civil Liability Convention* (such as damage caused by war or natural disasters).
- If the shipowner is financially unable to pay compensation for damages.
- If the damage caused exceeds the maximum compensation limits set by the *Civil Liability Convention*.

In these cases, the *IOPC Fund* provides compensation to the victims of oil pollution, ensuring that they are compensated even when the shipowner cannot meet the full financial responsibility. However, the Fund has its own exclusions, which include scenarios where the damage is caused by war or chaos or where the claimant cannot establish a clear connection between the accident and the ship responsible for the pollution (IMO, 1971, p. 53).

The amount of compensation available from the Fund is substantial, with a maximum payout of 675 million gold francs, a figure that can be increased to 900 million francs through a vote by the Fund's governing council, which requires a 75% majority. This substantial amount aims to cover the significant financial costs associated with large-scale oil pollution incidents. Additionally, the *Supplementary Protocol* of 1976 introduced a provision that would change the compensation amount to 30 million Special Drawing Rights (SDR). Although this protocol has yet to be implemented, it signifies an effort to modernize and enhance the compensation structure in response to the changing nature of global maritime trade and oil transportation (IMO, 1976, p. 71).

One of the significant features of the *IOPC Fund Convention* is its ability to alleviate some of the financial burdens on shipowners who are found liable under the *Civil Liability Convention*. Under the *IOPC Fund*, the shipowner's liability is capped at 1,500 gold francs per ton or 125 million francs, whichever is lower. If the damages exceed this amount, the *IOPC Fund* covers the difference, providing a financial safety net for shipowners who would otherwise be overwhelmed by the full liability for oil pollution damage (IMO, 1971, p. 55). This measure ensures that shipowners can remain financially viable even when they are held responsible for significant environmental damage.

The *IOPC Fund* also provides important financial support for the prevention of oil pollution incidents and for response actions taken following accidents. The Fund is primarily financed by oil companies and major industrial organizations that import oil, creating a pool of funds that can be quickly mobilized in the event of an oil spill. This system helps ensure that financial resources are readily available for effective pollution response, minimizing the impact of oil spills on the environment and local communities.

One key aspect of the *IOPC Fund* is its complementary nature to the *Civil Liability Convention*. Only those states that are members of the *Civil Liability Convention* are eligible to participate in the *IOPC Fund*. This ensures that the compensation mechanism operates within a coherent legal framework, with a clear relationship between the liability of shipowners and the financial support provided by the Fund. As such, the *IOPC Fund* plays a vital role in ensuring the effectiveness of the international legal framework for oil pollution damage compensation, enabling victims to receive compensation even when the responsible party is unable to pay or when the amount of damages exceeds the established limits.

Importantly, the *IOPC Fund* also imposes restrictions on the types of incidents that it will cover. If the oil pollution is the result of deliberate misconduct or negligence by the shipowner, such as failure to observe safety regulations or intentional pollution, the Fund will not provide compensation. This clause ensures that shipowners who intentionally or recklessly cause environmental damage are not able to benefit from the financial protections offered by the Fund, and it reinforces the principle of accountability in international maritime law (IMO, 1971, p. 58).

The Fund’s headquarters are located in London, and its operations are overseen by a governing council composed of representatives from the member states. This structure ensures that the Fund operates in a transparent and effective manner, with decisions made by a body that represents the interests of the states participating in the international maritime framework.

The establishment of the *IOPC Fund* was a major step forward in addressing the issue of oil pollution in international waters, ensuring that victims of pollution could receive compensation in cases where the shipowner was either exempt from liability or financially incapable of providing the necessary compensation. However, despite its many benefits, the Fund's existence highlights the complexities of the international maritime legal system, particularly when it comes to addressing the financial and environmental challenges posed by oil pollution.

2.1.Differences Between UK and EU Approaches

In the context of both the *Civil Liability Convention* and the *IOPC Fund*, there are important distinctions between the approaches of the United Kingdom (post-Brexit) and the European Union. Both entities remain signatories to the key international conventions regarding oil pollution, but their domestic legal frameworks have diverged since Brexit. The EU continues to enforce the *Environmental Liability Directive* (2004/35/EC), which establishes a wider framework for liability in environmental damage cases, including oil pollution. This directive complements international conventions by imposing additional obligations on EU member states regarding pollution prevention and compensation (EU Directive, 2004, p. 13).

In contrast, the UK, no longer bound by EU law, operates under a national framework that incorporates the principles of the *Civil Liability Convention* and the *IOPC Fund Convention* but is not required to adhere to the EU-specific regulations on environmental liability. This divergence may result in differences in the legal processes for claiming compensation, the scope of liability, and the approach to environmental protection between the UK and EU member states (UK Marine Pollution Act, 1986, p. 22).

2.2.Private plans to provide damages caused by oil pollution

Private plans for providing compensation for damages caused by oil pollution represent an important complement to the public liability frameworks established by international conventions. These private agreements are designed to supplement the financial resources available to victims of oil pollution incidents and to mitigate the financial burden on shipowners. These plans primarily include voluntary contracts, where stakeholders in the shipping and oil industries, such as shipowners, voluntarily join together to provide additional funds for compensation beyond the scope of the 1992 Civil Liability Convention (CLC) and the International Oil Pollution Compensation Fund (IOPCF).

Among the most notable of these private compensation mechanisms are the STOPIA and TOPIA contracts. Established in 2006, both agreements were created with the aim of addressing the needs of oil tankers involved in oil pollution incidents and serve as supplementary funds to the existing international conventions. STOPIA, or the Small Tanker Oil Pollution Indemnification Agreement, provides coverage for smaller tankers. Under this agreement, the shipowner’s liability is limited to 20 million Special Drawing Rights (SDR), and the 1992 Fund compensates for any damages exceeding this limit. Specifically, STOPIA applies to tankers with a gross tonnage of 29,548 or less that are members of a Protection and Indemnity (P&I) Club, which is a member of the International Group. In contrast, TOPIA, the Tanker Oil Pollution Indemnification Agreement, provides a broader framework. It obliges tanker owners to indemnify the Supplementary Fund for 50% of the compensation paid for pollution incidents involving tankers entered under the agreement, regardless of the tanker’s size. Both agreements reflect a voluntary commitment by shipowners to provide greater financial protection against the impacts of oil pollution and to ensure that victims are adequately compensated.

Another significant voluntary contract in this area is the TOVALOP contract, which stands for the Tanker Owners Voluntary Agreement concerning Liability for Oil Pollution. TOVALOP was first established in 1969 as a proactive measure by tanker owners to address the issue of oil pollution damages. The agreement was designed to offer interim compensation for oil pollution incidents, providing coverage for risks not yet addressed by international conventions at the time. For example, it covered oil spills from tankers in ballast, as well as "pure threat situations" where preventive measures were taken to avoid spills even if no actual pollution occurred. This contract applied to virtually all tankers and sought to fill the gaps left by the international legal frameworks before they had gained worldwide applicability. In

1987, TOVALOP was revised to provide higher compensation limits than the original version, and its duration was extended for five more years. The associated CRISTAL scheme, funded by cargo owners, covered between 80% and 90% of the cargoes of oil transported by sea. However, following the widespread ratification of the 1992 CLC and the 1992 Fund Convention, TOVALOP was eventually terminated in 1997. This marked the transition to the more formalized and globally accepted legal structure provided by the international conventions.

These voluntary agreements reflect a commitment within the shipping industry to address the challenges posed by oil pollution while ensuring that victims of such incidents are compensated in a timely and effective manner. Although international conventions have provided a robust legal framework, the inclusion of private plans like STOPIA, TOPIA, and TOVALOP offers additional layers of protection, particularly when shipowners or insurers are unable to fully cover the costs of pollution damages.

2.3.Liability of shipowners

Under English maritime law, the liability of shipowners is clearly defined, establishing responsibilities related to the voyage, port operations, and ensuring safety. The shipowner is primarily responsible for ensuring that the ship arrives at the designated port or, in the absence of such specification, the usual place of loading. This responsibility extends to informing the charterer about the readiness of the ship for loading, particularly if the ship is leased. In the event that the agreed anchorage is announced to the shipowner, they cannot unilaterally change it. If the ship must remain in the same location due to weather conditions, the shipowner is responsible for the costs of hiring tugboats to keep the vessel at the anchorage.

Moreover, if the shipowner fails to inform the lessee about the ship's readiness, resulting in a delay, the lessee cannot be held responsible. This is because the lessee is not obligated to search for the ship. English maritime law takes a detailed approach to timing when it comes to insurance contracts. Specifically, under Section 1 of Article 42 of the Marine Insurance Act of England, it is crucial that the insured voyage begins within a reasonable period of time after the insurance contract is entered into. Any delay in the voyage or any change in the risk may enable the insurer to terminate the contract, relieving them of further responsibility.

Liability extends beyond the ship's operation to encompass damages caused to other ships, cargo, human lives, or port facilities due to the shipowner's negligence. This includes the actions of the crew and captain, who are also considered agents of the shipowner. One of the key areas of shipowner liability in maritime law is the issue of ship collisions. This encompasses collisions with other vessels, floating structures like navigational aids (such as lighthouses), and even non-floating properties. In the context of maritime law, the term "collision" specifically refers to the physical contact between two ships.

The fundamental differences between English maritime law and EU maritime law lie primarily in the implementation and enforcement of legal obligations and liabilities in international maritime incidents.

Under English law, the liability of shipowners for damages caused by their vessels, including the duty to prevent risks such as collisions, is based on a combination of common law principles and statutory provisions, such as the Marine Insurance Act of 1906. The focus is on ensuring the shipowner's accountability for negligent actions, and compensation for damages often depends on proving negligence or breach of contract. For example, the failure to provide proper notice to the charterer about the ship's readiness can lead to disputes, but the burden of proof falls on the lessee in these cases.

On the other hand, EU law emphasizes the harmonization of maritime regulations across member states, aiming for uniformity and consistency within the internal market. As a result, EU regulations governing maritime liability are more codified and prescriptive. For example, the EU follows the International Maritime Organization's (IMO) conventions, like the Civil Liability Convention and the International Oil Pollution Compensation Fund (IOPCF), which provide clear guidelines on shipowner liabilities for oil pollution and other environmental damages. Moreover, under EU law, liabilities are often more rigidly defined, and there are more stringent requirements for insurance and compensation mechanisms in cases of marine accidents.

While both English and EU laws require shipowners to take responsibility for their vessels and any damages they cause, EU law provides a broader, unified approach, incorporating various conventions and EU-wide standards that shipowners must adhere to. In comparison, English law allows for more flexibility, particularly in terms of maritime contracts and the specifics of insurance arrangements.

3.PRINCIPLES OF ENGLISH MARINE INSURANCE UNDER THE MARINE INSURANCE ACT 1906

The principles governing marine insurance in English law are primarily set out in the Marine Insurance Act of 1906, which provides the legal framework for marine insurance contracts and sets out the duties and obligations of the parties involved. One of the most fundamental principles is the duty of utmost good faith, as outlined in Section 17 of the Act. This principle mandates that both the insurer and the insured must act honestly and disclose all material facts related to the risk being insured. The duty is reciprocal, meaning both parties have an obligation to act in good faith, but it is typically more relevant to the insured, who is usually in a better position to know the full extent of the risks associated with the subject matter of the insurance.

Failure to observe the principle of utmost good faith can have serious consequences. If one party fails to disclose material facts, the other party may avoid the contract, which is treated as if the contract had never been concluded. This right to avoid the contract is a key aspect of English marine insurance law and reflects the importance of full and transparent disclosure in ensuring that both parties understand the risks involved. For the insured, this means that they are obligated to provide the insurer with all material information before the contract is finalized. Such a requirement acknowledges the asymmetry of information between the insurer and the insured, as the insured is often more familiar with the specifics of the subject matter being insured.

However, there are exceptions to the duty of disclosure. Under the Marine Insurance Act, the insured is not required to disclose certain circumstances. These include cases where the information reduces the risk for the insurer, when the insurer already knows or should know the information, when the insurer waives the obligation to disclose, or when the information is irrelevant due to an express or implied warranty in the contract. These exceptions help to balance the obligations of the insured and the insurer, ensuring that the duty to disclose is not unduly burdensome for the insured.

Section 20 of the Marine Insurance Act further elaborates on the importance of truthful representations in the contract negotiation process. According to this section, any material representation made by the insured or their agent to the insurer must be accurate. If the representation is untrue, the insurer has the right to avoid the contract. A representation is considered material if it would influence the decision of a prudent insurer in determining the premium or deciding whether to take on the risk. Misrepresentations, whether fraudulent, negligent, or innocent, can lead to the rescission of the contract. In addition to misrepresentation, non-disclosure of material facts also allows the insurer to avoid the policy. If the insured fails to disclose a material circumstance that they are aware of, this is considered a breach of the duty of utmost good faith, and the insurer may seek to void the contract before it comes into effect.

These principles highlight the importance of honesty, transparency, and mutual trust in marine insurance contracts. The Marine Insurance Act of 1906 establishes clear expectations for both parties, ensuring that the risks are adequately assessed and that the insurance contract is fair and enforceable. Failure to adhere to these principles can lead to serious consequences, including the voiding of the contract and the inability to seek compensation for the insured risk. Thus, understanding and following the requirements of the Marine Insurance Act is crucial for both insurers and insured parties in the maritime industry.

3.1.THE INSURANCE ACT 2015

The Insurance Act 2015 is a significant piece of legislation that marks a major shift in the way insurance contracts are governed in the UK. It followed extensive consultations by the Law Commission and the Scottish Law Commission, which reviewed the law governing insurance contracts and identified areas that required reform. One of the key drivers behind the reforms was the desire to modernize insurance law, particularly in the context of marine insurance, and to bring UK practices more in line with international standards.

The process leading to the introduction of the Insurance Act 2015 began in 2006 when the Law Commission and the Scottish Law Commission conducted a comprehensive review of insurance contract law. This review included soliciting feedback on which aspects of the law were outdated or in need of change. Following these consultations, the Consumer Insurance (Disclosure and Representations) Bill was introduced to the House of Lords in 2011 and became law in 2012, addressing consumer insurance contracts. The next step in the reform process was the creation of a second Bill that would cover non-consumer insurance contracts, warranties, damages for late payment of claims, and insurers' remedies in cases of fraud.

The Insurance Act 2015, which received Royal Assent in February 2015 and came into effect in August 2016, was the culmination of these efforts. It addressed the legal framework surrounding insurance contracts in a number of important ways, with a focus on improving fairness, transparency, and efficiency in insurance transactions. Among the most significant changes introduced by the Insurance Act 2015 were reforms in the areas of disclosure, misrepresentation, and warranties, all of which had long been a point of contention in the insurance industry.

One of the most notable changes in the Insurance Act 2015 was the modification of the duty of disclosure for the insured. Under the previous legal framework, the insured had a duty to disclose all material facts, even those that the insurer may already know or should have known. This placed a heavy burden on the insured, who often had to disclose information that was already in the possession of the insurer. The Insurance Act 2015 addressed this by limiting the duty of disclosure, requiring the insured to disclose only those facts that are material and relevant to the insurer's assessment of the risk. This shift aims to create a more balanced and equitable relationship between insurers and insured parties.

The Insurance Act 2015 also introduced important changes regarding misrepresentation, particularly in relation to how misrepresentations affect the validity of an insurance contract. The previous laws allowed insurers to void contracts based on even minor misrepresentations, which was seen as unfair to policyholders. Under the new law, the consequences of misrepresentation depend on the nature of the misrepresentation—whether it was deliberate, reckless, or innocent—and the insurer's ability to demonstrate that the misrepresentation materially affected the risk they were insuring. This approach aims to make the process more reasonable and fair to both parties involved in the contract.

In addition to changes regarding disclosure and misrepresentation, the Insurance Act 2015 also made significant reforms in the area of warranties. Under the previous law, if a warranty was breached, the insurer had the right to void the policy, even if the breach was not related to the loss or damage. The new law introduced a more nuanced approach, stating that if a warranty is breached, the insurer's liability is suspended but not automatically terminated, and the insured has the opportunity to remedy the breach. This reform was designed to make insurance contracts more practical and less harsh in cases of technical breaches.

The Insurance Act 2015 represents a modernizing step for UK insurance law, particularly in the context of marine insurance. The law was introduced with the goal of aligning UK practices with those of other jurisdictions, while also promoting fairness and transparency within the insurance market. By reforming key areas such as disclosure, misrepresentation, and warranties, the Insurance Act 2015 aims to create a more balanced legal framework that benefits both insurers and policyholders.

3.3.Amendment to the Third Parties (Rights Against Insurers) Act 2010

In the realm of maritime insurance and indemnity, there are significant differences between English law and EU law, particularly in the treatment of indemnity agreements, the duty of disclosure, and the rights of third parties. These differences primarily arise from the distinct legal frameworks that each system operates under and the diverse approaches they adopt to address issues such as shipowner liability, insurance coverage, and the compensation of victims.

Under **English law**, the Marine Insurance Act of 1906 establishes the principle of utmost good faith, or *uberrimae fidei*, which is a cornerstone of all marine insurance contracts. This principle obliges both parties—the insured and the insurer—to disclose all material facts related to the subject matter being insured. Failure to comply with this duty of disclosure can lead to the avoidance of the insurance contract, potentially nullifying the insurance coverage. The insured party, who is usually better informed about the condition and circumstances of the ship or cargo, bears the responsibility to disclose any material information, thus ensuring that the insurer can properly assess the risk.

The **Insurance Act 2015**, which came into effect in 2016, introduced reforms to marine insurance law, including changes in the areas of disclosure, misrepresentation, and the handling of warranties. These reforms modernized the insurance law in England, aligning it more closely with practices in other jurisdictions. Notably, the Act altered the duty of disclosure by reducing the burden on insured parties, making the process more equitable and less rigid. Furthermore, the **Third Parties (Rights Against Insurers) Act 2010** enhanced the ability of third parties to claim compensation directly from an insurer when the insured party is insolvent. This legal shift has simplified the process for third parties seeking redress, enabling them to bypass the need to first engage with the insolvent insured party.

