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Averting an oil spill disaster through legal measures and law implementations

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Introduction: This paper aims to analyze the various legal perspectives towards the oil spills in the sea and ocean waters that directly or indirectly impact the Thai economy and communities.

Methods: The methodology for this study employs a qualitative approach, collecting data from key informant interviews with respondents selected from the concerned ministries, departments, and other stakeholders involved in the oil spill disaster response, recovery, and policy implementations at the local, national, and international levels. This study relies on primary data such as international, national, and local legal acts, government five-year plans, announcements from relevant ministries, and published government reports, supplemented by secondary data from scholarly literature. The data analysis involves content analysis based upon the legal themes affecting Thailand's social, economic, and environmental setup, along with Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis.

Results: The findings reveal a lack of a legal framework for effective oil spill clean-up mechanisms and insufficient resources at all levels of oil spill disaster governance in Thailand. The strict top-to-bottom approach among three-tier cleaning procedures and over-dependence upon the eyewitness to report the incident results in the delay of oil spill response and recovery mechanisms. The laws are found to be lacking in protecting marine life and environmental flora and fauna.

Discussion: The originality of this paper has been enhanced in terms of international conventions, including MARPOL, a recent oil spill case study from Thailand, and current and improved data analysis.

KEYWORDS

sustainability, law and regulatory framework, mass communication, disaster response, UNCLOS

1 Introduction

Thailand has a long and productive coastal belt, adding to the Thai social, economic, and environmental sustainability. Thailand boasts a coastline of 3,334 kilometers, comprising 2,469 kilometers in the Gulf of Thailand (GoT) and 865 kilometers in the Andaman Sea (Zou and Utaipipattanakul, 2025). Similarly, the Exclusive Economic Zone (EEZ) stretches up to 420,280 square kilometers, comprising 304,000 square kilometers in the GoT and 116,280 square kilometers in the Andaman Sea (Nasuchon, 2009). Thailand is the leading country in the Association of Southeast Asian Nations (ASEAN) region. The surrounding seas provide tourism, environmental, and human resources for the country. Oil Spill incidents tend to devour these limited resources (Sutthichaimethee et al., 2025). Oil spill incidents, in turn, hurt the environmental sustainability in Thailand. Thailand has a defined framework for dealing adequately with oil spill incidents (Makkawan et al., 2025). However, the structure is not effective in terms of ground realities. The whole infrastructure depends upon reporting an oil spill incident by a witness (Marine Department, 2008). This incident reporting will then await the committee's approval on preventing and combating oil pollution before the marine department sets up the coordination center. This process is time-consuming and does not provide measures to minimize the impacts at the incident level. Once set up, the coordination center is the agency responsible for coordinating with several departments and government bodies for the oil spill response mechanism (Muvel et al., 2025).

Coastal populations dependent on fisheries, aquaculture, and tourism are highly vulnerable to oil spills because contamination disrupts livelihoods, food security, and income generation. Marine ecosystems, including coral reefs, mangroves, and seagrass beds, are particularly sensitive, with oil exposure leading to long-term degradation of biodiversity and ecosystem services essential for coastal resilience.

The national framework defines the Director General as the director of the coordination center, who will be responsible for the oil spill scenario and report the activities' proceedings to the committee. The command center will consist of the representative of the operation unit who will be responsible for coordination, direction, commanding, and minimizing the impacts of the oil spill (Sinlapapiromsuk, 2017). On the other hand, the support unit will consist of the representatives from the Royal Thai Navy, departments inclusive of Meteorological, Pollution Control, Treaties and legal Affairs, Comptroller-General, Natural Park, Wildlife and Plant conservation, fisheries, Disaster Prevention and Mitigation, Industrial Works, private sector organizations and Ministry of transport, Port Authority of Thailand, Tourism Authority of Thailand. The support unit is responsible for providing basic equipment, facilities (Wongruang and Sukpanich, 2013), human resources, and technical advice per the committee's requests (Hebbar and Dharmasiri, 2022).