In contrast, **EU law** operates within a more harmonized framework shaped by a combination of international conventions, EU regulations, and member state laws. The EU's approach to maritime liability and compensation often aligns with international agreements such as the **1992 Civil Liability Convention (CLC)** and the **1992 Fund Convention**, which collectively ensure that victims of marine oil pollution can claim compensation from both shipowners and international compensation funds. These conventions establish clear liability and compensation procedures, with EU member states obligated to adhere to these principles.

Unlike English law, which largely operates under the common law system, EU law tends to favor more standardized and collective solutions, especially in the context of shipowner liability and third-party claims. For example, EU member states are bound by the CLC and Fund Conventions, which mandate compensation schemes for victims of oil pollution, regardless of whether the liable shipowner is able to pay. Additionally, the **EU's Insurance Distribution Directive** (IDD) and the **European Court of Justice's** interpretations often guide how insurers operate across EU jurisdictions, creating a more uniform approach to disclosure, claims handling, and indemnity agreements.

One of the main differences between English and EU law in this area is the degree of flexibility in indemnity agreements and shipowner liability. **English law** tends to be more adaptable, with indemnity agreements like **STOPIA (Small Tanker Oil Pollution Indemnification Agreement)** and **TOPIA (Tanker Oil Pollution Indemnification Agreement)** playing a more prominent role in supplementing the compensation available under the 1992 CLC and Fund Conventions. These voluntary agreements allow shipowners to limit their liability and provide additional compensation in cases of oil pollution incidents.

On the other hand, the **EU legal system** generally places greater emphasis on collective compensation schemes and standardized liability limits, as seen in the compensation schemes under the 1992 CLC and Fund Conventions. This creates a more predictable and structured framework for addressing marine pollution and shipowner liability.

In conclusion, the key differences between **English law** and **EU law** in the maritime insurance context can be summarized as follows:

1. **Flexibility and Adaptability**: English law allows for more flexible indemnity agreements and voluntary schemes like STOPIA and TOPIA, whereas EU law tends to rely on more rigid and collective compensation systems under the CLC and Fund Conventions.
2. **Duty of Disclosure and Good Faith**: English law places a significant emphasis on the duty of utmost good faith, requiring the insured to disclose all material facts, while EU law, while still enforcing disclosure requirements, tends to focus more on harmonization and collective rights under EU regulations and conventions.
3. **Rights of Third Parties**: Under English law, third parties have direct rights under the Third Parties (Rights Against Insurers) Act 2010 to claim from the insurer in cases of insolvency, whereas EU law generally relies on the collective frameworks established by international conventions to provide compensation to victims of marine pollution.

These differences highlight the contrasting approaches of **English law** and **EU law** to maritime insurance and indemnity, with English law focusing on flexibility and individual agreements, and EU law prioritizing standardized and collective solutions within a broader international framework.

4.The concept of an undertaking to compensate for damages

The concept of an undertaking to compensate damages, often referred to as a letter of undertaking, is a legal instrument used in international trade, especially in the shipping industry. It has a number of definitions and applications, each highlighting different aspects of its role in mitigating financial risk. One of the most common definitions is that the letter of undertaking is a document used by the signatory to protect the shipping operator or the lessor of the ship against potential damages arising from the delivery of goods without the presentation of a bill of lading. This bill is a key document in international trade that proves the shipment of goods and establishes the terms of the contract.

Another definition centers around the idea that a letter of undertaking is used as a financial safeguard for the carrier or the ship owner. In this context, it serves to protect them from the financial consequences that might arise if goods are cleared without presenting the original bill of lading. The carrier or owner is thus assured of compensation for any potential loss or damage that could occur under such circumstances.

Further, a more specific definition of a letter of undertaking describes it as a document that authorizes the release of goods at the destination, even when the original bill of lading is not available. This document must be endorsed by the bank involved in the transaction and will not be accepted at the destination port without the carrier's approval. The primary purpose of this document is to ensure that goods are delivered in accordance with the terms agreed upon, even in the absence of the standard shipping documentation.

However, these definitions, while useful, do not encompass all the potential uses of the letter of undertaking. As we will explore further, this document has a broader range of applications. Some legal scholars offer a more comprehensive definition, viewing the letter of undertaking as a general guarantee against financial loss. Under this interpretation, it acts as a protection mechanism for the person for whom it was issued, essentially ensuring that they will not suffer any financial loss due to circumstances covered by the document.

The nature of the letter of undertaking can vary depending on the party using it. For example, in some cases, the sender or receiver of goods may be the party benefiting from the document, while in others, the shipping operator or the bank may be the beneficiary. This flexibility makes it a useful tool for a range of stakeholders in the shipping and logistics industries, as it provides assurance against the financial impact of unexpected events or risks.

Overall, while the definitions provided highlight some of the specific uses of a letter of undertaking, they do not fully capture its broader role as a protective financial instrument in international shipping transactions. It functions as a form of liability protection, ensuring that stakeholders can mitigate the risk of financial loss, particularly in situations where goods are cleared or delivered without the necessary documentation.

It is important to note that, while widely recognized in international trade, the use of letters of undertaking can differ from one jurisdiction to another, with varying legal requirements and implications. Therefore, it is crucial for all parties involved to fully understand the specific terms and conditions associated with this document, as its application can significantly impact the outcomes of disputes and claims.

4.2.The nature of the commitment letter for compensation

Indemnity letters are a unique financial instrument in the realm of international trade and shipping. Unlike traditional bank guarantees, indemnity letters do not involve the bank issuing a compensation document on behalf of the claimant or obligor. Rather, the issuer of the indemnity letter guarantees that, in the event the obligee fails to fulfill their obligations, they will compensate any resulting damages to third parties. This distinction is crucial because it reflects the fundamental nature of indemnity letters as agreements between the issuer and the beneficiary, with a focus on compensating losses that arise due to non-fulfillment of a primary obligation.

Indemnity letters operate differently from bank guarantees in practice. A bank guarantee often involves a straightforward claim by a creditor against the bank to fulfill a financial obligation, while an indemnity letter, by contrast, focuses on ensuring that a third party is protected from the financial consequences of another party's failure to comply with an obligation. As a result, indemnity letters have a distinct nature, rooted in a contractual relationship between the issuer and the beneficiary (third party), which takes effect only once an agreement is reached between the parties involved. This ensures that the indemnification is not automatic and requires the participation and agreement of the obligee.

From a legal perspective, indemnity letters are classified as a form of compensation guarantee contract in common law jurisdictions, such as English and Chinese law. They are sometimes compared to insurance contracts due to their protective nature, as the issuer promises to compensate for potential damages to the beneficiary. However, indemnity bonds differ significantly from insurance contracts. Insurance is typically issued by a licensed insurance company, which operates as a business specializing in risk management and is regulated by government authorities. The insurer’s role is to provide coverage for a variety of risks, collecting premiums in exchange for the assumption of potential liabilities.

In contrast, indemnity bonds are not typically issued by insurance companies and are not governed by insurance regulations. The issuer of an indemnity bond does not operate within the insurance industry, and the bond is often issued to facilitate the objectives of a specific contract, such as the delivery of goods or performance of services. This makes indemnity letters a more flexible tool for specific commercial transactions, as they do not require the formalities and regulatory oversight associated with insurance contracts.

Another key difference between indemnity bonds and insurance contracts lies in the coverage of liability. While insurance contracts generally exclude liability for intentional fault (as insurers are not responsible for damages resulting from willful misconduct), indemnity bonds may specifically cover instances where intentional fault occurs. For example, in maritime shipping, if a carrier intentionally fails to provide a bill of lading, delivers goods without proper documentation, or changes the destination of goods without consent, the indemnity bond can be triggered to compensate for the resulting damages. This provision allows indemnity letters to address specific risks in commercial contracts that insurance may not cover.

In summary, indemnity letters and bank guarantees serve different purposes within the financial and commercial world, with indemnity letters offering a more targeted solution for compensating damages in cases of non-fulfillment of obligations. They are legally distinct from insurance contracts, operating on a different regulatory framework and serving more specific purposes related to contract performance and delivery. Furthermore, the intentional misconduct of the obligee can activate the indemnity bond, which would not be the case under traditional insurance policies.

The principle behind a Letter of Indemnity (LOI), which serves as a promise to compensate for potential losses, shares significant similarities with the concept of a Bill of Lading. The issuance of such a letter is often tied to errors or discrepancies within the Bill of Lading itself. In essence, a Letter of Indemnity acts as a safeguard for the carrier, allowing them to issue Bills of Lading that may contain inaccuracies or fail to align with the actual circumstances surrounding the shipment. This connection is emphasized by one English judge’s remark that "false bills of lading are the cancer of international trade" (Barrett, 2020, p. 42). The statement underscores the contentious nature of the LOI, which, historically, has been met with resistance by courts, particularly due to its potential to undermine legal clarity and trust in the documentation used for international trade.

Critics of the validity of indemnification agreements often argue that such letters provide a loophole for parties to engage in unlawful activities, such as tampering with or manipulating the Bill of Lading (Harding & Goodhart, 2019, p. 97). The fear is that by accepting the validity of a Letter of Indemnity, there could be an incentive for parties to commit fraudulent actions, ultimately undermining the integrity of international trade. This position is particularly concerning since the recipient of the goods, who typically holds the Bill of Lading, may be forced into legal battles to protect their rights when such fraud occurs. In most cases, it is the holder of the Bill of Lading who becomes the victim when the LOI is misused.

Some legal scholars, particularly those influenced by English law, argue that the use of indemnification agreements violates principles of good faith (Lee, 2021, p. 135). These scholars assert that this tool can enable fraudulent practices within the maritime industry by providing a legal cover for actions that could be seen as dishonest or illegal. Furthermore, other jurists have considered the issuance of a Letter of Indemnity for the delivery of goods without presenting the Bill of Lading as a form of criminal insurance, quasi-crime, or contractual breach (Broomfield, 2018, p. 121). From this perspective, such practices should be regarded as invalid, given their potential to foster unethical conduct and undermine the integrity of contractual relationships in international shipping.

Given these concerns, the legitimacy of Letters of Indemnity remains a contentious issue, particularly under English law. While some legal frameworks have begun to regulate these practices more strictly, others remain hesitant to accept the validity of LOIs in the context of international trade (The International Group, 2020, p. 55). As global trade evolves and regulatory measures are updated, the role and regulation of such documents will likely continue to be a subject of significant debate, with calls for greater transparency and legal consistency in their use.

5.Brief Summary of UK and EU Shipping Insurance Law

5.1. Brief Summary of UK Shipping Insurance Law

1. **Deed of Compensation:**
   The deed of compensation is a form of agreement that obliges the issuer to compensate the recipient for any damages incurred. Its primary benefit is enhancing the speed and economic efficiency of commercial transactions, which is vital in international trade. However, its main drawback is the potential for abuse and fraud, posing risks to the legal security of such transactions. This is especially concerning in the shipping industry, where the misuse of such documents could undermine trust and contractual reliability (Barrett, 2020, p. 42).
2. **Uses of Deed of Compensation:**
   This document has a wide range of applications. Some of the most common uses include facilitating the delivery of goods without the original bill of lading, requesting the issuance of a clean bill of lading, changing the destination of goods, and requesting the issuance of a backdated bill of lading. Additionally, it can be used to ensure the payment of letters of credit from the bank. These varied uses highlight the significance of the deed in facilitating international trade and ensuring that commercial operations proceed smoothly, even in complex scenarios (Lee, 2021, p. 135).
3. **Nature of the Undertaking:**
   A deed of compensation fundamentally differs from other legal

instruments such as guarantee contracts, bank guarantees, and insurance policies. Although it shares some characteristics with insurance contracts, it is considered an independent private agreement, specifically a compensation obligation. This distinction underscores the unique nature of the undertaking, as it directly ties the issuer to the responsibility of compensating for damages without the broader regulatory oversight that governs traditional insurance contracts (Harding & Goodhart, 2019, p. 97).

4. **Validity of the Indemnity:**
   The validity of indemnity agreements has been a topic of extensive debate. Despite some concerns, such agreements are generally accepted across various legal systems, provided there is no bad faith or fraudulent intent. This means that if the operator compensates for the damages suffered, they are entitled to claim reimbursement from the issuer of the indemnity. However, legal frameworks remain cautious, and the validity is contingent on transparency, good faith, and the absence of fraudulent activity (Broomfield, 2018, p. 121).

5.2.Brief Summary of EU Shipping Insurance Law

The European Union has a robust legal framework to regulate shipping insurance, with one of the key regulations being Directive 2009/20/EC. This directive specifically governs the insurance requirements for shipowners, imposing clear responsibilities on them, particularly for ships with a gross tonnage of 300 or more. According to Article 2, No. 1 of this directive, ships of this size are required to be insured, ensuring that shipowners fulfill their insurance obligations under EU law. For ships that are not flying the flag of an EU Member State, the directive mandates that insurance be in place as soon as the ship enters ports within the jurisdiction of the EU. This insurance is designed to cover the claims that are subject to limitation under the 1996 Convention and must pay up to the specified liability limitation levels outlined in that convention.

One of the critical elements of this directive is the requirement for insurance certificates, which are issued to prove that ships are adequately insured. The Member States are tasked with ensuring that any ship anchored within their ports holds a valid insurance certificate. These certificates must include several key pieces of information: the ship's name, registration number, and port of registry, the name of the shipowner and their principal place of business, the type and length of the insurance, and the primary insurance provider's address. If the certificate is not in English, French, or Spanish, it must be translated into one of these languages. This ensures that the insurance status of ships is clear and accessible for inspection and compliance verification across the EU.

In case of violations of the regulations, the directive requires that Member States establish systems of reasonable and effective sanctions. These penalties are intended to act as a deterrent against non-compliance and ensure that the shipping industry adheres to the set insurance rules. Furthermore, maritime claims arising from accidents or other liabilities covered under the 1996 Convention are fully backed by insurance as specified in Directive 2009/20/EC. The coverage for any given maritime event must align with the maximum liability limit set forth in the Convention.

There are exemptions to the directive's insurance requirements. For example, warships, auxiliary warships, and other governmental ships used for non-commercial public services are not subject to the insurance obligations outlined in this directive. This distinction helps in differentiating between commercial shipping and vessels used for national defense or public service.

Both the EU and UK shipping insurance laws share a common goal: to provide protection for shipowners against unforeseen disasters while ensuring accountability when accidents occur at sea. These laws are structured to guarantee that shipowners are financially prepared to handle potential claims, with the ultimate aim of safeguarding both the interests of the shipping industry and the broader public. While the EU has its own specific regulatory framework, the principles in both legal systems reflect a mutual commitment to promoting safety and responsibility in maritime operations.

The UK and EU frameworks, although they have slight differences in implementation, work towards the same objectives and offer protections that are critical for the health of international shipping. By ensuring that insurance is in place and enforcing compliance with regulations, both systems help to maintain the integrity of the maritime industry and provide a secure environment for trade.

5.3.The insurance gap in the field of shipping insurance and marine pollution in the laws of the United Kingdom and the European Union.

In both the European Union (EU) and the United Kingdom (UK), the legal framework for shipping insurance aims to protect shipowners, cargo owners, and the maritime community from various risks. However, significant gaps exist in the coverage offered by these laws, especially in the context of marine pollution and evolving maritime technologies. These gaps pose challenges to both the legal systems and the maritime industry, often leaving certain risks unaddressed.

5.3.1.EU Shipping Insurance: Gaps in Coverage

The EU's maritime insurance regulations are largely governed by Directive 2009/20/EC, which mandates that all ships exceeding 300 gross tons must maintain insurance coverage for maritime claims. The Directive is designed to ensure that shipowners can meet their liabilities in the event of accidents or pollution. However, certain types of vessels are exempt from these provisions, which creates an insurance gap.

For example, warships, auxiliary warships, and other state-owned or government-operated ships used for non-commercial public services are excluded from the scope of this Directive (European Union, 2009). This exemption means that ships operated by national defense or public services are not required to maintain the same level of insurance coverage as commercial vessels. As a result, there could be insufficient coverage for accidents involving these ships, especially when they operate in international waters.

Another significant gap in the Directive pertains to offshore oil pollution. While the Directive addresses some aspects of maritime claims, it does not specifically tackle legal liability for oil pollution resulting from offshore oil exploration or extraction activities. This oversight is especially concerning given the environmental risks associated with offshore drilling and the potential for catastrophic oil spills. The absence of explicit provisions for offshore oil pollution liability in the Directive leaves a gap in the insurance coverage for such activities, potentially burdening affected communities and ecosystems without clear recourse to compensation.

5.3.2.UK Shipping Insurance: Addressing Evolving Risks

The UK, with its extensive maritime history, has a well-established system of marine insurance laws. The legal framework is built on a combination of historical statutes, case law, and international treaties. However, as with the EU, there are gaps in coverage, particularly in response to new and emerging risks in the maritime industry.

One of the primary concerns in the UK's shipping insurance laws is the adequacy of coverage in light of modern transportation patterns. The growth of containerized shipping has dramatically changed the risk landscape, introducing new complexities in cargo handling, stowage, and damage assessment. Traditional insurance models may struggle to fully address these risks, particularly when it comes to large-scale container ship accidents that result in both cargo loss and environmental damage. Furthermore, the rise of unmanned ships, such as autonomous vessels, poses significant legal challenges. These vessels introduce uncertainties regarding liability, operational risks, and insurance requirements, which existing laws and policies are not fully prepared to address.

The expansion of unmanned ships presents a particularly pressing issue for UK maritime law. Unlike manned vessels, autonomous ships operate without human crews, which complicates the assignment of fault in the event of accidents or violations of maritime law. Insurance providers may struggle to assess the risks associated with such ships, and current regulations may not sufficiently cover the liabilities that arise from accidents involving unmanned vessels. Consequently, the growing presence of autonomous ships represents a significant gap in the UK's shipping insurance landscape.

International treaties play a crucial role in governing shipping insurance and establishing common rules for liability and compensation. The International Convention on Civil Liability for Oil Pollution Damage (CLC) and the International Convention on the Prevention of Pollution from Ships (MARPOL) are two key instruments that address various aspects of marine pollution and shipping-related insurance. These treaties provide a framework for shipowners to obtain insurance and ensure compensation in the event of oil spills or other forms of environmental damage. However, there remain significant gaps in international law.

A major issue that is not fully addressed by international treaties is civil liability for oil contamination resulting from offshore activities, such as oil drilling and exploration. While certain conventions address pollution from ships, they do not cover the risks associated with offshore oil platforms or other non-shipborne activities. This gap in coverage means that if an offshore oil spill occurs, there may be insufficient insurance to cover the damages, leaving environmental protection efforts and affected parties vulnerable.

Moreover, the recognition of foreign judicial purchases of ships is another area not fully addressed by international treaties. When a foreign court orders the sale of a ship to satisfy a debt or liability, there are no consistent international guidelines for recognizing and enforcing such orders across different jurisdictions. This lack of clarity can result in legal disputes and complications for insurers, who may face challenges in compensating claimants or enforcing liabilities when ships are sold under foreign orders.

In addition, the introduction of unmanned ships is not comprehensively covered by existing international conventions. As unmanned vessels become more prevalent, there will likely be a need for new international norms and treaties that specifically address the legal and insurance issues associated with these vessels.

Both the EU and UK shipping insurance laws provide a legal framework for managing maritime risks, but significant gaps remain, especially in the context of emerging risks and new maritime technologies. These gaps, including exemptions for certain types of ships, offshore oil pollution liabilities, and issues surrounding unmanned vessels, present serious challenges for insurers, shipowners, and policymakers. To address these issues, both regional and international legal frameworks will need to evolve, ensuring that insurance coverage keeps pace with the rapidly changing maritime industry.

Chapter Four:Case Studies

Moreover, case studies provide valuable lessons for reforming international conventions and national laws. By closely examining the successes and failures in previous cases, policymakers and legal scholars can identify best practices, areas for improvement, and recommendations for strengthening the legal framework. The experience of past incidents helps anticipate future risks and prepares governments to address emerging challenges, such as the growing threat posed by the transport of oil in ever larger tankers, as well as the emerging issues related to offshore oil activities and their potential for environmental harm.

In conclusion, the importance of case study analysis in the field of marine pollution and oil transport law is immense. These real-life examples provide a concrete understanding of how legal frameworks function in practice, offering critical insights into the efficacy of international conventions, the responsibilities of governments, and the challenges of enforcing preventive measures and compensating victims. By studying past cases, we can strengthen future responses, ensure more effective legal regimes, and ultimately work toward minimizing the devastating effects of marine pollution on the environment and society.

The early legal cases that highlighted the responsibility of states regarding transboundary environmental pollution resulting from their economic activities include the following key disputes:

- **Corfu Channel Case** (dispute between England and Albania, 1949)
- **Lake Lanoux Case** (dispute between France and Spain, 1957)
- **French Nuclear Tests Case** (lawsuit filed by Australia and New Zealand against France, 1973)
- **Gabcikovo-Nagymaros Project Case** (dispute between Hungary and Slovakia, 1997)
- **Southern Bluefin Tuna Case** (dispute between Australia, New Zealand, and Japan, 1999)

In addition, international documents such as the UN declarations and the **United Nations Convention on the Law of the Sea** (UNCLOS) also reinforce the principle of the non-harmful use of territories. A closer examination of these rulings and relevant international instruments will follow.

1.The issue of the Corfu Channel and the plan of SIC UTERE (principle of non-harmful use of territorial territory)

The Corfu Channel case is one of the key international disputes that helped establish important legal principles concerning state responsibility for transboundary environmental damage, especially regarding territorial waters. The case itself unfolded in three distinct incidents, all of which were central to the arguments brought before the International Court of Justice (ICJ).

The first incident occurred on May 15, 1946, when two British ships, *Orion* and *Superb*, were fired upon by Albanian artillery while transiting the Corfu Strait. This act of aggression was followed by a more tragic incident on October 22, 1946, when British ships *Saumarez* and *Volages* encountered mines on the Albanian coast. The explosion resulted in substantial loss of life and injuries. In total, eighty-four British sailors lost their lives, and forty-two others were injured (Cook, Bernard A., ed., 2001, p. 105). These incidents led the United Nations to urge the two countries to take the matter to the ICJ in a Security Council resolution dated April 9, 1947.

The legal argument that arose in the case primarily concerned the principle of *sic utere tuo ut alienum non laedas*—a concept from Roman law that emphasizes the non-harmful use of one's territory. The United Kingdom had conducted a minesweeping operation in the Corfu Channel, which Albania had not consented to. The UK justified this action as a self-defense measure, asserting it was a necessary response to the threat posed by the mines, which had caused significant damage to British naval vessels. In presenting its case to the ICJ, the UK gathered and submitted evidence to support its claim that it had acted out of self-help, thereby invoking the principle of self-defense.

This case helped clarify several key principles related to state responsibility under international law, especially regarding transboundary environmental damage. One of the key takeaways was the responsibility of states to ensure that their actions do not cause harm to other states, especially when it involves shared environmental or territorial areas like international waters.The International Court of Justice's (ICJ) ruling in the *Corfu Channel* case was pivotal in the development of modern international environmental law. The case arose after the United Kingdom conducted an unauthorized minesweeping operation in the Corfu Strait, an action that Albania deemed as a violation of its sovereignty. The court acknowledged Albania's claim that its territorial waters had been violated, asserting that the United Kingdom's activities in the Corfu Channel had encroached upon Albanian sovereignty without prior permission. This acknowledgment marked a critical affirmation of the principle that a state has the right to control its own territory and that other states must respect these boundaries, particularly when it comes to the use of territorial waters and airspace.

One of the central issues that the ICJ had to address was whether or not evidence obtained by the United Kingdom during its minesweeping operation, which was conducted without Albania's consent, should be admitted in court. The evidence in question was gathered by the UK during its activities in Albanian territorial waters, and the court was faced with determining whether the methods employed to obtain this evidence were lawful. In its decision, the court did not sufficiently explore the question of whether the UK's actions had compromised the admissibility of the evidence. This raised important questions about the legality of collecting evidence in circumstances where sovereignty may have been violated, highlighting the delicate balance between enforcing state rights and protecting the integrity of evidence.

Albania, in its defense, argued that the mines in the Corfu Strait were either relics from World War II, possibly of German origin, or had been improperly maintained.

Albania further contended that these mines were "freshly painted and free of marine biocides," indicating that they were likely inactive or outdated. The Albanian government also suggested that other states in the region, particularly those in proximity to the channel, would prefer to maintain normal political relations with the UK and would not want to see the situation escalate unnecessarily. Albania's response emphasized that the United Kingdom had failed to provide critical information to the court, and this lack of transparency undermined the legitimacy of the UK's claims.

From a legal perspective, scholars widely agree that the *Corfu Channel* case marks the origins of two foundational principles in international law: the principle of the non-harmful use of territory and the principle of government liability for harm caused to other states. The ICJ's ruling reinforced the idea that states have an affirmative responsibility not only to respect their neighbors' sovereignty but also to prevent their own actions from causing harm to other countries. This obligation includes ensuring that their territory is not used for activities that could adversely affect other states, as was the case in this instance where the mines posed a direct danger to foreign ships navigating the Corfu Channel.

The *Corfu Channel* ruling established a precedent for what has come to be known as the principle of *sic utere tuo ut alienum non laedas*—a principle that obligates states to prevent the use of their territory in ways that would cause harm to other states. The ICJ's decision reiterated that states must ensure their territory is not used for acts that infringe on the rights of others, underscoring the importance of maintaining peaceful and cooperative international relations. This principle has since been integrated into many aspects of international environmental law and remains central to discussions about state responsibility for environmental harm. Governments are now increasingly held accountable for the environmental impacts of their activities, and the case reinforced the expectation that states must prevent their actions from harming neighboring countries or the global community (Mukuki & Kioko, 1986).

The court's decision in this case has had long-lasting consequences in shaping the international legal landscape. Over time, the *Corfu Channel* case has come to symbolize the broader responsibility of governments to act with due diligence to avoid causing harm to other countries, especially in the context of environmental protection. The principle established in this case continues to inform modern environmental law, particularly in the context of transboundary pollution, and it serves as a foundation for the growing body of international environmental treaties and agreements that seek to address global challenges such as climate change, oil spills, and the degradation of shared natural resources.

The importance of this ruling cannot be overstated. It laid the groundwork for future developments in international environmental law and was pivotal in shaping the way the international community approaches state responsibility for environmental harm. As a result, the *Corfu Channel* case remains a key reference point for discussions about sovereignty, state responsibility, and environmental protection in the global legal arena.

The International Court of Justice (ICJ) rendered a significant decision regarding Albania's liability in the *Corfu Channel* case, specifically addressing the explosions that occurred in Albanian territorial waters and the resulting damage, which included fatalities. The case involved two critical components: Albania's responsibility for the mines in the water and the actions of the United Kingdom in responding to the threat posed by these mines. The ICJ's judgment clarified the extent to which a state is responsible for maintaining safety within its own borders, particularly when such safety concerns affect other states and their citizens.

The Court rejected Albania's defense that it had not set up the mines in question or that it had coordinated with the Yugoslav Navy to place them at Albania's request. Albania's argument was undermined by the Court's examination of the facts and the inferences that could be drawn from them. While the Court acknowledged that direct evidence of such actions might be difficult to obtain, it emphasized that states have a responsibility to ensure that their territories are not used to cause harm to others. In this context, the Court invoked the principle of *sic utere tuo ut alienum non laedas* (use your own property in such a way as not to harm others), indicating that Albania had failed to meet its international obligations regarding the safety of its territorial waters.

Crucially, the Court noted that the Albanian government must have been aware of the mines in its waters before they were buried, and that it had a duty to notify other states of their presence, particularly given the danger they posed to ships navigating the Corfu Channel. The Court pointed out that, while direct proof of the Albanian government's actions was difficult to establish, the circumstantial evidence provided by the United Kingdom was sufficient to draw reasonable inferences. The Court emphasized that in cases where direct evidence is lacking, a more liberal application of circumstantial evidence and factual inferences must be considered. These inferences should carry particular weight when they are based on a sequence of facts that logically lead to a single conclusion.

Albania's defense was further weakened by the fact that the United Kingdom had entered Albanian territorial waters to conduct a minesweeping operation, which led to further violations of Albania's sovereignty. While the UK initially argued that it had the right to perform such an operation under the principle of innocent passage through international straits, the Court rejected this claim. The Court concluded that while the UK had a right to pass through Albanian territorial waters, its subsequent actions—particularly the minesweeping operation—violated Albanian sovereignty, as it was conducted without Albania's consent. The UK had attempted to justify its actions under the doctrine of "self-help," arguing that it had acted to protect its own vessels from the threat posed by the mines. However, the Court found that the UK's actions could not be justified under this principle, as the minesweeping operation was carried out in a manner that disregarded Albania's sovereignty.

The decision ultimately resulted in the Court determining that Albania was liable for the damages caused by the explosions, and it ordered Albania to pay compensation to the United Kingdom. In its judgment, issued on December 15, 1949, the ICJ required Albania to compensate the UK with £844,000 in damages. This amount was intended to cover the costs incurred by the UK in dealing with the damage caused by the explosions and the fatalities that resulted from them. The Court's decision was not only a crucial ruling for the Corfu Channel case itself but also set an important precedent for the development of international law regarding state responsibility for territorial sovereignty and the safety of international shipping routes.

The importance of this ruling extends beyond the *Corfu Channel* case itself. The concept of territorial sovereignty that was reinforced by the ICJ's judgment has since been central to the development of international law, particularly in the context of maritime disputes. The idea that a state must ensure the safety of its territorial waters and take measures to prevent harm to other states from activities within its borders is now a well-established principle in international law. This principle is particularly relevant in the modern context of international environmental law, where issues such as transboundary pollution and the protection of marine environments require states to take proactive measures to prevent harm to neighboring countries and to ensure that their territories are not used in ways that cause damage to the global commons.

Moreover, the *Corfu Channel* case highlighted the importance of maintaining a balance between national sovereignty and the protection of international rights. While the ICJ upheld Albania's sovereignty over its territorial waters, it also emphasized that such sovereignty cannot be exercised in ways that infringe upon the rights of other states. This balance between sovereign rights and international responsibility is a key element in modern international law and remains relevant to the ongoing development of maritime regulations and conventions.

In addition, the case illustrates the role of the International Court of Justice in interpreting and enforcing international obligations, particularly in cases where state actions have transnational implications. The Court's ability to consider both direct and circumstantial evidence in determining liability has had a significant impact on the development of international legal standards, particularly in cases involving environmental harm, territorial disputes, and the protection of shared resources. The ruling in the *Corfu Channel* case continues to serve as a critical reference point for the interpretation of state responsibility in international law, particularly in the context of maritime law and environmental protection.

Furthermore, the *Corfu Channel* case laid the foundation for the development of international conventions and agreements that seek to regulate the use of maritime spaces and prevent environmental harm caused by activities within territorial waters. The principle of preventing harm to other states, as emphasized in this case, has been incorporated into various international treaties, including the 1982 United Nations Convention on the Law of the Sea (UNCLOS), which outlines the rights and responsibilities of states with respect to the use of the oceans and the protection of marine environments. The ICJ's decision in the *Corfu Channel* case remains a cornerstone in the development of international environmental law and continues to shape the way states approach their responsibilities in the protection of the global marine environment.

In summary, the *Corfu Channel* case was a landmark decision that established key principles in international law regarding territorial sovereignty, state responsibility for environmental harm, and the protection of international shipping routes. The Court's ruling reinforced the idea that states must exercise their sovereignty in a manner that does not harm the rights of other states, particularly in the context of transboundary pollution and the safety of international maritime trade. The case set important precedents that continue to inform international legal standards today and has played a crucial role in shaping the development of international environmental law.

1.2.Strengths and Weaknesses of the Corfu Channel Case

The *Corfu Channel* case (1949), adjudicated by the International Court of Justice (ICJ), has long been a cornerstone in international law, particularly in the development of the principles of state responsibility and sovereignty. The case stemmed from an incident in which British warships were damaged by mines laid in Albanian territorial waters, leading to a series of important legal questions surrounding territorial sovereignty, the responsibility of states for harm caused by activities in their territory, and the obligations of states under international law. While the judgment has been influential in shaping international law, it also presents certain strengths and weaknesses that merit discussion.

1.2.1.Strengths of the Corfu Channel Case

1. **Clarification of Sovereignty and Responsibility**: One of the primary strengths of the *Corfu Channel* case was its clear affirmation of the principles of territorial sovereignty and state responsibility. The Court confirmed that states have an obligation not only to refrain from actions that harm other states but also to prevent activities within their own territories from causing harm beyond their borders. This reinforced the idea that sovereignty is not absolute, and states are required to exercise it in a manner that does not violate the rights of other states. This principle has since become fundamental to international law, particularly in relation to environmental protection and transboundary harm (Brownlie, 2008).
2. **Establishment of Precedents in International Law**: The ruling established several precedents that are still influential today. For instance, the Court reinforced the principle of the non-harmful use of territorial waters, which is critical in the context of environmental law. The judgment emphasized the responsibility of states to avoid actions within their territory that could affect other states, a principle that underpins numerous international treaties, including the 1982 United Nations Convention on the Law of the Sea

(UNCLOS). The case also established the procedural significance of circumstantial evidence when direct evidence is unavailable, which has become an important standard in international legal proceedings (Tams, 2005).

3. **State Accountability**: The Court's ruling on Albania's liability for the damage caused by the mines was a significant step toward holding states accountable for activities within their jurisdiction that affect other countries. This responsibility is now enshrined in several international conventions and agreements that deal with state liability for environmental damage. By holding Albania accountable for the actions within its territory, the ICJ underscored the broader principle of state accountability in preventing and rectifying environmental harm (Krieger, 2002).
4. **Emphasis on the Protection of Maritime Traffic**: Another strength of the ruling is its emphasis on the importance of safeguarding international maritime traffic. The case highlighted the importance of ensuring that states do not allow their territorial waters to become a danger to international navigation. This principle is integral to the development of laws that regulate the safety of maritime trade routes, ensuring that states take measures to protect shipping activities from potential threats, including military hazards or environmental risks (Jouannet, 2014).

1.2.2. Weaknesses of the Corfu Channel Case

1. **Lack of Direct Evidence and the Reliance on Circumstantial Evidence**: One of the weaknesses of the *Corfu Channel* case lies in the Court's reliance on circumstantial evidence, which can be problematic in international legal proceedings. The Court acknowledged that direct evidence of Albania's actions was difficult to obtain, but it nevertheless permitted a broader use of circumstantial evidence to draw conclusions about Albania's responsibility. While this approach has its merits, it also creates a potential for uncertainty, as circumstantial evidence can be interpreted in different ways. In this case, the Court's reliance on such evidence to hold Albania liable for the actions of others (such as the possible placement of mines) left open the possibility that the judgment could be seen as less grounded in concrete proof (Krieger, 2002).
2. **Disregard for the UK's Sovereignty Violation**: The Court's ruling on the United Kingdom's actions in Albanian waters also raises concerns. Although the ICJ rejected Albania's claim that the UK had violated its territorial sovereignty by conducting a minesweeping operation, it failed to adequately address the broader implications of the UK's actions. The United Kingdom entered Albanian waters without the consent of the Albanian government, even after the mine explosions had occurred, and conducted military operations in what was undeniably a sensitive area. While the Court ultimately ruled that the UK had the right to engage in innocent passage through international straits, its failure to consider the broader implications of the UK's use of force in Albanian territorial waters could be seen as a

missed opportunity to further clarify the scope of state sovereignty in such situations (Shaw, 2008).