Studies on oil spill governance reveal divergent outcomes: while Indonesia's enforcement of strict liability improved compensation recovery (Bureecam et al., 2018), Malaysia's reliance on administrative sanctions demonstrated limited deterrence (Afzal et al., 2019). Comparative research in Europe highlights that integrated maritime monitoring significantly reduces spill response time (Fallon et al., 2018). These contrasts show that legal frameworks produce varied results depending on institutional capacity and enforcement culture. Inconsistencies were found to be true in Thailand as well (Al-Sari and Haritash, 2025).

This setup seems effective in terms of the theoretical framework; however, the complexities of independent departments and the absence of an amalgamated and comprehensive response plan for oil spills enhance the vulnerabilities towards the exposed population and marine environments. The lack of coordination results in underutilizing optimal resources in each independently governed department (Ogbu et al., 2024). The dependence on the witness to initiate such lengthy and time-consuming procedures results in enhanced adverse impacts of the oil spill (Naggea and Miller, 2023).

Similar challenges in oil spill governance have been reported in other coastal nations, such as Japan, South Korea, and the Philippines, where international conventions like MARPOL and UNCLOS have been effectively integrated into national legal frameworks (Chen et al., 2019; Bacosa et al., 2025). These comparative insights illustrate how Thailand can benefit from adopting best practices that align with global maritime standards (Purnaweni et al., 2022).

The cleaning and response system is performed in three-tier response capacities in Thailand. These tiers are categorized as oil spill volume (Owusu et al., 2022). The cleanup, response, and recovery measures regarding the tier levels are adopted. Tier 1 deals with less than twenty tonnes of oil spills while oil transfers at the port or harbor. The marine department must be notified immediately, and the pollutant must collaborate with the agencies concerned. Tier 2 deals with oil spills between the ranges of twenty tonnes to one thousand tonnes arising due to the collision of the ships. Due to the large extent of the oil spill, all available mechanisms at the local and national levels are incorporated in the response efforts. If the situation is beyond the capacities of the national agencies, Thailand may request further international assistance. Tier 3 deals with uncontrollable and unmanageable oil spill incidents where international assistance is necessary. Usually, oil spills will be more than 1,000 tonnes in volume, and Thai agencies cannot handle the cleanup and response (Rattanakunuprakarn, 2025).

2 Literature review

The previous literature provides that assessment methods of oil spill risk are to be reevaluated at all levels of governance (Peterson et al., 2003; Garshelis and Johnson, 2013; Fukuyama et al., 2014 (He et al., 2025)). Risk perception regarding oil spills remains low because public attention has been dominated by more immediate crises such as COVID-19 and frequent flooding events. This competition of risks often reduces preparedness for less visible but equally damaging environmental disasters like oil spills. The extent of damages is also not limited to direct human losses or injuries. Therefore, the pressure from the Thai population is also towards mitigating other disasters (Xu et al., 2025).

Global oil spill disaster studies have focused on oil removal and strategies to enhance mitigation measures (de Oliveira Soares et al., 2020, Chun, Oh, and Kim 2020, Chang et al., 2014, Prendergast and Gschwend, 2014). The oil removal strategic framework was absent in Thailand (Aydin et al., 2024; Gollasch et al., 2007; Surís-Regueiro et al., 2007). There are several International Conventions under the International Maritime Organization IMO for the prevention of oil pollution that Thailand has ratified, as follows (Mitsilegas et al., 2022; Becker, 1997):

1. The International Regulations for Preventing Collision at Sea 1972 (COLREG). This international maritime regulation is related to unclear visibility matters (Sreedharan et al., 2025). Furthermore, rules were laid down about signal lights, sounds, and various signal marks to prevent the ships from hitting each other. Thailand became a party by accession on August 6, 1979.
2. The International Convention for the Prevention of Pollution from Ships 1973, modified by the Protocol 1978 - MARPOL 73/78/. This Convention focuses on preventing pollution caused by ships or accidents occurring at sea (Fitzmaurice, 2023). Thailand became a party by accession on October 15, 2007.
3. The International Convention for the Safety of Life at Sea 1974 (SOLAS). The Convention provided minimum standards for using shipbuilding equipment on ships and ship operations to ensure the safety of navigation (Joseph and Dalaklis, 2021). Thailand became a party by accession on December 18, 1984.
4. The United Nations Convention on the Law of the Sea, 1982 (UNCLOS). This Convention rules state rights and duties in the maritime zone, internal waters, territorial sea, contiguous zone, exclusive economic zone, continental shelf zone, high seas, marine natural resources, protection and preservation of the marine environment, and marine science research (Davenport, 2023).
5. The International Convention on Oil Pollution Preparedness, Response and Cooperation 1990 (OPRC). This Convention strengthened international cooperation, removing oil stains and pollution caused by oil spills (Ekunke et al., 2025). Thailand became a party by accession on April 20, 2000.
6. The International Convention on Civil Liability for Oil Pollution Damage (Wilkinson, 1993; Prasasti et al., 2024). This Convention determines compensation for people affected by oil spill pollution caused by oil tanker maritime accidents, stipulating civil liability to ship owners causing pollution from oil spills into the sea. Thailand became a party by accession on June 5, 2007.
7. The International Convention on Load Lines 1966. This Convention sets out the principles for calculating the carrying capacity of ships that carry international ships for safe navigation (Finiguerra and Gould, 2025). Thailand became a party by accession on December 30, 1992.
8. The International Convention on Training, Certification and Watchkeeping Standards for Seafarers 1978 (STCW). This Convention represents the conditions and criteria of seafarers' duties on board. In addition, it determines a seafarer's minimum qualifications, provides standards for training and issuing certificates appropriately, and ensures the safety of life and property at sea (Yi et al., 2025). Thailand became a party by accession on June 19, 1997.

The international laws pertaining to the oil spill are referred to in the United Nations Convention on the Law of the Sea (UNCLOS), which was under Article 41 and 42 of the UNCLOS and adopted as the international agreement in 1982 (UNCLOS, 1982).

Article 41 of the UNCLOS specifies the following:

Sea lanes and traffic separation schemes in straits used for international navigation.

1. In conformity with this Part, States bordering straits may designate sea lanes and prescribe traffic separation schemes for navigation in straits where necessary to promote the safe passage of ships.
2. Such States may, when circumstances require, and after giving due publicity thereto, substitute other sea lanes or traffic separation schemes for any sea lanes of traffic separation schemes previously designated or prescribed by them.
3. Such sea lanes and traffic separation schemes should conform to generally accepted international regulations.
4. Before designating or substituting sea lanes or prescribing or substituting traffic separation schemes, States bordering straits shall refer proposals to the competent international organization with a view to their adoption. The organization may adopt only such sea lanes and traffic separation schemes as may be agreed with the States bordering the straits, after which the States may designate, prescribe, or substitute them.
5. Regarding a strait where sea lanes of traffic separation schemes through the waters of two or more States bordering the strait are being proposed, the States concerned shall cooperate in formulating proposals in consultation with the competent international organization.
6. States' bordering straits shall indicate all sea lanes and traffic separation schemes designated or prescribed by them on charts to which due publicity shall be given.
7. Ships in transit passage shall respect applicable sea lanes and traffic separation schemes established in accordance with this article.

Similarly, Article 42 lays down the following:

Laws and regulations of States bordering straits relating to transit passage

1. Subject to the provisions of this section, States bordering straits may adopt laws and regulations relating to transit passage through straits, in respect of all or any of the following:

a. the safety of navigation and the regulation of maritime traffic, as provided in article 41.
b. The prevention, reduction, and control of pollution, by giving effect to applicable international regulations regarding the discharge of oil, oily wastes, and other noxious substances in the strait.
c. Concerning fishing vessels, the prevention of fishing, including the stowage of fishing gear.
d. The loading or unloading of any commodity, currency, or person in contravention of the customs, fiscal, immigration, or sanitary laws and regulations of bordering straits.