3. **Absence of a Comprehensive Approach to Environmental Responsibility**: While the Court's decision was significant in establishing principles of territorial sovereignty and state responsibility, it did not go far enough in addressing the environmental implications of the incident. The case centered primarily on the issues of sovereignty and state responsibility but did not delve deeply into the environmental damage caused by the explosions or the long-term effects on the marine ecosystem. Given the growing importance of environmental concerns in international law, this omission is notable. A more comprehensive ruling that addressed the environmental consequences of the mine explosions would have been more aligned with modern international environmental law principles (Bodansky, 2010).
4. **Political and Diplomatic Influences**: Some critics argue that the *Corfu Channel* case was influenced by political and diplomatic considerations. The dispute occurred in the context of post-World War II tensions, and the United Kingdom's actions in Albanian waters were likely influenced by broader geopolitical considerations. The Court's ruling, while legally significant, may have been shaped by these external factors, which could undermine its impartiality and fairness in terms of strictly legal analysis. The political context surrounding the case complicates its status as a purely legal precedent (Brownlie, 2008).

In conclusion, the *Corfu Channel* case remains a pivotal moment in the development of international law, particularly with regard to territorial sovereignty, state responsibility, and the protection of maritime navigation. The strengths of the case include its clarification of key legal principles, the establishment of important precedents, and its emphasis on the protection of international shipping routes. However, the case also presents significant weaknesses, particularly in its reliance on circumstantial evidence, its failure to fully address the UK's violation of Albanian sovereignty, and its limited focus on environmental responsibility. Despite these weaknesses, the case continues to inform contemporary discussions on international law, particularly in the fields of environmental law, maritime law, and the regulation of transboundary harm (Tams, 2005).

2.The case of Lake Lanoux (principle of non-harmful use of territorial territory)

The case of *Lake Lanoux* (1957), which involved France and Spain, is a pivotal case in the field of international environmental law, particularly in relation to the principle of non-harmful use of territorial territory. This principle, which underscores the obligation of states to refrain from using their territory in a manner that causes harm to other states, was clearly demonstrated through the legal disputes surrounding the use of *Lake Lanoux*, a body of water located on the southern slopes of the Pyrenees, straddling both French and Spanish territories. The case not only delves into the legalities of territorial sovereignty and shared resources but also emphasizes the importance of mutual cooperation in the management of transboundary natural resources.

2.1.Background of the Dispute

The initial framework for managing the use of *Lake Lanoux* was established in the Bayonne Treaty of May 26, 1866, between France and Spain. The treaty specifically stated that any significant action that could affect the shared water resources of the lake, such as diverting or altering water flows, could not be undertaken without the mutual consent of both parties. *Lake Lanoux*, while located within French territory, is connected to the Spanish territory through the Carol River. The river passes through Spain after flowing from the lake, joining the *Serge* River, which ultimately flows into the *Ebro River*. This interconnection made *Lake Lanoux* a shared environment, requiring cooperation between the two nations regarding its usage.

The case was sparked by a request from *Electricité de France* in 1950, seeking permission to alter the natural flow of water from *Lake Lanoux*. The company proposed to redirect the lake's water into the *River Ariège*, using a tunnel to divert it and eventually return the water to the Carol River through the Puigcerda Canal. The purpose of this plan was to increase water flow for hydropower generation. While the diversion was intended to maintain a minimum flow of water to the Carol River in Spain, the Spanish government rejected the proposal, arguing that any alteration to the natural watercourse was unacceptable.

2.2.Legal Issues and Tribunal Proceedings

The dispute was brought before an international tribunal, which was tasked with interpreting the terms of the 1866 Bayonne Treaty and determining whether France's proposed actions were in line with the treaty's obligations. The tribunal specifically examined whether France had sufficiently considered Spain's interests when making its proposal.

A key issue in the case was whether France's actions would cause harm to Spain, violating the principle of non-harmful use of territorial waters. The tribunal acknowledged the complexity of the situation, emphasizing that decisions regarding the shared use of natural resources like *Lake Lanoux* require careful balancing of the interests of both parties.

The tribunal focused on several critical factors when evaluating the proposal, including the nature of the negotiations between France and Spain, the overall benefits and drawbacks of the scheme for both countries, and the extent to which Spain's concerns had been addressed by France. The tribunal concluded that France had indeed taken sufficient account of Spain's interests. Specifically, it ruled that France had made a reasonable effort to maintain the flow of water to Spain by ensuring that a minimum amount would still be directed into the Carol River through the Puigcerda Canal.

Moreover, the tribunal assessed the overall impact of the water diversion plan, finding that the changes proposed by France were unlikely to cause substantial harm to Spain. The tribunal emphasized that the treaty's Article 11, which governs such agreements, required both parties to ensure that their respective actions did not harm one another. By redirecting water without causing significant damage to the Spanish portion of the Carol River, France was seen as meeting these obligations.

2.3.The Principle of Non-Harmful Use of Territorial Waters

The *Lake Lanoux* case is significant for its contribution to the development of the principle of non-harmful use of territorial waters, which asserts that states have a responsibility to ensure that activities within their territory do not cause damage to neighboring states. This principle is particularly relevant in the context of transboundary watercourses and shared resources, where the actions of one state can directly impact the environment and economy of another.

In this case, while the tribunal ultimately sided with France, it was clear that the principle of non-harmful use of territorial waters was central to the tribunal's reasoning. The tribunal's approach exemplified the need for cooperation between states when managing shared natural resources, particularly when those resources have the potential to affect the welfare of neighboring nations. This case thus reinforced the idea that states must exercise due diligence in protecting the interests of other states and refrain from actions that could harm the shared environment.

Additionally, the *Lake Lanoux* case emphasized the importance of mutual consent in matters related to the use of transboundary resources. The tribunal's focus on negotiation and the protection of Spain's interests underscores the significance of diplomacy and cooperative mechanisms in the management of cross-border environmental issues. The case thus serves as a reminder that the principle of non-harmful use is not merely a legal requirement but also a reflection of the broader commitment to peaceful and mutually beneficial international relations.

The *Lake Lanoux* case played a pivotal role in the development of international environmental law, particularly concerning the non-harmful use of shared resources. By addressing the legal and diplomatic complexities surrounding the management of transboundary watercourses, the case underscored the importance of cooperation and mutual respect between states. The tribunal's decision highlighted the necessity of balancing national sovereignty with the rights and interests of neighboring countries, reinforcing the idea that states have a responsibility to ensure their actions do not cause harm to others.

While the case ultimately favored France, it provided valuable insights into how international law addresses environmental disputes and the allocation of shared natural resources. It also set a precedent for future cases involving the use of transboundary water resources, helping to shape the framework for international cooperation on environmental protection and sustainable resource management.

In conclusion, the tribunal concluded that the French government did not violate the terms of the *Treaty of Bayonne* dated May 26, 1866, nor the Additional Act of the same date, when it carried out the works for the utilization of the waters of *Lake Lanoux* in accordance with the conditions specified in the scheme for utilizing the lake's waters. France proceeded with its plans without first obtaining consent from the Spanish government, which was a point of contention in the case. However, the tribunal found that the French actions, in the context of the project as laid out, did not breach the obligations under the treaty, as long as the measures taken did not result in direct harm to Spain's interests, specifically with respect to water contamination or potential pollution.

The tribunal acknowledged that Spain had concerns about the potential harm to its territorial waters, particularly the risk of contamination or impairment of its sea territory. However, the court emphasized that Spain would be within its rights to claim violations only if the actions of France resulted in actual harm or posed a significant risk of harm to Spanish territory. This interpretation of the case served to strengthen the application of the precautionary principle, which highlights the need for preventive measures in cases where there is a threat of environmental damage, even in the absence of definitive proof of harm (Dupuy, 1991).

The tribunal's judgment also reinforced a critical aspect of international law: that bad faith cannot be assumed as a general presumption. This reasoning served as a further contribution to the evolution of the precautionary principle, which was later codified in international legal instruments, such as Principle 21 of the *Stockholm Declaration* (1972) and Principle 2 of the *Rio Declaration* (1992). These principles encapsulate the notion that states must act responsibly to prevent harm to the environment, particularly when there is a risk of transboundary harm, which aligns closely with the Sic Utere principle of non-harmful use of shared resources.

The case of *Lake Lanoux* set a significant precedent for the development of environmental law, particularly concerning shared water resources and the rights of states to prevent environmental harm to neighboring countries. The tribunal's decision underscored the importance of cooperation and mutual consent when dealing with cross-border environmental issues, and it laid the groundwork for the integration of the precautionary principle into international environmental law. The legal framework established in this case continues to influence how transboundary environmental disputes are addressed, especially in terms of preventing potential harm before it occurs, thereby protecting the rights and territories of all affected states.

2.4.Strengths and Weaknesses of the Lake Lanoux Case

The *Lake Lanoux* case stands as a pivotal moment in the evolution of international environmental law, particularly concerning the principles of non-harmful use of shared resources and precautionary measures. This case between France and Spain dealt with the shared waters of Lake Lanoux, located on the border between the two countries, and set important precedents for the management and regulation of transboundary environmental resources. However, as with any legal dispute, the case exhibits both strengths and weaknesses in its legal reasoning and implications for future cases.

2.4.1.Strengths

1. **Emphasis on the Principle of Non-Harmful Use of Shared Resources (Sic Utere)**: One of the primary strengths of the *Lake Lanoux* case lies in its reinforcement of the principle of non-harmful use of shared resources. This principle, which is foundational in international environmental law, requires states to use shared natural resources in a manner that does not cause harm to other states (Dupuy, 1991, p. 45). In this case, the tribunal underscored that both France and Spain had rights and responsibilities regarding the use of Lake Lanoux's waters, and any decision must consider the potential transboundary impacts. This case is thus a significant step in the development of legal frameworks that govern the shared use of natural resources.
2. **Support for the Precautionary Principle**: The *Lake Lanoux* case also provided a significant affirmation of the precautionary principle, which holds that if there is a risk of serious or irreversible environmental harm, precautionary measures should be taken even in the absence of full scientific certainty. Spain expressed concerns that France's diversion of Lake Lanoux's water could lead to adverse environmental effects, and the tribunal's decision reflects a growing acknowledgment of the need for preventive action in cases of environmental uncertainty (Tams, 2005, p. 68). This development contributed to the incorporation of the precautionary principle into subsequent international agreements, such as the Rio Declaration (1992), where it was explicitly recognized.
3. **Clarification of State Responsibilities in Transboundary Environmental Disputes**: Another strength of the case is its clarification of the responsibilities of states when engaging in activities that affect shared environmental resources. The tribunal highlighted that states must take into account the interests of neighboring states and consider their impact on the shared environment. The decision in *Lake Lanoux* became an essential reference point for understanding the balance of state sovereignty and the need for cooperation in managing transboundary resources (Krieger, 2002, p. 102). This helped to shape later international environmental law, particularly in contexts where countries share river systems or other ecosystems.
4. **Rejection of Bad Faith as a General Assumption**: The tribunal's ruling in *Lake Lanoux* reinforced the principle that bad faith cannot be presumed in international environmental disputes. This was a crucial point in ensuring

that states were not automatically assumed to act maliciously or recklessly when involved in transboundary environmental issues. Instead, the tribunal ruled that the actions of France were to be judged based on the facts presented, rejecting the presumption of bad faith (Dupuy, 1991, p. 50). This approach fostered a more constructive and cooperative atmosphere for international negotiations and disputes.

2.4.2. Weaknesses

1. **Limited Practical Guidance on Dispute Resolution**: Despite its significance, the *Lake Lanoux* case falls short in providing concrete, practical guidance for resolving disputes when states are unable to agree on the use of shared resources. While the tribunal emphasized the need for cooperation and consultation, it did not establish clear procedures for handling situations in which states remain at an impasse. This lack of detailed procedural guidance leaves a gap in the legal framework that could hinder the resolution of similar disputes in the future (Shaw, 2008, p. 114). The case thus underscores the importance of developing more comprehensive dispute resolution mechanisms in international environmental law.
2. **Insufficient Consideration of Potential Environmental Harm**: While the tribunal acknowledged Spain's concerns about potential environmental harm resulting from the diversion of Lake Lanoux's waters, it did not fully address the possible long-term environmental consequences. The tribunal focused primarily on the legal framework and the interpretation of the treaty, with less emphasis on a thorough scientific assessment of the potential ecological impacts. This oversight reflects the limitations of the legal process when dealing with complex environmental issues, especially in the absence of detailed environmental impact assessments (Krieger, 2002, p. 106). Future international cases may benefit from a more integrated approach that combines legal, scientific, and technical analyses.
3. **Lack of Clarity on Rights and Obligations of States**: Another weakness of the *Lake Lanoux* case is its insufficient clarification of the precise rights and obligations of states regarding shared water resources. While the tribunal emphasized that both France and Spain had rights to the water, it did not clearly outline the extent of these rights and how they should be balanced in practice. The decision leaves open questions about how countries can protect their interests while ensuring equitable access to transboundary resources. This ambiguity has led to difficulties in applying the principles established in this case to other similar disputes (Shaw, 2008, p. 121).
4. **Limited Applicability of General Principles**: While the *Lake Lanoux* case established significant principles regarding the use of shared environmental resources, the application of these principles remains limited in practice. The principles articulated in the case—particularly the non-harmful use of resources and the precautionary principle—are often difficult to apply in situations where states have differing priorities, economic interests, and levels of environmental protection. The decision did not provide a clear

framework for reconciling these conflicting interests in practice, which limits the broader applicability of the principles it established (Tams, 2005, p. 74).

The *Lake Lanoux* case remains a landmark in the development of international environmental law, particularly in terms of reinforcing the principles of non-harmful use of shared resources and the precautionary principle. However, it also reveals significant weaknesses, including a lack of practical dispute resolution mechanisms, insufficient consideration of environmental impacts, and ambiguities regarding state rights and obligations. These weaknesses highlight the ongoing challenges in balancing state sovereignty with environmental protection in the context of shared resources. Despite these limitations, the case has had a lasting impact on the field of international environmental law, influencing later treaties and legal frameworks that govern the use of transboundary natural resources.

3. The issue of French nuclear tests and the principle of obligation to prevent

The issue surrounding France's nuclear tests in the 1970s and the subsequent lawsuits filed by Australia and New Zealand against France serves as a critical case in environmental law, particularly in relation to the principle of a state's obligation to prevent environmental harm. The case was based on the contention that France's atmospheric nuclear tests in the South Pacific posed a significant environmental risk not just to France's own territory, but also to neighboring states, particularly Australia and New Zealand. This dispute highlights the growing awareness in international law of the need for states to consider the environmental impact of their actions, especially when those actions have the potential to harm the global commons or neighboring countries.

The legal conflict began on May 9, 1973, when both Australia and New Zealand filed lawsuits against France in the International Court of Justice (ICJ). The crux of the dispute was the environmental consequences of France's planned nuclear tests in the atmosphere. Australia and New Zealand did not feel that concrete evidence of radioactive fallout was necessary to justify their objection to the tests. Their legal claim was built on the principle that a government has the right to protect its environment from actions taken by another state, even if that state's activities have not yet caused demonstrable harm. This argument was grounded in the broader concept of the shared environment, where states are expected to respect each other's territorial integrity and prevent actions that could potentially harm the environment of other states, even before actual damage occurs (Gabbai, 2020, p. 78).

From a legal standpoint, the issue raised important questions about the obligations of states under international environmental law. The primary legal argument was that environmental harm could be anticipated even without direct evidence of damage, especially in the case of radioactive fallout, which can have delayed and far-reaching impacts. This principle aligns with the precautionary approach in international law, where governments are expected to act to prevent potential environmental harm before it occurs, based on credible risks rather than waiting for definitive proof of damage (Jia, 2019, p. 134). It was also a challenge to the notion that a state's sovereignty over its territory is absolute, as this case clearly demonstrated that states are expected to prevent activities within their own borders that could harm the environment of neighboring countries.

France, however, refused to present any evidence during the hearings or submit documents to support its position. It claimed that the ICJ lacked jurisdiction over the matter, essentially challenging the court's authority to intervene in what it considered a sovereign right to conduct nuclear tests on its own territory. France's refusal to engage in the court proceedings and its non-compliance with the ICJ's interim measures raised concerns over the enforcement of international legal norms, particularly when powerful states seek to bypass international jurisdiction (Noyes, 2017, p. 112).

In response to the applications by Australia and New Zealand, the ICJ, by two Orders on June 22, 1973, indicated provisional measures, instructing France to refrain from conducting nuclear tests that could result in radioactive fallout over the territories of Australia and New Zealand. This provisional measure was a critical moment in international environmental law, emphasizing the court's role in safeguarding the environment, even in the absence of definitive proof of harm. The decision marked a growing recognition of environmental protection as a global concern, transcending individual national interests and sovereignty (Brown, 2018, p. 145).

However, despite the court's provisional orders, the case eventually stalled. In its Judgments on December 20, 1974, the ICJ concluded that the objectives of Australia and New Zealand had been met, as France had publicly stated that it would cease atmospheric nuclear tests after completing the 1974 series. France did not attend any further hearings or submit additional claims to the court on the matter, and the case was considered to have lost its object. The outcome, though significant in affirming the right of states to seek protection against potential environmental harm, also highlighted the challenges in enforcing environmental obligations under international law when powerful states refuse to cooperate (Choudhury, 2019, p. 67).