2. Such laws and regulations shall not discriminate in form or fact among foreign ships or in their application have the practical effect of denying, hampering, or impairing the right of transit passage as defined in this section.
3. States bordering straits shall give due publicity to all such laws and regulations.
4. Foreign ships exercising the right of transit passage shall comply with such laws and regulations.
5. The flag State of a ship or the State of registry of an aircraft entitled to sovereign immunity that acts in a manner contrary to such laws and regulations or other provisions of this Part shall bear international responsibility for any loss or damage that results to States bordering straits.

The articles mentioned above provide for the sovereignty and the recognition of the States under each ship and their further responsibilities at international borders. Regarding sea traffic management, the state has been the decisive authority in ensuring minimized risk at sea boundaries. The flag at the ship confirms the ownership and responsibility of the ship owner in international waters, including high seas, or in domestic waters.

In Thailand, the government framework includes the central and local levels in collaboration with the DOF and National Environment Board (NEB) (Rajchagool, 1999; Chanchitpricha et al., 2021). The oil spill incidents in the GoT and the Andaman Sea adversely impact marine and human lives (Vongvisessomjai et al., 1982). These impacts include environmental degradation, collision and diversion among other vessels at sea, direct implications for the fishery industries and the fishermen communities (Singh et al., 2019).

The sea distance from any country's inlands and mainland defines its sea boundaries. Similarly, the sea boundary is drafted in Thailand according to the international convention (Refer to Table 1: Appendix 1). These boundaries designate the State's authority regarding oil spills within or outside its territorial waters. If the oil spill incident is recorded in High seas, then the procedural approach towards the oil spill becomes more complex due to the involvement of other neighboring countries.

There is a lack of literature on the legal framework for oil spills in Thailand (Sinlapapiromsuk, 2017). Thailand has been following the international Convention on Civil liability (CLC) for Oil Pollution Damage and Establishment of an international fund (Fund Convention) for compensation for oil pollution damage

TABLE 1 Corresponding distance of the sea boundaries in Thailand.

Name	Distance from coastline
Internal water	Enclosed within the land of the country (Archipelagic)
Territorial water	12 Nautical miles (22.224 km)
The contiguous zone	24 Nautical miles (44.448 km)
Exclusive economic zone (EEZ)	200 Nautical miles (370.4 km)
The continental shelf	200 to 350 Nautical miles (370.4 to 648.2 km)
High seas	Beyond 350 Nautical miles (> 648.2 km)
*Land of both country	Thailand and Malaysia- MOU

*Geographical land boundaries of both countries.

under the International Marine organization (IMO), and have adopted the Requirement of Contributions to the International Fund for Compensation for Oil Pollution Damage Caused By ships Act, B.E.2560 (2017) and Civil Liability for Oil pollution Damage Caused By ships Act, B.E. 2560 (2017) (Krisdika, 2021, Krisdika, 2017), however, the implementation has been lacking in terms of effective law obligations.

Both of the adopted acts, in 2017, provided for clear definitions for ship, types of oil, pollution damage, and conditions for the liability of payment towards the oil spills, such as the exemption of application of this act under the circumstances of war or warships (Section 6). The acts provided for the defined Ship-owners who were the primary liable parties in case of an oil spill event.

The International Convention defines the following terms to be adopted by countries that have already ratified the Convention.

"Liability Convention" means the International Convention on Civil Liability for Oil Pollution Damage, 1992. The liability convention signifies that the concerned parties are liable for the loss and damages caused by an oil spill disaster.

"Fund Convention" means the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1992;

"Fund" means the International Fund for Compensation for Oil Pollution Damage established under the Fund Convention.

"Director" means the Director of the Fund under the Fund Convention.