In the broader context, the case of the French nuclear tests stands as a pivotal moment in the evolution of international environmental law, particularly concerning the concept of obligations to prevent harm. The French decision to halt further atmospheric nuclear tests without further legal proceedings was a victory for Australia and New Zealand, but it also underscored the limitations of the ICJ's jurisdiction in cases involving large, powerful states that are willing to ignore international legal processes.

This case has had a lasting impact on the development of the principle of precautionary action in environmental law, as it emphasized the importance of states taking preventive measures to protect the global environment. The ruling was aligned with subsequent international legal instruments, including Principle 21 of the 1972 Stockholm Declaration and Principle 2 of the 1992 Rio Declaration, both of which reflect the importance of preventing environmental damage and ensuring that states do not use their territory for activities that could harm the environment of other states. These principles have been further reinforced in recent international agreements, including the 2015 Paris Agreement on climate change, which underscores the need for proactive measures to address environmental risks (Choudhury, 2020, p. 89).

Ultimately, while the case against France regarding its nuclear tests in the South Pacific did not lead to a full legal resolution, it played a crucial role in shaping the discourse around state responsibility and environmental protection. It also served as a precursor to the growing body of international environmental law that emphasizes the prevention of harm and the need for states to cooperate in safeguarding the shared environment for future generations.

The case concerning France's nuclear tests in the South Pacific, brought before the International Court of Justice (ICJ) by Australia and New Zealand in 1973, presents a landmark moment in international environmental law. The dispute revolved around the environmental consequences of France's planned atmospheric nuclear tests, and while it has yielded significant lessons for international law, it also highlights some of the challenges associated with enforcing environmental protections against powerful sovereign states.

3.1.Strengths of the Case

1. **Precedent for Preventative Measures:** One of the most notable strengths of this case was the ICJ's recognition of the need for preventive measures to safeguard the environment. This was especially important in the context of environmental harm that is not immediately visible, such as the potential radioactive fallout from nuclear tests. By issuing provisional measures in 1973, the ICJ emphasized that states have an obligation to prevent environmental damage even before it occurs, a principle that aligns with the broader precautionary approach in international environmental law (Brown, 2018, p. 145). This case became a cornerstone for later environmental treaties that advocate for anticipatory action, such as the 1992 Rio Declaration on Environment and Development.
2. **Affirmation of State Responsibility for Transboundary Harm:** Another strength of this case was the court's recognition of the principle that a state is responsible for preventing transboundary harm. The application of this principle was significant because it reinforced the idea that one state's actions, particularly when they have the potential to affect neighboring countries, cannot be pursued without regard to the environmental impacts on others. This principle was a precursor to the legal framework surrounding the management of shared resources and environmental governance on a global scale (Jia, 2019, p. 134).
3. **Strengthening of International Environmental Law:** The case also marked a milestone in the development of international environmental law by

highlighting the importance of international cooperation in matters of environmental protection. It was a crucial moment that solidified the emerging consensus that environmental issues transcend national borders and that multilateral frameworks are essential for the protection of the global commons. The French case was one of the first instances where international law was employed to address potential environmental harm at the international level, setting the stage for subsequent legal developments (Gabbai, 2020, p. 78).

3.2.Weaknesses of the Case

1. **Lack of Direct Enforcement:** One of the major weaknesses of the case was the difficulty of enforcing the ICJ's decision, particularly when one of the parties, in this case, France, was reluctant to engage with the court. Although the court issued provisional measures asking France to halt its nuclear tests, France did not comply with the ruling in the traditional sense. Instead, the issue was resolved through public statements, and France unilaterally decided to cease atmospheric nuclear testing. This demonstrates a significant limitation in the capacity of the ICJ to enforce its decisions, especially when a powerful state opts for non-compliance and refuses to further participate in legal proceedings (Choudhury, 2020, p. 89).
2. **Limited Jurisdiction and Lack of Concrete Evidence:** Another weakness of this case was the lack of concrete evidence to substantiate the claims of harm. Australia and New Zealand did not need to provide proof of actual radioactive fallout, but their claim was based on the anticipation of harm, which is more difficult to prove in a legal setting. Although this aligns with the precautionary principle, it also raises concerns about the ability to manage international disputes when direct, tangible harm is not easily demonstrable. This lack of physical evidence made the case less clear-cut, and while the Court issued provisional measures, it did not provide a final resolution based on definitive findings of harm, which limited the effectiveness of the court's intervention (Noyes, 2017, p. 112).
3. **Failure to Address Broader Environmental Concerns:** While the court addressed the specific issue of atmospheric nuclear tests, the broader environmental concerns regarding nuclear testing were not fully addressed in the judgment. The case was narrowly focused on the transboundary effects of France's actions on Australia and New Zealand, but it did not engage with the wider global implications of nuclear testing or the long-term environmental impacts of such activities. This limited the broader implications of the case for global environmental governance, as it did not set a precedent for dealing with other forms of environmental harm arising from nuclear activities, such as contamination of marine or land-based ecosystems (Gabbai, 2020, p. 80).
4. **Absence of Comprehensive Legal Remedy:** Another weakness lies in the absence of a comprehensive legal remedy following the cessation of the nuclear tests. While the case did result in the halting of atmospheric nuclear tests, there was no formal resolution from the ICJ regarding reparations or

other legal consequences for France's earlier actions. The case, therefore, did not establish a clear precedent for compensating states that suffer from environmental harm caused by other countries, leaving a gap in international legal frameworks concerning environmental compensation (Choudhury, 2019, p. 67). This underscores the need for clearer guidelines on state responsibility and accountability when it comes to environmental damage.

The case of France's nuclear tests in the South Pacific is a pivotal moment in international environmental law, demonstrating both the strengths and limitations of the legal mechanisms in place for protecting the environment across borders. On one hand, it reinforced the growing recognition of state responsibility for environmental protection and helped to solidify the principle of preventing harm before it occurs. On the other hand, it highlighted the challenges of enforcing international legal decisions, particularly when powerful states choose not to comply, and the limitations of the legal framework in addressing broader environmental concerns. While the case may have been resolved through France's unilateral decision to halt nuclear testing, it remains a critical case in the evolution of international environmental law and continues to influence the development of global environmental governance today.

4.The issue of fishing territory and the principle of conservation use of natural resources as a common heritage of humanity

The issue of fishing territories and the principle of conservation and use of natural resources as a common heritage of humanity is increasingly urgent in the context of global environmental concerns. Over the past few decades, there have been alarming signs indicating the depletion of the world's fishery resources, an issue that has now come to the forefront of international environmental law and policy. The deterioration of fish stocks and the overexploitation of marine resources present a serious threat to global biodiversity and the sustainability of ocean ecosystems (Hewison, 2001, p. 220).

Historically, the global fisheries industry has been a vital source of food and economic activity for many coastal and island nations. However, by 1990, a report from the Food and Agriculture Organization (FAO) of the United Nations confirmed a concerning trend: the harvest of global fish supplies had begun to decline for the first time (FAO, 1990, p. 14). This trend has been attributed to a combination of overfishing, habitat destruction, and increasing fishing pressures, particularly in the southern oceans. As fishing practices have expanded further into these areas, stocks of marine species have steadily decreased, and ecosystems that rely on these species have started to degrade.

In recent years, there has been increasing concern among scientists that, contrary to the long-standing belief that fish stocks are renewable, these resources may no longer be sustainable in the face of overfishing. This is particularly alarming because, if fishing pressures continue at their current pace, the very ecosystems that support marine life may collapse, leading to permanent damage to both fish populations and their habitats (Kaiser, 2009, p. 173). This recognition challenges the previously held assumption that marine resources are inexhaustible and prompts the urgent need for more stringent conservation measures.

One of the most critical challenges in addressing the depletion of fisheries is the conflict between national interests and international cooperation. While nations with distant water fleets (those that fish on the high seas) seek to maintain access to these waters, coastal states—who rely on the fishery resources near their shores—have been pushing for greater control over their adjacent marine areas (Schneider, 2015, p. 88). This has created a complex dispute over how to balance the rights of nations to exploit marine resources with the collective responsibility to ensure the long-term sustainability of these resources.

The principle of the conservation of natural resources as a shared heritage of humanity is central to resolving this issue. Under this principle, the use of marine resources should be managed in a way that preserves these resources not just for the benefit of individual nations but for the benefit of all humanity, both now and in the future (Gabbai, 2020, p. 45). The concept of "common heritage" suggests that natural resources—such as fish stocks—belong to all people, and their use must therefore be governed by a collective responsibility to ensure sustainability.

The United Nations Convention on the Law of the Sea (UNCLOS) plays a critical role in regulating the use of the world's oceans, including fisheries. UNCLOS, which entered into force in 1994, provides a framework for resolving disputes over fishing rights and emphasizes the need for international cooperation in managing shared resources. Specifically, it recognizes the rights of coastal states to manage their exclusive economic zones (EEZs), while also acknowledging the need for international cooperation to protect fish stocks that migrate across national boundaries (United Nations, 1982, Art. 61, p. 74). However, the challenge remains in ensuring that these regulations are effectively enforced, particularly in high seas areas where fishing fleets often operate outside the jurisdiction of any single state.

In the face of this dilemma, the principle of fairness is key to resolving the conflicts over fishing rights. Coastal states argue that they have a greater claim to the fishery resources in their territorial waters, as these resources are vital to their economies and food security. On the other hand, distant water fishing states assert their right to access these resources, given their long-standing practices of fishing in the high seas. The court has stressed the need for a fair and balanced approach that takes into account both the rights of coastal states and the obligations of other states to prevent overfishing and environmental degradation (Calleja, 2012, p. 109). In this context, the goal should be to establish an equitable system that respects both national interests and the shared responsibility for global resource conservation.

Moreover, the preservation of the natural environment and the protection of biodiversity are now universally recognized as essential components of sustainable development. This recognition has led to an increased emphasis on the precautionary principle, which asserts that states should take preventative measures to avoid environmental harm, even in the absence of full scientific certainty (Gabbai, 2020, p. 53). The precautionary principle has become a cornerstone of international environmental law, particularly in the context of fisheries management, where scientific data on fish populations and ecosystems may be incomplete or uncertain. Under this principle, the responsibility to prevent harm falls not only on the states directly exploiting the resources but also on the international community to cooperate in ensuring sustainable use.

In conclusion, the issue of fishing territories and the principle of conservation and sustainable use of natural resources as a common heritage of humanity represents a critical area of focus in international environmental law. As overfishing continues to threaten the world's marine ecosystems, it is essential that states work together to ensure the long-term viability of global fisheries. This requires a shift from unilateral national interests to a more collaborative approach that recognizes the shared responsibility for preserving these resources for future generations. By adhering to principles of fairness, sustainability, and precaution, the international community can work toward a more balanced and just system of fisheries management that respects both the rights of individual states and the needs of the global community.

The case of fishing territories and the principle of conservation and sustainable use of natural resources is an important and complex issue in international environmental law. Below are the strengths and weaknesses of this case from a legal and practical perspective:

4.1.Strengths

1. **Emphasis on Shared Responsibility:** One of the key strengths of the legal framework surrounding fishing territories is the principle of the **common heritage of humanity**, which emphasizes the shared responsibility of all nations to preserve and sustainably manage marine resources. This idea has led to international cooperation, especially through frameworks like the United Nations Convention on the Law of the Sea (UNCLOS), to regulate fishing rights and ensure that fishery resources are not depleted (United Nations, 1982). By recognizing that resources in the oceans belong to all humanity and not just to individual nations, it encourages collaboration rather than conflict.
2. **Recognition of Coastal States' Rights:** The rights of coastal states over their **Exclusive Economic Zones (EEZs)** have been recognized internationally, allowing countries to control and manage the resources in their nearby waters. This is particularly important for small island states and nations with vulnerable economies that rely heavily on marine resources for their livelihoods (Schneider, 2015, p. 88). This recognition of sovereign rights gives coastal states a legitimate claim over the conservation and sustainable management of their fishery resources.

3. **Application of the Precautionary Principle:** The precautionary principle, which holds that action should be taken to prevent environmental harm even in the face of scientific uncertainty, has been effectively applied in the context of fisheries management (Gabbai, 2020, p. 53). This principle is crucial for preventing irreversible damage to marine ecosystems before it is too late to recover, especially when scientific evidence of overfishing or ecosystem collapse is not yet definitive. It has become an important tool in international law to safeguard biodiversity and ensure sustainability.
4. **Global Recognition of Fisheries as a Global Issue:** The decline in global fish stocks and the overfishing of southern oceans highlight that fisheries management is a **global issue**, transcending national borders. The collaborative efforts in international forums and the creation of regulations to limit harmful fishing practices demonstrate a growing recognition that fishery conservation is essential for global food security and biodiversity (FAO, 1990, p. 14). This holistic perspective benefits all nations, particularly those who depend on marine resources for sustenance.

4.2.Weaknesses

1. **Conflicting National Interests:** One of the main weaknesses in the case of fishing territories is the **conflict between national interests**. Coastal states, whose economies are more directly impacted by the state of fish stocks near their shores, often seek more control over their waters. Meanwhile, distant water fishing nations argue for continued access to international waters, particularly the high seas (Schneider, 2015, p. 88). These competing interests can create significant challenges for international cooperation, as nations prioritize their own economic and political concerns over shared environmental goals.
2. **Weak Enforcement of International Regulations:** While frameworks such as UNCLOS set forth the legal parameters for managing fisheries and protecting marine environments, enforcement of these regulations can be weak. **Illegal, unreported, and unregulated (IUU) fishing** continues to be a significant issue, particularly in regions where oversight is limited. The lack of binding enforcement mechanisms in international law often results in weak compliance with conservation measures (Kaiser, 2009, p. 173). As a result, overfishing and ecosystem degradation persist, undermining the effectiveness of international agreements.
3. **Lack of Global Consensus on Sustainable Practices:** Despite the recognition of the need to protect fish stocks, there is no universal agreement on how best to achieve this goal. **Disagreements over sustainable fishing practices**, such as catch limits and fishing techniques, can hinder progress. Additionally, the scientific uncertainty regarding fish stock assessments means that different countries may interpret the available data differently, leading to disagreements over quotas and conservation measures (Hewison, 2001, p. 220). This lack of consensus can delay necessary actions to prevent the collapse of marine ecosystems.

4. **Overemphasis on Economic Growth Over Environmental Protection:** Economic factors often take precedence over environmental concerns in international discussions about fisheries management. In some cases, nations may prioritize **short-term economic gains** from fishing industries over long-term sustainability goals. This imbalance, coupled with the lack of strong international legal obligations, can result in unsustainable fishing practices that undermine efforts to protect marine life. Additionally, the global demand for fish and seafood continues to drive overfishing in some areas, despite the environmental consequences (Gabbai, 2020, p. 45).
5. **Challenges of Effective Monitoring:** Monitoring the health of fish stocks and the enforcement of fishing regulations across vast areas of the high seas presents a significant challenge. Countries with limited resources may struggle to adequately **monitor and patrol their fishing zones**, leading to violations and continued overfishing. Furthermore, as fishing fleets move across multiple jurisdictions, it becomes difficult to track the full extent of fishing activities, complicating efforts to manage fish stocks effectively.

The case of fishing territories and the principle of conservation highlights both significant achievements and ongoing challenges in international fisheries law. The **shared responsibility** for the sustainable use of marine resources, under the principles of the common heritage of humanity and the precautionary principle, represents a key strength of the legal framework. However, conflicting national interests, weak enforcement mechanisms, and challenges in reaching global consensus on sustainable practices pose considerable barriers to ensuring the long-term viability of fish stocks and marine ecosystems.

Moving forward, stronger international cooperation, more effective enforcement of regulations, and the integration of scientific research into policy decisions are essential to address the urgent issue of overfishing. Additionally, efforts must be made to **balance economic interests with environmental sustainability** to ensure that marine resources are available for future generations. As the global community becomes more attuned to the fragility of marine ecosystems, the legal framework surrounding fisheries will likely continue to evolve in response to these pressing challenges.

5.The case of Gabcikovo Nagymars and the concept of sustainable development

The Gabcikovo-Nagymaros case, involving Hungary and Slovakia, is one of the most significant international environmental disputes to have ever been adjudicated by the International Court of Justice (ICJ). The case highlights several important legal concepts, including **sustainable development**, **state responsibility**, and **environmental protection** in the context of large-scale infrastructure projects. The dispute arose from a joint hydroelectric dam project on the Danube River, which was initially agreed upon in 1977 but later led to a series of complex legal and environmental issues. The dispute serves as a key example of how international law can balance economic development with the imperative to protect the natural environment.

5.1.Background of the Case

In 1977, Hungary and Czechoslovakia (which later split into Slovakia and the Czech Republic) signed a treaty known as the **Budapest Treaty**. The agreement outlined plans for the construction of a hydroelectric dam system on the Danube River, specifically in the regions of Gabcikovo and Nagymaros. The project's main goals were to enhance water resource development, energy production, flood protection, and transportation along the river. Importantly, both parties had agreed that the project would not result in changes to the water quality of the river, and that the natural environment surrounding the river would be preserved (Sands, 2007, p. 128).

However, by 1989, Hungary became increasingly concerned about the potential environmental impacts of the dam, particularly in relation to the river's ecological health. Hungary expressed concerns that the project would harm the river's natural flow, degrade water quality, and disrupt the surrounding ecosystems. In response, Hungary terminated its participation in the project, citing environmental considerations, and informed Czechoslovakia of its decision in 1992 (Sands, 2007, p. 130). Subsequently, Slovakia, which had inherited the treaty obligations after the dissolution of Czechoslovakia, sought to continue with the dam's construction, albeit in a revised version.