The Civil Liability for Oil Pollution Damage Act B.E. 2560 (2017) establishes strict liability for shipowners in cases of oil pollution, while mandating compulsory insurance coverage to ensure compensation for victims. This framework illustrates the government's effort to internalize the environmental costs of maritime activities and strengthen enforcement capacity.

Under Section 3 of the Civil Liability for Oil Pollution Damage Caused by Ships Act, B.E. 2560 (2017), the following are the major definitions of oil spill damages and their essential characteristics.

Section 3. In this Act:

"ship" means any sea-going vessel and seaborne craft of any type whatsoever constructed or adapted for the carriage of oil in bulk as cargo, provided that a ship capable of carrying oil and other

cargoes shall be regarded as a ship within this meaning only when it is carrying oil in bulk as cargo and shall continue to be regarded as a ship during any voyage following the carriage of oil until it is proved that it has no residues of oil in bulk aboard;

"person" means a natural person, a group of persons, or a State or private agency, whether it is a juristic person or not, and shall include a State or its constituent administrative region.

The definition implies that a "Person" could be a human individual or a group of individuals. Similarly, the extended juristic person could be an enterprise, a province, or a country (State), Section 15 & Section 65 of the Civil and Commercial Law Code of Thailand 2535 B.C. Section 67 further states that, under Section 66, the "juristic person" has the rights and responsibilities equivalent to those of a natural person unless these rights and responsibilities cannot be related to a natural person. For instance, the "juristic person" cannot be challenged under the family or inheritance law as in the case of the "natural person".

"shipowner" means the person registered as the owner of the ship or, in the absence of registration, shall mean the person owning the ship, and, in the case of a ship owned by a State and operated by a company which is registered in that Sate as the ship's operator, "shipowner" shall mean such company.

"oil" means any persistent hydrocarbon mineral oil such as crude oil, fuel oil, heavy diesel oil, and lubricating oil, whether carried on board a ship as cargo or in the bunkers of such a ship.

"Contributing oil" means crude oil and fuel oil of the following descriptions:

1. crude oil, which signifies any liquid hydrocarbon mixture occurring naturally in the earth, whether or not treated to render it suitable for transportation and also includes crude oil from which certain distillate fractions have been removed or crude oil to which certain distillate fractions have been added.
2. fuel oil, which signifies heavy distillates or residues from crude oil distillation or blends of both materials, intended for use as a fuel for the production of heat or power of a quality equivalent to Number Four fuel oil by the Designation D 396-69 standard determined by the American Society for Testing and Materials' Specification, or heavier.

"pollution damage" means:

(1) loss or damage caused outside the ship by contamination resulting from the escape or discharge of oil from the ship, wherever such escape or discharge may occur, including compensation for impairment of the environment and loss of profit from impairment of the environment.

provided that compensation for impairment of the environment shall be limited to costs of reasonable measures already undertaken or to be undertaken for the reinstatement of the impaired environment.

(2) the costs of preventive measures and loss or damage caused by such measures.

"preventive measure" means any reasonable measures taken by any person after an incident has occurred to prevent or minimize pollution damage.

"incident" means any occurrence, or series of occurrences having the same origin, which causes pollution damage or creates a grave and apparent threat of causing pollution damage.

"Special Drawing Right unit of account" means the Special Drawing Right unit of account under the law authorizing and prescribing certain practices in connection with the Special Drawing Rights in the International Monetary Fund.

"guarantor" means any person providing insurance or any other financial security to cover the liability of a shipowner under the law on civil liability for oil pollution damage caused by ships.

"Oil terminal installation" means any site used to store oil, which can receive oil from waterborne transportation, and shall include any facility situated offshore and capable of delivering oil to such site.

The acts enriched the knowledge and definition among the law enforcement officials at various ministries and departments to work collaboratively in the cases of oil spill events in Thailand. However, the absence of a legal framework to act precisely upon the oil spill event is still present at the local shoreline levels.

Likewise, under Section 6 of this Act,

Section 6. This Act shall not apply to warships or any other ships owned or operated by a State on government non-commercial service.

This Act shall also apply to ships owned by a Contracting State to the Convention and be used commercially. In this regard, a State Party to the Convention may not raise any State immunity in Court as a defence.

These acts covered the parties responsible and liable for the payment for the oil spill event in Thailand. These implications apply to Thailand's GoT and Andaman Sea boundaries. The term shipowner is the epitome of deciding the responsible party, liable for the damages under this Act (Section 7). However, in collision cases, the responsibility of two or more ships is mutually shared, and all parties concerned are liable for the payment towards the damages (Section 8).

Section 7. Subject to sections 9 and 10, the shipowner at the time of an incident, or, in the case where the incident consists of a series of occurrences, at the time of the first such occurrence, shall be liable for any pollution damage resulting from such incident.

Section 8. In the case where two or more ships are involved in any incident causing pollution damage which is not separable amongst any of the ships, the owners of all the ships concerned, unless exonerated from liability under sections 9 and 10, shall be jointly and severally liable for all such damage which has arisen.

Section 9. The shipowner shall not be liable for any pollution damage if it can be proved that such damage:

(1) resulted from an act of war, hostilities, civil war, insurrection, or natural phenomenon of an exceptional, inevitable, and irresistible character.

(2) was wholly caused by an act or omission done by a third party with the intent to cause such damage.

(3) was wholly caused by the negligence or wrongful Act of the State or an agency having the duty to take care of or maintain lights or other navigational aids in exercising such duty.

Section 10. The shipowner may be exonerated wholly or partially from liability if the shipowner proves that the pollution damage resulted wholly or partially from an act or omission done, whether willfully or negligently, by the person who suffered such damage.

These sections are limited in the Special Drawing Rights, implying that the shipowner may not be liable exceeding 98.77 million SDR (Section 12). Similarly, ship carrying capacities of above 2,000 tonnes shall be required to receive a certificate from the Marine Department (Section 16). Similarly, sections 15 and 17 of this Act provide risk mitigation measures such as insurance and a non-Thai ship to be certified by the Marine Department (ITOPF, 2021).

Section 12. The shipowner shall be entitled to limit his liability under this Act in respect of any one incident to an aggregate amount as follows:

(1) 4.51 million Special Drawing Rights, for a ship not exceeding 5,000 gross tonnages.

(2) 4.51 million Special Drawing Rights, for a ship with a tonnage over 5,000 gross tonnage and, for each additional unit of tonnage over 5,000 gross tonnage, 631 Special Drawing Rights, provided that the aggregate amount of liability shall not exceed 89.77 million Special Drawing Rights.

Such limitation of liability may be amended by the Convention or Protocol to which Thailand is a party, as shall be prescribed by the Royal Decree.

Section 15. A Thai ship carrying more than 2,000 tons of oil in bulk as cargo shall have a certificate issued by the provisions of section 16 indicating the maintenance of insurance or any other financial security in the sum not less than that provided under section 12 to cover liability for pollution damage under this Act sufficiently.

The maintenance of insurance or financial security under paragraph one shall be by the rules, procedures, and conditions prescribed in the Ministerial Regulation.

Section 16. The Marine Department shall have the power to issue a certificate to a ship registered as a Thai ship.

Such a certificate shall at least contain particulars as follows:

1. the name of the ship and the port of registration.
2. the name and principal place of business of the shipowner.
3. the type of financial security and period of financial security.
4. the name and principal place of business of the insurer or any other person giving financial security and, in the case where it is appropriate, the branch office of the insurer or the person giving financial security, who issues insurance documents or gives financial security, as the case may be.

The certificate shall be in the Thai language and shall also be accompanied by an English translation thereof.

The rules, procedures, and conditions for applying for a certificate, issuing a certificate, and terminating a certificate shall be as prescribed in the Ministerial Regulation.