5.2.Legal Dispute and ICJ Involvement

The dispute was brought before the ICJ in 1993, when Slovakia initiated legal proceedings against Hungary. Slovakia argued that Hungary’s termination of the 1977 agreement was illegal and that Hungary had violated its obligations under international law. On the other hand, Hungary contended that Slovakia’s unilateral continuation of the project violated the treaty, especially since the environmental concerns had not been adequately addressed (Aust, 2005, p. 167). The primary legal question revolved around whether Hungary had the right to stop and abandon its involvement in the dam project in 1989 and whether Slovakia was permitted to proceed with the construction without Hungary’s consent.

The case was further complicated by **sustainable development** concerns. The principle of sustainable development in international law posits that states must pursue economic development while ensuring the protection of the environment for future generations. In this context, the **precautionary principle** came into play, as Hungary argued that the project posed an irreversible environmental threat, and the failure to address these concerns could result in long-term damage to the Danube ecosystem (Aust, 2005, p. 172).

The ICJ, in its 1997 ruling, addressed three central issues:

1. **Hungary's Right to Withdraw**: The Court determined that Hungary had the right to halt the construction of the Nagymaros portion of the dam due to the environmental risks posed by the project. This decision reinforced the idea that environmental protection could, in certain cases, justify a state's refusal to honor an international agreement when the potential harm outweighed the economic benefits.
2. **Slovakia's Right to Proceed**: The Court also ruled that Slovakia could proceed with the "provisional solution," which involved constructing a modified version of the dam, despite Hungary's objections. This decision was based on the fact that Slovakia had a legitimate right to fulfill its obligations under the treaty, and its actions were considered to be within the bounds of international law. However, the Court emphasized that Slovakia must act in good faith and consider the environmental implications of its actions (Bodansky, 2009, p. 104).
3. **Termination of the Treaty**: The ICJ ruled that Hungary's unilateral termination of the treaty in 1992 was not justified, as the treaty did not allow for such termination without the agreement of both parties. The Court emphasized the binding nature of international agreements and the importance of respecting legal commitments made between states.

5.3.The Role of Sustainable Development

The Gabcikovo-Nagymaros case is a landmark in terms of applying the principle of **sustainable development** in international law. Sustainable development, as articulated in documents such as the **Rio Declaration (1992)** and the **Agenda 21**, requires that environmental protection be integrated into all development projects. The ICJ's ruling in this case reflects this concept, as it acknowledged the environmental risks posed by the dam and highlighted the need to balance development goals with the imperative to preserve natural resources for future generations (Sands, 2007, p. 137). The decision also underscored the necessity of **environmental impact assessments** before embarking on large-scale infrastructure projects, ensuring that states consider potential environmental consequences before making development decisions.

Furthermore, the case also touched upon the principle of **equitable utilization** of shared resources, particularly in the context of international rivers. The Court emphasized that both Hungary and Slovakia had a duty to cooperate in managing the Danube River's resources in a way that would benefit both countries while also safeguarding the river's ecosystems (Aust, 2005, p. 179).

5.4.The Outcome and Broader Implications

In 2006, the ICJ concluded the case with a ruling that allowed for the continuation of the modified dam project. The ruling also emphasized the need for cooperation between Hungary and Slovakia in managing the Danube River. The **Gabcikovo-Nagymaros Project** served as a model for future cooperation on transboundary rivers, highlighting the importance of balancing environmental protection with economic development (Bodansky, 2009, p. 112).

The case further reinforced the notion that **states must act in good faith** when pursuing development projects that could have transboundary environmental impacts. Additionally, it showcased the growing recognition of **environmental sovereignty**, where states have the right to take action to protect their environment but must also respect the rights of other states when using shared resources.

The Gabcikovo-Nagymaros case remains a pivotal moment in the evolution of international environmental law, particularly in relation to the principle of sustainable development. The Court's decision demonstrated that environmental considerations can override economic development concerns, especially when long-term ecological damage is at stake. The case also highlighted the importance of cooperation between states, not only to achieve economic goals but also to ensure the protection of shared environmental resources.

As such, the case offers important lessons for future international environmental disputes, particularly in the context of large-scale infrastructure projects that may affect shared natural resources. The principles of sustainable development, equitable utilization, and good faith cooperation continue to guide the legal and diplomatic efforts aimed at resolving conflicts over natural resource management and environmental protection.

The case of Gabcikovo-Nagymaros represents a significant turning point in the development of international environmental law, marking the first instance in the 50-year history of the International Court of Justice (ICJ) where the Court undertook a site visit. This visit, which took place from April 1 to April 4, 1997, was an essential step in understanding the physical implications of the dispute, further demonstrating the ICJ's growing engagement with complex environmental issues. This action also highlighted the Court's increasing commitment to applying rigorous environmental standards in resolving international conflicts, particularly those that involve shared natural resources.

The dispute between Hungary and Slovakia regarding the construction of a hydroelectric dam on the Danube River raised serious questions about state responsibility, treaty obligations, and environmental protection. The Court's decision emphasized the importance of **good faith negotiations** between the two countries, urging both sides to find a resolution that would not only adhere to the terms of the original agreement but also address the environmental concerns that led Hungary to halt its participation in the project in 1989. The Court's ruling placed a clear responsibility on both Hungary and Slovakia, acknowledging that while Hungary was wrong in halting the project, Slovakia also could not unilaterally proceed with the revised version of the dam without Hungary's consent (Judgment, 1997, para. 137).

The ruling required Hungary to compensate Slovakia for the damages caused by its suspension of work, highlighting the importance of honoring international agreements and the financial implications of terminating projects midstream. On the other hand, Slovakia was also instructed to compensate Hungary for the environmental harm resulting from the operationalization of the dam, which was carried out without Hungary's agreement. This dual compensation mechanism emphasized the Court's commitment to ensuring that both parties bore responsibility for their actions, particularly when those actions affected the shared environment (Sands, 2007, p. 145).

5.5.Slovakia's Further Request for Clarification

Following the Court's ruling, Slovakia filed a request for an additional judgment on September 3, 1998, as Hungary had failed to implement the Court's decision regarding the execution of the 1997 Judgment. Slovakia argued that despite engaging in negotiations and preparing a draft framework agreement, Hungary's newly elected government had postponed approval and ultimately dismissed the draft, preventing the full implementation of the Court's ruling (Aust, 2005, p. 183). Slovakia requested the ICJ to intervene and determine the modalities for executing the decision.

The Court's handling of this request highlights the importance of compliance with international legal rulings and the need for states to follow through on their commitments. While the two countries eventually resumed negotiations, it was clear that the Court's oversight was necessary to ensure that the dispute was resolved in accordance with international law. The continued correspondence between the ICJ and both Hungary and Slovakia, including the formal communication of the discontinuance of the procedure in 2017, illustrated the complexity and prolonged nature of enforcing international decisions (Bodansky, 2009, p. 122). The case illustrates the challenges of securing long-term compliance with international judgments, especially when they concern large-scale, politically sensitive projects.

5.6.The Role of Environmental Protection and the Principle of Prevention

One of the most crucial aspects of the Court's ruling was its emphasis on **environmental protection**, particularly in the context of shared natural resources. The ICJ reaffirmed the **principle of prevention**, which states that countries must take proactive measures to avoid causing environmental harm, especially when dealing with natural resources that cross national borders (Sands, 2007, p. 153). The Court's decision in paragraph 140 of its ruling noted the irreversible nature of environmental damage, particularly when it comes to large infrastructure projects such as the Gabcikovo-Nagymaros dam, and stressed the importance of **precautionary measures** to safeguard the environment.

The Court recognized that the **sustainable development** of natural resources requires a delicate balance between economic growth and environmental protection. It emphasized that the potential environmental impacts of the dam could not be ignored, especially in light of the scientific evidence that suggested significant risks to the Danube River ecosystem. As such, the Court underscored that environmental protection cannot be secondary to economic interests, and that both states must work together to ensure that development projects do not cause irreversible damage to shared ecosystems (Bodansky, 2009, p. 125).

The **precautionary principle**, which calls for action to prevent harm to the environment even in the absence of conclusive scientific evidence of that harm, played a key role in the Court's reasoning. The Court acknowledged that **environmental damage** often cannot be fully compensated or reversed, particularly when it comes to large-scale projects that affect ecosystems in fundamental ways. Therefore, the Court ruled that both Hungary and Slovakia had an obligation to take preventive action to avoid potential harm to the Danube River and its surrounding environment (Aust, 2005, p. 186).

5.7.Sustainable Development and International Cooperation

The case also illustrated the increasing recognition of **sustainable development** as a fundamental principle in international law. This principle, which was widely discussed in international forums such as the 1992 **Rio Conference** on Environment and Development, stresses the need to ensure that the current generation's development does not undermine the ability of future generations to meet their own needs. The Gabcikovo-Nagymaros case directly engaged with this concept, as the Court emphasized that the two states must work together to achieve development in harmony with environmental preservation, ensuring that the Danube River's ecosystem would continue to function sustainably (Sands, 2007, p. 158).

The case is a reminder that environmental protection is not only a matter of national concern but is increasingly seen as a **global responsibility**. The Danube River, which flows through multiple countries, is a shared resource that requires cooperation among states to ensure its long-term viability. The Court's ruling reinforced the idea that states must collaborate in managing transboundary natural resources, balancing the economic benefits of development with the need to protect these resources for future generations (Bodansky, 2009, p. 127).

The Gabcikovo-Nagymaros case serves as a significant lesson in **environmental diplomacy**, demonstrating how legal frameworks can be used to resolve conflicts over shared natural resources while ensuring that environmental concerns are given priority. The case reaffirmed the importance of international legal mechanisms in resolving disputes, particularly those that involve large-scale projects with potential environmental risks. It also emphasized the need for states to cooperate in managing shared resources and ensuring that development proceeds in a way that respects both national interests and the global commons.

In the end, the Gabcikovo-Nagymaros case underscores the need for **international cooperation**, **environmental stewardship**, and **sustainable development** in the management of shared natural resources. The Court's decision provided a clear framework for how states should navigate the delicate balance between economic development and environmental protection, offering valuable insights for future disputes involving transboundary resources.

6.The Southern Bluefin Tuna case and the precautionary principle

The Southern Bluefin Tuna (SBT) case is a landmark in international environmental law, particularly concerning sustainable fishing practices and the protection of marine ecosystems. The case highlighted the growing tension between economic interests, such as fishing, and the environmental need to protect vulnerable species from overexploitation. At the heart of the dispute was the Southern Bluefin Tuna, a highly prized and commercially valuable fish, whose population was dwindling due to excessive fishing. This case involved a conflict between New Zealand and Australia, who accused Japan of overfishing the Southern Bluefin Tuna and conducting unilateral experimental fishing practices that violated agreed-upon conservation measures. The case ultimately revolved around the application of the **precautionary principle**, an important concept in international environmental law that requires action to prevent environmental harm, even in the face of scientific uncertainty.

6.1.Background and Context of the Case

The Southern Bluefin Tuna, scientifically named *Thunnus maccoyii*, has been a critical resource for commercial fisheries, particularly in Japan, where it is highly valued for sushi and sashimi. However, by the late 1990s, concerns were mounting about the sustainability of the Southern Bluefin Tuna population. Despite international agreements to regulate and manage the tuna stock through the **Commission for the Conservation of Southern Bluefin Tuna** (CCSBT), there were increasing signs that these measures were not being followed uniformly. Japan had been accused of overfishing the species and violating conservation measures by conducting **unilateral experimental fishing** in 1998 and 1999, despite established international agreements that were supposed to limit their fishing activities (Huck, W., 2022, p. 215).

In July 1999, New Zealand and Australia, both members of the CCSBT, brought a case before the **International Tribunal for the Law of the Sea (ITLOS)** under Annex VII of the **United Nations Convention on the Law of the Sea (UNCLOS)**. They claimed that Japan's actions violated its obligations to cooperate in the conservation of Southern Bluefin Tuna. The two countries argued that Japan's unilateral actions had the potential to seriously harm the fishery, and as such, Japan was required to cease its experimental fishing activities unless it could prove, beyond doubt, that its actions would not harm the species (Huck, W., 2022, p. 217).

6.2.Precautionary Principle in the Southern Bluefin Tuna Case

At the core of the dispute was the **precautionary principle**, a fundamental tenet of international environmental law. The precautionary principle stipulates that, in situations where there is scientific uncertainty about the potential harm of an activity, the burden of proof lies with the party initiating the activity. In this case, Japan, by conducting experimental fishing on the Southern Bluefin Tuna, had to provide scientific evidence to prove that its actions would not lead to further depletion of the tuna population (Fitzmaurice, M., 2005, p. 35).

New Zealand and Australia invoked this principle in their legal arguments, emphasizing that Japan should be required to prove that its fishing activities would not cause damage to the Southern Bluefin Tuna population or the broader marine ecosystem. They argued that, given the lack of scientific consensus about the impact of Japan’s actions, Japan should be obligated to halt its experimental fishing until it could demonstrate that these activities were sustainable. This approach is grounded in the precautionary principle, which calls for the prevention of environmental harm even when there is no conclusive scientific evidence that such harm will occur.

The **International Tribunal for the Law of the Sea (ITLOS)** ruled on the matter in an advisory opinion on August 4, 2000. The tribunal emphasized that, in the absence of scientific certainty, the obligation to provide proof lay with the party initiating the activity. Japan, therefore, was required to demonstrate that its unilateral fishing activities would not adversely affect the Southern Bluefin Tuna population or its ecosystem. In the tribunal’s view, Japan had failed to meet this burden of proof and, as such, it was ordered to cease its experimental fishing activities until it could show evidence that these activities would not harm the tuna stocks (Huck, W., 2022, p. 219).

6.3.The Significance of the Case in International Environmental Law

The Southern Bluefin Tuna case marked a key moment in the development of international environmental law. The decision reinforced the **precautionary principle** as an essential tool for regulating human activities that pose potential risks to the environment, particularly in situations where scientific evidence is lacking. This principle is crucial in managing the **sustainability of marine resources**, especially as the world's oceans face increasing threats from overfishing, pollution, and climate change (Aust, A., 2005, p. 92). The case underscored the importance of taking preventive action in the face of uncertainty, especially when dealing with **transboundary natural resources** like fish stocks that are shared between nations.

The case also highlighted the challenges of **international cooperation** in managing shared marine resources. While the CCSBT was established to regulate the fishing of Southern Bluefin Tuna, the dispute demonstrated the limitations of international agreements in enforcing compliance and ensuring the long-term sustainability of resources. Japan's unilateral actions raised concerns about the effectiveness of the CCSBT and other similar treaties in preventing overfishing and promoting cooperative conservation efforts. This case thus served as a reminder of the importance of strong enforcement mechanisms and the need for nations to work together to protect the global commons (Fitzmaurice, M., 2005, p. 40).

6.4.Implications for Sustainable Fisheries Management

The Southern Bluefin Tuna case also carries significant implications for the broader issue of sustainable fisheries management. The principle of **sustainability** is increasingly central to discussions about how to balance economic interests, such as the fishing industry, with the need to protect marine ecosystems. The case reaffirmed that marine biodiversity and the health of marine ecosystems are inextricably linked to the survival of the fishing industry itself. If fish stocks are overexploited, the long-term viability of the fishing industry is jeopardized, leading to economic and ecological consequences (Huck, W., 2022, p. 222).

Moreover, the case underscored the growing recognition that fish stocks are a shared resource, requiring international collaboration to manage them effectively. This is particularly relevant as global fish populations are in decline, and overfishing has become a widespread issue. The Southern Bluefin Tuna case serves as an important reminder of the necessity of cooperative management frameworks, such as regional fisheries management organizations (RFMOs), to regulate fishing practices and ensure that marine resources are harvested in a sustainable manner.

The Southern Bluefin Tuna case is a significant contribution to international environmental law, particularly in the context of fisheries management. It highlighted the importance of the precautionary principle and the responsibility of states to protect the marine environment, especially in the face of scientific uncertainty. The case also underscored the need for international cooperation to manage shared marine resources and ensure the sustainability of fish stocks. Ultimately, the case reinforced the idea that the conservation of natural resources is not just a national issue, but a global responsibility that requires collective action to ensure the protection of the environment for future generations.

Chapter Five: Unmanned Ships and the Issue of Marine Pollution

1.An introduction to the subject as a whole

Our era is marked by rapid technological advancements, and the maritime industry is no exception to this transformation. Over the years, tools such as early warning systems, global positioning systems (GPS), and sonar have been integrated into maritime operations to enhance safety and efficiency. However, the next wave of innovation is focused on autonomous systems, which aim to minimize or even eliminate human intervention in vessel operations.

In recent years, research and development in autonomous shipping have expanded from small-scale experiments to large-scale applications, including both commercial and military uses. For example, Rolls-Royce, a leader in high-tech marine engineering, has been at the forefront of developing crewless ships (Buchholz, 2018, p. 45). Additionally, the European Commission launched the "Maritime Unmanned Navigation through Intelligence in Networks" (MUNIN) project, which aims to advance technologies for unmanned vessels (MUNIN, n.d., p. 12). These initiatives highlight the growing interest in autonomous shipping and its potential to revolutionize the industry.

The implications of autonomous ship technologies extend beyond technical innovation; they are beginning to influence broader societal and environmental outcomes. One of the most promising benefits of Maritime Autonomous Surface Ships (MASS) is their potential to significantly reduce maritime pollution, including oil spills and greenhouse gas emissions. Autonomous ships can optimize routes, improve fuel efficiency, and reduce human errors, which are major contributors to maritime accidents and pollution (International Maritime Organization [IMO], 2023, p. 7). According to a recent report by the IMO, the adoption of autonomous technologies could lead to a 20-30% reduction in carbon emissions from shipping by 2040, aligning with global efforts to combat climate change (IMO, 2023, p. 9).

Moreover, autonomous ships are equipped with advanced monitoring systems that can detect and prevent oil leaks or spills more effectively than traditional vessels. These systems use real-time data analytics and artificial intelligence to ensure safer and more environmentally friendly operations (OECD, 2022, p. 23). By reducing the reliance on human operators, autonomous ships also minimize the risk of accidents caused by fatigue or human error, further contributing to marine pollution prevention.

In conclusion, the rise of autonomous ships represents a significant step forward for the maritime industry, offering not only operational efficiencies but also substantial environmental benefits. As these technologies continue to evolve, they hold the potential to play a critical role in reducing marine pollution and promoting sustainable shipping practices worldwide.

1.1. Minimizing Human Error

One of the most significant advantages of autonomous ships is their ability to minimize human error, which is a leading cause of maritime accidents and pollution. By removing the human factor, the likelihood of mistakes such as navigational errors, miscommunication, or fatigue-related incidents is drastically reduced (Abilio Ramos, M., Utne, I. B., & Mosleh, A., 2019, p. 34). Human error accounts for approximately 75% of maritime accidents, many of which result in oil spills, cargo losses, and other forms of marine pollution (IMO, 2021, p. 18). Autonomous systems, equipped with advanced sensors, artificial intelligence (AI), and machine learning algorithms, can make precise decisions based on real-time data, thereby reducing the risk of accidents and their associated environmental impacts.

1.2.Optimizing Fuel Consumption

Autonomous ships have the potential to revolutionize fuel efficiency in the maritime industry. By enabling just-in-time (JIT) ship operations, these systems can optimize routes, speeds, and fuel consumption based on weather conditions, sea currents, and port schedules (OECD, 2022, p. 56). This level of precision ensures that ships use only the necessary amount of fuel, reducing greenhouse gas emissions and air pollutants such as sulfur oxides (SOx) and nitrogen oxides (NOx). According to a study by the International Transport Forum (ITF), autonomous technologies could reduce fuel consumption by up to 15%, significantly mitigating the environmental footprint of global shipping (ITF, 2023, p. 22).

1.3. Improving Oil-Spill Response and Recovery

Autonomous vessel technology can also enhance the response to oil spills, a major source of marine pollution. Traditional response methods often suffer from delays due to human coordination and logistical challenges. In contrast, autonomous ships can be equipped with rapid-response systems that deploy containment booms, skimmers, or dispersants with precision and speed (MUNIN, n.d., p. 15). For example, AI-powered drones and underwater robots can quickly assess the extent of a spill and initiate cleanup operations before the oil spreads further. This capability not only minimizes environmental damage but also reduces the long-term costs associated with oil-spill recovery.

1.4. Prevention of Illegal Discharge

Illegal discharge of waste, including oil, chemicals, and plastics, is a persistent problem in the maritime industry. Autonomous ships offer a technological solution to this issue by incorporating advanced monitoring systems that ensure compliance with international waste disposal regulations (OECD, 2022, p. 78). These systems can detect and report any unauthorized discharge in real time, making it easier for authorities to enforce environmental laws. Furthermore, the transparency provided by autonomous systems discourages illegal practices, contributing to cleaner oceans and improved marine ecosystems.

1.5. Decreased Risk of Oil Spills

The design and operation of autonomous ships inherently reduce the risk of oil spills. Since these vessels are not reliant on human operators, they eliminate errors such as improper ballast management, collision avoidance failures, or mechanical oversights that often lead to spills (Abilio Ramos et al., 2019, p. 36). Additionally, autonomous ships are equipped with predictive maintenance systems that monitor engine performance and hull integrity, preventing malfunctions that could result in leaks or spills. This proactive approach to safety ensures that the risk of environmental disasters is significantly lowered.

1.6. Regulatory Challenges and the Need for International Cooperation

While the benefits of autonomous ships are clear, their adoption also presents regulatory challenges. Current maritime laws were designed for traditional, crewed vessels and do not adequately address the unique characteristics of autonomous systems (IMO, 2023, p. 12). For instance, questions arise about liability in the event of an accident involving an autonomous ship, as well as the legal framework for their operation in international waters. Moreover, the transition to autonomous shipping requires harmonized international standards to ensure safety, security, and environmental protection. Without such regulations, there is a risk that gaps in the legal framework could undermine the potential environmental benefits of these technologies.

Autonomous ships represent a transformative shift in the maritime industry, offering significant opportunities to reduce marine pollution and enhance sustainability. By minimizing human error, optimizing fuel consumption, improving oil-spill response, preventing illegal discharge, and reducing the risk of oil spills, these technologies can play a crucial role in protecting marine ecosystems. However, realizing their full potential requires addressing regulatory challenges and fostering international cooperation. As the industry continues to evolve, it is imperative to develop policies that support the safe and responsible integration of autonomous systems, ensuring that they contribute to a cleaner and more sustainable future for global shipping.

The current international legal framework for maritime operations was primarily designed for traditional, crewed vessels, which raises concerns about its applicability to unmanned ships. There may be significant gaps in existing legislation when it comes to addressing the unique requirements of autonomous and remotely operated vessels. For instance, many regulations under the International Maritime Organization (IMO) assume the presence of a human crew for decision-making, emergency response, and operational oversight (IMO, 2023, p. 45). This creates challenges for integrating Maritime Autonomous Surface Ships (MASS) into the global maritime system, as their operation fundamentally differs from conventional ships.

To address these challenges, the IMO has initiated a regulatory scoping study to explore potential amendments and new instrument solutions that can accommodate the safe, secure, and environmentally responsible operation of

MASS. The study aims to ensure that autonomous vessels comply with existing IMO regulatory frameworks while also identifying areas where new rules or guidelines may be necessary (IMO, 2023, p. 47). For example, questions surrounding liability in the event of an accident, the role of remote operators, and the certification of autonomous systems are currently under review. The goal is to create a harmonized international regulatory environment that supports innovation while maintaining safety and environmental standards.

While autonomous ships hold significant promise for reducing marine pollution—through optimized fuel consumption, minimized human error, and enhanced spill response capabilities—they also introduce new risks and challenges. One of the most pressing concerns is cybersecurity. Autonomous vessels rely heavily on digital systems, satellite communications, and remote control, making them vulnerable to hacking, data breaches, and other cyber threats (OECD, 2022, p. 89). A successful cyberattack could disrupt navigation systems, compromise safety protocols, or even lead to environmental disasters such as oil spills. Therefore, the development and deployment of autonomous ships must be approached with caution, ensuring that robust cybersecurity measures are integrated into their design and operation.

This chapter focuses on the operational and regulatory aspects of unmanned ships. It begins by examining the IMO's current legal framework, with particular attention to provisions related to manning requirements, which are inherently incompatible with the concept of unmanned vessels. For example, the International Convention for the Safety of Life at Sea (SOLAS) and the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW) both assume the presence of a human crew (IMO, 2023, p. 50). These conventions will need to be revised or supplemented to address the unique characteristics of MASS.

The chapter also evaluates the practical application of existing regulations to autonomous ships. This assessment is based on the assumption that key technical and safety challenges, such as communication delays and signal reliability, have already been addressed by projects like the Maritime Unmanned Navigation through Intelligence in Networks (MUNIN). Without this assumption, it would be difficult to assess the compatibility of current regulations with unmanned vessels, as many of these challenges directly impact compliance with safety and operational standards (MUNIN, n.d., p. 20).

In conclusion, while autonomous ships offer transformative potential for the maritime industry, their integration into the global regulatory framework requires careful consideration. Addressing gaps in existing legislation, mitigating new risks such as cybersecurity threats, and ensuring alignment with international standards are essential steps toward realizing the benefits of this technology. By fostering collaboration among stakeholders and developing forward-looking policies, the maritime industry can ensure that autonomous ships contribute to a safer, more efficient, and environmentally sustainable future.

2.Unmanned Vessels: Definition and Operations

According to Nordahl and Rødseth (2017, p. 5), an autonomous ship is defined as a vessel that possesses a certain degree of automation and self-governance. These ships are referred to by various terms, some of which are used interchangeably, such as unmanned vessels, unmanned craft, unmanned marine vehicles, and others. However, the term "unmanned vessel" (UV) is often preferred because it explicitly highlights two key characteristics: the absence of a crew on board and the clear identification of the object as a ship (Veal, 2017, p. 2). This distinction is crucial for both regulatory and operational clarity. The autonomy of unmanned vessels is categorized into different levels, as outlined by Lloyd's Register. There are seven levels of autonomy, ranging from AL0 (no autonomy) to AL6 (full autonomy). At AL0, the vessel operates entirely under human control, while at AL6, the vessel is fully autonomous, requiring no human intervention whatsoever (Lloyd's Register, 2016, p. 12). This classification system helps stakeholders understand the varying degrees of automation and the corresponding reduction in human involvement as autonomy levels increase.

Unmanned ships are further classified into three subcategories based on their operational specializations:

1. Automated Operation: In this mode, the vessel operates completely autonomously, managing its own journey plan without human intervention. The only human input required is entering the destination into the vessel's onboard computer. The ship's reflexive capabilities and decision-making systems handle all other aspects of navigation and operation (Pritchett, 2015, p. 199).

2. Autonomous Operation: This mode represents a hybrid between fully automated and remotely operated systems. While the vessel can perform routine maneuvers independently within predefined parameters, human supervision is required in emergencies or when corrections are needed (Hooydonk, 2014, p. 404).

3. Remote-Based Operation: In this mode, the vessel is controlled remotely from a shore control center (SCC), which is located at a considerable distance from the ship. Advanced data collection apparatus onboard the vessel transmits relevant information to the SCC, enabling remote operators to monitor and control the vessel's operations (Hooydonk, 2014, p. 404).

The navigation of unmanned vessels relies heavily on advanced technologies for data collection, processing, and transmission. Sensors, cameras, radar systems, and satellite communications are used to gather real-time information about the vessel's surroundings, including weather conditions, sea state, and nearby traffic. This data is transmitted to the SCC, where operators can make informed decisions or, in the case of fully autonomous vessels, where the onboard computer systems process the data to make independent decisions (MUNIN, n.d., p. 8).

The operational efficiency of unmanned vessels is further enhanced by their ability to perform complex tasks without human intervention. For example, automated systems can optimize route planning, adjust speed based on fuel efficiency algorithms, and avoid collisions using advanced obstacle detection systems (Pritchett, 2015, p. 201). These capabilities not only improve operational efficiency but also reduce the risk of human error, which is a leading cause of maritime accidents and pollution.

unmanned vessels represent a significant advancement in maritime technology, offering a range of operational modes that cater to different levels of autonomy. From fully automated systems to remote-controlled operations, these vessels are redefining the way maritime activities are conducted. However, their successful integration into the global maritime system requires addressing technical, regulatory, and safety challenges, particularly in areas such as data security, communication reliability, and compliance with international regulations.

3.Are Unmanned Ships Compatible with Traditional Maritime Definitions?

The acceptance of unmanned ships within the traditional legal framework of maritime conventions hinges on how these vessels align with existing definitions of a "ship." The maritime legal framework is composed of several significant conventions, each of which may include different definitions of what constitutes a ship. When evaluating the status of an innovative concept like unmanned vessels within this framework, it is essential to examine the definitions provided by these conventions to determine whether they impose any constraints or limitations on the concept (Hooydonk, 2014, p. 406). Notably, the definitions of a ship can vary across conventions, as each focuses on different aspects of maritime operations, and some do not explicitly address specific language regarding crew or human presence.

3.1. International Convention for the Safety of Life at Sea (SOLAS), 1974

The International Convention for the Safety of Life at Sea (SOLAS), adopted in London on November 1, 1974, is one of the most important conventions governing maritime safety. However, SOLAS does not provide an exact definition of a "vessel" in its regulations. Instead, it focuses on safety standards for ships, including requirements for life-saving appliances, fire protection, and navigation safety. The absence of a specific definition means that there are no explicit barriers to including unmanned vessels under SOLAS, particularly with regard to personnel requirements (Hooydonk, 2014, p. 407). This suggests that unmanned ships could, in principle, be covered by SOLAS, provided they meet the convention's safety standards.

3.2.International Convention on Salvage, 1989

The International Convention on Salvage, adopted in London on April 28, 1989, defines a vessel in Article 1(b) as "any ship or craft, or any structure capable of navigation." This broad definition does not specify the need for a crew or human presence, focusing instead on the vessel's capability to navigate. As such, unmanned ships would likely fall within this definition, as they are designed to operate and navigate autonomously or remotely (Hooydonk, 2014, p. 408).

3.3. International Regulations for Preventing Collisions at Sea (COLREGs), 1972

The International Regulations for Preventing Collisions at Sea (COLREGs), adopted in London on October 20, 1972, provide a more detailed definition of a vessel. According to Rule 3(a), a vessel is understood to mean "every description of water craft, including non-displacement craft, WIG craft, and seaplanes, used or capable of being used as a means of transportation on water." This definition emphasizes the functional aspect of a vessel—its ability to transport goods or people—rather than its operational mode or the presence of a crew. Consequently, unmanned ships would likely qualify as vessels under COLREGs, as they are capable of transportation on water (Hooydonk, 2014, p. 409).

3.4. International Convention for the Prevention of Pollution from Ships (MARPOL), 1973

The International Convention for the Prevention of Pollution from Ships (MARPOL), adopted in London on November 2, 1973, defines a ship in Article 2(4) as "a vessel of any type whatsoever operating in the marine environment and includes hydrofoil boats, air-cushion vehicles, submersibles, floating craft, and fixed or floating platforms." This definition is inclusive and does not impose any requirements related to crew or human presence. As such, unmanned ships would fall within the scope of MARPOL, provided they operate in the marine environment and comply with the convention's pollution prevention standards (Hooydonk, 2014, p. 410).

3.5. The Distinct Advantage of Unmanned Ships

One of the most significant advantages of unmanned ships is that they do not require a crew to operate. This characteristic sets them apart from traditional vessels and raises questions about their classification under existing maritime conventions. However, as the definitions analyzed above demonstrate, none of the major conventions explicitly require a vessel to have a crew. Instead, they focus on the vessel's capability to navigate, transport, or operate in the marine environment. This suggests that unmanned ships are entitled to the same rights and responsibilities as traditional vessels, provided they meet the operational and safety standards outlined in the relevant conventions (Hooydonk, 2014, p. 411).

In conclusion, unmanned ships can be accepted as ships within the traditional meaning, as they align with the broad and inclusive definitions provided by key maritime conventions such as SOLAS, the Salvage Convention, COLREGs, and MARPOL. The absence of explicit crew requirements in these conventions supports the argument that unmanned vessels are entitled to undertake maritime duties and enjoy the same rights as traditional ships. However, their integration into the legal framework may require clarifications or amendments to address specific operational and safety concerns related to their autonomous or remote-controlled nature.

4.Evaluating the Compatibility of Existing IMO Regulations with Unmanned Ships

The International Maritime Organization (IMO) uses the term "Maritime Autonomous Surface Ship (MASS)" to describe vessels capable of operating with varying degrees of autonomy, ranging from partial automation to fully autonomous systems. These levels of automation are categorized as follows:

1. Degree 1: Ship with Automated Processes and Decision Support . At this level, the ship incorporates automated systems and decision-support tools, but seafarers remain on board to manage and oversee operations. While certain functions may operate autonomously, human intervention is always available to take control if necessary (IMO, 2021, p. 15).

2. Degree 2: Remotely Operated Ship with Seafarers Onboard . In this scenario, the ship is controlled and managed from a remote location, but seafarers are still present on board. These crew members are prepared to assume command of the vessel's systems and operations if needed (IMO, 2021, p. 16).

3. Degree 3: Remotely Operated Ship Without Seafarers Onboard . At this level, the ship is operated entirely from a remote location, with no crew members on board. All functions, including navigation and system management, are handled by remote operators (IMO, 2021, p. 17).

4. Degree 4: Fully Autonomous Ship . This represents the highest level of autonomy, where the ship's operating system is capable of making decisions independently, without human intervention. The vessel can determine its actions and operations based on real-time data and predefined algorithms (IMO, 2021, p. 18).

While the definitions of ships provided by IMO conventions have been useful in addressing the legal status of unmanned vessels (UVs), significant challenges remain in aligning existing regulations with the unique characteristics of these ships. One major issue is the absence of crew-related provisions in current IMO instruments. Traditional regulations assume the presence of a human crew for tasks such as emergency response, maintenance, and decision-making. However, UVs operate without onboard personnel, creating gaps in the application of these rules (Hooydonk, 2014, p. 412).

For example, the International Convention for the Safety of Life at Sea (SOLAS) includes numerous provisions related to crew training, life-saving appliances, and emergency procedures, all of which are designed for manned vessels. Similarly, the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW) focuses exclusively on the qualifications and responsibilities of human crew members. These conventions require significant revisions or supplementary guidelines to accommodate the operational realities of UVs (IMO, 2021, p. 20).

Another challenge lies in the distinction between autonomous and remote-based operations. While remote-controlled ships rely on human operators stationed ashore, fully autonomous vessels depend on advanced artificial intelligence (AI) systems to make decisions. Until AI technology reaches a level of sophistication comparable to human decision-making capabilities, it will be difficult to establish a regulatory framework that fully addresses the safety and operational requirements of autonomous ships (OECD, 2022, p. 95).

In conclusion, while existing IMO instruments provide a foundation for regulating maritime operations, they are not fully equipped to address the complexities of unmanned ships. Addressing these regulatory gaps will require a comprehensive review of current conventions, as well as the development of new guidelines tailored to the unique characteristics of UVs. By doing so, the IMO can ensure that the integration of autonomous and remote-controlled ships into the global maritime system is both safe and effective.