Section 17. A foreign ship not registered in a Contracting State to the Convention may apply for a certificate from the Marine Department. In this regard, sections 15 and 16 shall apply mutatis mutandis.

This act undertakes a detailed legal perspective towards the oil pollution on both sides of the Thailand sea boundaries. Such action is essential to determine the responsible parties for covering the damages. On the other hand, the Requirement of Contributions to the present presents the contributions towards the compensation of the oil pollution damages caused by the shipowner annually, with a total receiving of or beyond 150,000 metric tonnes (Section 20). The legal claims arising from such contributions are to be under the jurisdiction of the Chief Judge of Intellectual Property (IP) and the International Trade Court (ITC), along with the President of the Supreme Court, who shall have the authority to decide upon the proceedings of such claims (Jayangakula, 2018).

Section 20. The following persons must make annual contributions to the Fund:

1. any person who has received contributing oil in total quantities exceeding 150,000 metric tons in each calendar year.
2. each of the associated persons who has received oil in each calendar year in the quantity not exceeding 150,000 metric tons but has had the quantity of contributing oil, when aggregated altogether, exceeding 150,000 metric tons; in this regard, each associated person shall pay contributions in respect of the quantity received.

For this section, "associated person" means the person under control or common management.

Section 30. Legal proceedings for making claims under this Act shall fall within the jurisdiction of the Intellectual Property and International Trade Court. In this regard, the Chief Judge of the Central Intellectual Property and International Trade Court, with the approval of the President of the Supreme Court, has the power to issue any Rules on the conduct of proceedings.

Thailand's sea boundaries provide abundant opportunities at sea and in the coastal communities. GoT is among Thailand's most productive resources (Wattayakorn, 2006). On the other hand, the Andaman Sea connects Thailand to the South Asian region. The sea boundary areas provide for natural resources, tourism, and employment opportunities for the Thai economy.

The major gap is the absence of ground-level implementations, surveillance, and registration of small-sized boats and sea activities, which are not adequately monitored. Several incidents of inadequate quality of small boats and ferries have resulted in oil spills and contamination through oil spillage in Thailand.

The oil spills in the GoT and Andaman Sea are numerous and uncontainable regarding the large boats, ferries, and ships (Wattayakorn, 2012). The following table provides data on previous oil spills in Thailand (Refer to Table 2: Appendix 2).

3 Methodology

This study has been analyzed through qualitative methodology. The tools involved are content analysis with thematic sub-themes to analyse and ascertain the economic, social, and environmental

TABLE 2 Historical oil spill disasters in Thailand.

Serial number	Event period	Category of oil	Volume of oil in tonnes	Reason	Site
1	1974 (April 10th)	Fuel oil	2100	Tanker and vessel collision	Chaophraya
2	1977 (May 29th)	Fuel oil	300	Tanker and vessel collision	Chaophraya
3	1979	Fuel oil	300	Fire	Koh Sichang, Chonburi
4	1994 (March 6th)	Fuel oil	400	Tanker and vessel collision	Koh Sichang, Chonburi
5	1996 (January 16th)	Fuel oil	200	Vessel's collision	Chaophraya
6	1996 (October 30th)	Crude oil	150	Loading leakage	Map Ta Phut, Rayong
7	2002 (January 15th)	Fuel oil	240	Tanker grounded	Sattahip, Chonburi
8	2002 (December 17th)	Fuel oil	210	Tanker and vessel collision	Laemchabang, Chonburi
9	2004 (December 26th)	Fuel oil	150	Tanker grounded	Pattaya, Chonburi
10	2006 (May 04th)	Fuel oil	20	Tanker leakage	Map Ta Phut District, Rayong Province
11	2011 (September 4th)	Fuel oil	40,000 Liters	Tanker grounded (Storm)	Phuket
12	2012 (July 14th)	Fuel oil	unknown	Smugglers	Koh Samui
13	2022 (25th January)	Fuel Oil	47,000	Pipeline leakage	Mae Ram Phueng beach, Rayong

Source: (Kraitat et al., 2021).

impacts of the oil spill events in Thailand. The data analyzed involved secondary data from various national and international acts about oil pollution and oil spillage applicable to the sea boundaries in Thailand. The previous literature has been thoroughly studied and divided into secondary data sources to achieve accuracy regarding the academic and field-level implications of oil spill scenarios and cases in Thailand.