5.Revisiting SOLAS Regulations in the Context of Unmanned Ships

The International Convention for the Safety of Life at Sea (SOLAS) was first enacted in 1914 in response to the Titanic disaster. Since then, it has undergone numerous revisions to address emerging challenges in maritime safety. SOLAS establishes minimum standards for ship construction, safety equipment, and operational procedures, with the primary goal of safeguarding life at sea (SOLAS, 1974). While it has played a pivotal role in regulating maritime safety, the advent of unmanned vessels (UVs) necessitates a reevaluation of certain provisions, particularly those related to crew requirements and operational responsibilities.

5.1.Chapter V: Manning and Operational Requirements**

Chapter V of SOLAS focuses on safety of navigation and includes several provisions that assume the presence of a human crew. These provisions must be carefully reviewed to determine their applicability to unmanned ships, which operate without onboard personnel.

5.2. Regulation 14: Minimum Safe Manning

Regulation 14(1) states that ships must be "sufficiently and efficiently manned" to ensure safety. This provision can be interpreted in two ways:

- A strict interpretation would require at least one crew member to be physically present on board, which would exclude unmanned ships from compliance.

- A more flexible interpretation could focus on the capabilities of the ship itself, rather than the presence of a crew. In this case, UVs could meet the requirement through advanced technologies, such as remote supervision by a shore control center (SCC) or autonomous systems capable of handling emergencies (Pritchett, 2015, p. 203).

Regulation 14(2) mandates that flag states issue a minimum safe manning document, which specifies the number and qualifications of crew members required for safe operation. For UVs, this provision would need to be revised to reflect the absence of onboard personnel. Flag states would need to establish new criteria for determining the "safe manning" of unmanned ships, taking into account the capabilities of remote operators and autonomous systems (Ringbom et al., 2016, p. 43).

5.3. Regulation 22(3): Visibility Requirements

Regulation 22(3) emphasizes the importance of visibility in ship design to ensure safe navigation. While traditional ships rely on crew members to monitor their surroundings, most modern vessels already incorporate advanced technologies, such as radar and cameras, to enhance visibility. For UVs, this provision could be adapted to focus on the placement of sensors and the use of artificial intelligence (AI) to detect and avoid obstacles. However, additional modifications may be necessary to address challenges such as signal interference or the placement of cargo near navigation systems (IMO, 2021, p. 25).

5.4. Regulation 33(1): Distress Situations and Logbook Entries

Regulation 33(1) outlines the responsibilities of a shipmaster in distress situations, including the obligation to assist those in need and record the reasons for any failure to provide assistance in the ship's logbook. The first part of this provision poses significant challenges for UVs, as offering assistance in distress situations often requires human intervention, such as rescuing individuals or providing medical aid. Since UVs lack onboard crew, they would be unable to fulfill this obligation without significant technological advancements (OECD, 2022, p. 98).

The second part of Regulation 33(1), which requires the recording of incidents in a logbook, could be adapted for UVs by introducing electronic logbooks. These digital records could be maintained by the SCC or onboard systems, ensuring compliance with SOLAS requirements while accommodating the unique operational characteristics of unmanned ships (Pritchett, 2015, p. 205).

The integration of unmanned ships into the global maritime system requires a thorough review of SOLAS provisions, particularly those related to manning and operational responsibilities. While some regulations can be adapted to accommodate UVs through technological solutions, others may require significant revisions to address the absence of onboard crew. By updating SOLAS to reflect the capabilities and limitations of unmanned ships, the IMO can ensure that these vessels operate safely and in compliance with international maritime standards.

6.Navigating COLREG Compliance for Unmanned Ships

The International Regulations for Preventing Collisions at Sea (COLREG), adopted in 1972 and often referred to as "The Rules of the Road" by sailors, establish the foundational standards for maritime navigation. These rules aim to prevent collisions at sea by defining responsibilities, operational procedures, and safety measures for all vessels (COLREG, 1972). However, the unique nature of unmanned vessels (UVs) presents challenges in complying with certain COLREG provisions, particularly those that assume the presence of a human crew. Key COLREG Provisions and Their Implications for Unmanned Ships :

1. Rule 2: Responsibility

Rule 2 emphasizes that no vessel is exempt from liability for negligence or failure to take necessary precautions. This provision underscores the importance of competent seamanship, which traditionally relies on human judgment and experience. For UVs, the absence of onboard crew raises questions about how responsibility is assigned, particularly in cases where decisions are made by remote operators or autonomous systems. The Shore Control Center (SCC) plays a critical role in ensuring that UVs adhere to COLREG requirements, but the delegation of responsibility between the SCC and the vessel's autonomous systems remains a contentious issue (CMI, 2018, p. 14–15).

2. Rule 5: Look-Out Procedures

Rule 5 requires all vessels to maintain a proper lookout by sight and hearing to assess the risk of collision. This provision is inherently tied to human capabilities, as it assumes the presence of crew members who can visually and audibly monitor the vessel's surroundings. For UVs, advanced sensor technologies, such as radar, LiDAR, and cameras, can replace human sight and hearing by providing real-time data on the vessel's environment. These systems, combined with artificial intelligence (AI), can detect obstacles, floating debris, and other vessels more effectively than human operators in many cases (Pritchett, 2015, p. 205). As a result, the terms "sight and hearing" in Rule 5 could be reinterpreted to include technological equivalents, ensuring that UVs remain compliant with COLREG.

3. Rule 6: Safe Speed

Rule 6 mandates that vessels proceed at a safe speed, taking into account factors such as visibility, traffic density, and maneuverability. While UVs are often designed to operate at higher speeds than traditional manned vessels, they are equipped with advanced navigation systems that can dynamically adjust speed based on real-time conditions. However, challenges such as radar range-scale limitations—where closer objects may not be detected—can be mitigated by using dual radar systems with different scales (Cockcroft & Lameijer, 2004, p. 31–32). The SCC can further enhance compliance by monitoring and adjusting the vessel's speed as needed, ensuring that UVs operate safely in congested or low-visibility conditions.

4. Rule 8: Collision Avoidance

Rule 8 focuses on collision avoidance and emphasizes the importance of adhering to COLREG rules and practicing good seamanship. For UVs, collision avoidance relies on a combination of autonomous decision-making systems and remote oversight by the SCC. While UVs lack the traditional "seamanship" skills of human crew members, their advanced algorithms and real-time data processing capabilities can effectively replicate these skills in many scenarios. However, the SCC must ensure that UVs are programmed to prioritize safety and comply with COLREG requirements, particularly in complex or high-risk situations (McLaughlin, 2011, p. 111).

The integration of unmanned ships into the global maritime system requires a careful reevaluation of COLREG provisions to address the unique characteristics of these vessels. While certain rules, such as those related to look-out procedures and safe speed, can be adapted to accommodate UVs through advanced technologies, others, such as the assignment of responsibility and collision avoidance, require more nuanced solutions. By leveraging the capabilities of the SCC and autonomous systems, UVs can achieve compliance with COLREG while maintaining the highest standards of safety and operational efficiency. However, ongoing collaboration between regulators, industry stakeholders, and technology developers will be essential to ensure that COLREG remains relevant and effective in the era of unmanned shipping.

7.Regulatory Challenges for Unmanned Ships: MARPOL and STCW Compliance

The integration of unmanned ships into the maritime industry requires a careful examination of key international conventions, particularly the International Convention for the Prevention of Pollution from Ships (MARPOL) and the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW). While these conventions were designed for traditional, crewed vessels, their provisions must be adapted to address the unique characteristics of unmanned vessels (UVs) and ensure their safe and environmentally responsible operation.

7.1.MARPOL: Pollution Prevention for Unmanned Ships

MARPOL, adopted in 1973 and subsequently updated, sets global standards for preventing pollution from ships, whether intentional or accidental. The convention includes six annexes that address various types of pollution, such as oil, chemicals, sewage, and air emissions. While UVs are not explicitly addressed in MARPOL, they are expected to comply with its provisions in the same manner as manned vessels (CMI, 2018, p. 17).

One advantage of UVs is that their operations are less likely to result in human error, which is a leading cause of maritime pollution, such as oil spills or improper waste disposal. However, the absence of onboard crew raises questions about the enforcement of MARPOL requirements, such as monitoring emissions, managing waste, and responding to pollution incidents. For example, Annex I, which deals with oil pollution, requires regular inspections and maintenance of oil discharge monitoring systems. In the case of UVs, these tasks would need to be performed remotely or through automated systems, necessitating updates to MARPOL's technical guidelines (IMO, 2021, p. 30).

Despite these challenges, MARPOL's focus on pollution prevention aligns well with the potential environmental benefits of UVs, such as optimized fuel consumption and reduced emissions. By leveraging advanced technologies, UVs can achieve compliance with MARPOL while contributing to the convention's overarching goal of protecting the marine environment.

7.2.STCW: Training and Certification in the Era of Unmanned Ships

The STCW Convention, adopted in 1978, establishes minimum standards for the training, certification, and watchkeeping of seafarers. Its provisions are inherently tied to the presence of a human crew, making it one of the most challenging conventions to adapt for UVs. For example:

- Article III emphasizes that the convention applies to "seafarers serving on board seagoing ships," which excludes UVs by definition.

- Chapter VIII includes watchkeeping requirements such as "keeping the watch on the bridge" and ensuring that "the bridge is never left unattended," which are incompatible with the operation of UVs (STCW, 1978).

The STCW Convention was designed to address the skills and responsibilities of human seafarers, not the operation of unmanned systems. This creates a significant regulatory gap, as UVs rely on shore-based controllers and advanced information technology (IT) rather than onboard crew (CMI, 2018, p. 17). To address this gap, the convention would need to be revised to include standards for remote operators and autonomous systems.

One potential solution lies in Article IX(1), which allows for the adoption of alternative training and certification programs for specific types of ships. This provision could be used to develop specialized training programs for shore-based controllers and technicians responsible for operating UVs (Ringbom et al., 2016, p. 47–48). However, such programs would need to be carefully designed to ensure that remote operators possess the skills and knowledge required to manage UVs safely and effectively.

7.3.Conclusion: Balancing Innovation and Regulation

While unmanned ships offer significant potential for reducing marine pollution and improving operational efficiency, their integration into the maritime regulatory framework presents numerous challenges. MARPOL and STCW, two of the most important international conventions, were not designed with UVs in mind and require significant updates to address their unique characteristics.

This chapter has examined the operational and regulatory aspects of unmanned ships, focusing on the applicability of existing IMO conventions and the need for new frameworks to ensure their safe and environmentally responsible operation. The analysis assumes that key technical challenges, such as communication delays and signal reliability, have been addressed by initiatives like the Maritime Unmanned Navigation through Intelligence in Networks (MUNIN) project.

From this discussion, it is clear that Maritime Autonomous Surface Ships (MASS) represent a promising solution for mitigating marine pollution and enhancing sustainability. However, their development and deployment must be accompanied by robust regulatory frameworks that address emerging risks, such as cybersecurity threats, and ensure compliance with international standards. Moving forward, continued research and collaboration among stakeholders will be essential to harness the potential of autonomous systems in a safe, ethical, and sustainable manner.

Thesis Conclusion

The present thesis has undertaken a comprehensive examination of the rights and obligations of states in preventing and compensating marine pollution caused by oil transportation, with a particular focus on the framework provided by international conventions. The study delves into the intricate legal and operational mechanisms established by key conventions of the International Maritime Organization (IMO), such as MARPOL, CLC, and FUND, to address the growing challenges of marine pollution. By analyzing the roles and responsibilities of states, as well as the evolving technological landscape, this research highlights both the achievements and the gaps in the current international legal regime. Furthermore, through the examination of case studies and the emerging challenges posed by unmanned vessels, the thesis provides a comparative analysis of existing laws and underscores the necessity for reforms to adapt to new realities in maritime transportation.

Key Findings:

1. Prevention of Marine Pollution:

International conventions, particularly MARPOL (International Convention for the Prevention of Pollution from Ships) and CLC (International Convention on Civil

Liability for Oil Pollution Damage), have been instrumental in setting global standards for the prevention of marine pollution. These conventions impose stringent requirements on the design, construction, and operation of ships to minimize the risk of oil spills and other forms of pollution. For instance, MARPOL mandates the use of double-hulled tankers, which significantly reduce the likelihood of oil spills in the event of a collision or grounding. Additionally, the convention regulates the discharge of harmful substances, including oil, chemicals, and sewage, into the marine environment.

However, the effectiveness of these measures depends heavily on the willingness and capacity of states to enforce them. While developed nations often have robust mechanisms for monitoring and compliance, developing countries may lack the resources and infrastructure to implement these standards effectively. This disparity underscores the need for enhanced international cooperation, including technical assistance and capacity-building programs, to ensure uniform enforcement of these regulations across all maritime jurisdictions.

2. Compensation for Damages:

The CLC and FUND conventions have established a comprehensive framework for compensating victims of marine pollution. Under the CLC, shipowners are held strictly liable for oil pollution damage, and they are required to maintain insurance or other financial guarantees to cover potential claims. The International Oil Pollution Compensation Funds (IOPC Funds), established under the FUND convention, provide additional compensation when the damages exceed the shipowner's liability limit.

While this system has proven effective in many cases, it is not without its challenges. Determining liability in complex incidents involving multiple parties, such as charterers, cargo owners, and port authorities, can be legally contentious and time-consuming. Moreover, the rising costs of environmental remediation and compensation claims have put pressure on the existing compensation regime. There is a growing recognition that the liability limits under the CLC and FUND conventions may need to be revised to reflect the increasing costs associated with major oil spills.

3. Unmanned Vessels and Emerging Technologies:

The advent of unmanned and autonomous vessels represents a paradigm shift in maritime transportation. These vessels, which operate without a human crew, have the potential to reduce the risk of human error, which is a leading cause of maritime accidents. By leveraging advanced technologies such as artificial intelligence, machine learning, and remote sensing, unmanned vessels can enhance navigational safety and operational efficiency.

However, the integration of these technologies into the existing legal framework poses significant challenges. Current international conventions, such as SOLAS (International Convention for the Safety of Life at Sea) and STCW (International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers), are predicated on the presence of a human crew. For example, SOLAS requires ships to have a minimum number of crew members to ensure safe operation, while STCW sets standards for the training and certification of seafarers. These conventions will need to be revised to accommodate the unique characteristics of unmanned vessels, including issues related to liability, cybersecurity, and the reliability of autonomous systems.

4. Legal and Technical Challenges:

The rapid pace of technological innovation in the maritime sector has outpaced the development of corresponding legal frameworks. One of the most pressing challenges is the issue of liability in accidents involving unmanned vessels. Traditional liability regimes, which are based on the assumption of human error, may not be applicable in cases where accidents are caused by software malfunctions or cyberattacks.

Cybersecurity is another critical concern, as unmanned vessels rely heavily on digital systems for navigation, communication, and operational control. A cyberattack on these systems could have catastrophic consequences, including collisions, oil spills, and environmental damage. To address these risks, international conventions will need to incorporate provisions for cybersecurity, including standards for the design and operation of autonomous systems and protocols for responding to cyber incidents.

Furthermore, the reliability of autonomous systems is a key factor in ensuring the safe operation of unmanned vessels. While these systems have the potential to reduce human error, they are not infallible. Rigorous testing and certification processes will be required to ensure that autonomous systems meet the highest standards of safety and reliability.

Recommendations:

1. Amendment of International Laws:

The existing international legal framework must be updated to reflect the realities of modern maritime transportation. Conventions such as SOLAS and STCW should be revised to address the unique challenges posed by unmanned vessels. This includes developing new definitions for terms such as "ship" and "crew," as well as establishing liability regimes that account for the role of autonomous systems in maritime accidents. In addition, the liability limits under the CLC and FUND conventions should be reviewed and adjusted to reflect the increasing costs associated with major oil spills. This will ensure that victims of marine pollution receive adequate compensation and that the financial burden is equitably distributed among all stakeholders.

2. Strengthening International Cooperation:

Effective prevention and compensation of marine pollution require close collaboration among states, international organizations, and industry stakeholders. Mechanisms for information sharing, joint monitoring, and coordinated enforcement should be established to ensure uniform compliance with international standards. Developing countries, in particular, should be provided with technical assistance and capacity-building support to enhance their ability to implement and enforce international conventions. This could include training programs for maritime officials, the provision of monitoring equipment, and the establishment of regional centers for pollution response.

3. Development of Environmentally Friendly Technologies:

Investment in technologies that reduce the environmental impact of maritime transportation should be a priority. This includes the development of alternative fuels, such as hydrogen and ammonia, which produce fewer emissions than traditional marine fuels. Additionally, advanced monitoring and pollution control systems, such as satellite-based surveillance and autonomous drones, can enhance the ability of states to detect and respond to oil spills and other forms of pollution. Governments and industry stakeholders should also explore the potential of circular economy principles in the maritime sector. For example, the recycling and reuse of ship components and materials can reduce waste and minimize the environmental impact of shipbuilding and decommissioning.

4. Education and Awareness:

Raising awareness about the importance of marine environmental protection is essential for fostering a culture of compliance and responsibility. Training programs for maritime personnel should be expanded to include modules on environmental protection, pollution prevention, and the use of new technologies.

Public awareness campaigns can also play a crucial role in promoting sustainable practices and encouraging public participation in environmental protection efforts. These campaigns should highlight the economic, social, and environmental benefits of a clean and healthy marine environment.

Final Thoughts:

This thesis underscores the critical importance of international conventions in addressing the challenges of marine pollution. While significant progress has been made in preventing and compensating pollution, the emergence of new technologies and the evolving nature of maritime transportation necessitate ongoing reforms to the legal framework. By fostering international cooperation, investing in innovative technologies, and promoting education and awareness, the global community can work together to achieve a sustainable and secure future for the marine environment.

The findings and recommendations presented in this thesis provide a roadmap for policymakers, industry stakeholders, and environmental advocates to address the complex and multifaceted challenges of marine pollution. Through collective action and a commitment to continuous improvement, it is possible to protect the world's oceans for future generations while ensuring the safe and efficient transportation of goods across the globe.

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