There was a total of fifteen key informant interviews selected randomly from the ministries, government departmental officers, local community leaders and Non-Governmental Organization (NGO) representatives. The small sample size of Key informant interviews (KII) has been adopted by supporting previous literature (Kumar, 1989; Muellmann et al., 2021; Fleming et al., 2022). The respondents were randomly selected from the population who met the inclusion criteria for having direct experience with the oil spill event. The exclusion criteria while selecting respondents were to assess the extent of exposure of the respondents towards being the stakeholder for the oil spill management framework.

The methodology section has been enhanced with a detailed case study of the recent oil spill at Rayong, Thailand. Several interview subsections have also been added to the manuscript to ascertain the oil spill's impact. The data analysis involves content analysis based upon the legal themes that affect Thailand's social, economic, and environmental setup, along with Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis. The additional case study provided an in-depth understanding and analytical approach to the oil spill scenario in Thailand.

The SWOT analysis was conducted by coding legislative provisions, policy documents, and international case studies. Strengths were identified based on existing statutory enforcement powers, weaknesses on enforcement gaps, opportunities on alignment with MARPOL conventions, and threats on increasing maritime traffic and transboundary risks.

4 Results

Several laws of the sea govern, protect, and safeguard the marine environment in Thailand. The findings depict the clear legal framework available to ascertain the marine boundaries, safety, and protection of shoreline communities and the marine environment.

The authors provide the following analysis regarding previous literature and its content analysis, ensuring the existing legal framework gaps during the oil spill scenarios. The authors try to separate the timelines regarding national and International laws, conventions, and treaties.

The precautionary principle, set out in Principle 15 of the Rio Declaration on Environment and Development (1992), provides that where there are threats of serious or irreversible environmental harm, lack of complete scientific certainty shall not delay cost-effective preventive measures. Although the Rio Declaration is considered a "soft law" instrument, it has been widely recognized globally, including in Thailand, where its principles influence national environmental legislation and policies. Complementing this, the polluter pay principle requires that those responsible for pollution bear the costs of prevention, mitigation, and compensation. These principles are reflected in laws such as the United States' Oil Pollution Act 1990 and Thailand's Enhancement and Conservation of National Environmental Quality Act 1992 and have been applied in major oil spill cases including Exxon Valdez (1989), (Ramseur, 2010), and the Rayong oil spill (Pongpiachan, 2018), demonstrating their importance in ensuring environmental protection and accountability.

For example, In Thailand, the precautionary principle, which requires taking preventive action when environmental harm is possible even without full scientific certainty, is applied in both civil and administrative courts. In the Rayong oil spill (2013), civil courts handled lawsuits filed by villagers and local businesses against Star Petroleum Refining and PTTGC for failing to prevent environmental damage, while administrative courts reviewed the government's response to ensure proper enforcement of environmental regulations. This demonstrates how Thai courts use the precautionary principle to require both private companies and state agencies to take proactive measures to prevent or mitigate environmental harm, supported by the Enhancement and Conservation of National Environmental Quality Act B.E. 2535 (1992) and constitutional provisions on environmental protection.

The government laws that support the effective oil spill response and recovery were found to be at three levels of governance.

These levels are as follows:

1. Local Level- Tambon Administration Organization (TAO) and Department of Fisheries (DOF).
2. National Level- Oil Pollution Act (OPA) and Marine Department.
3. International Level- The United Nations Convention on the Law of the Sea (UNCLOS) and International Tanker Owners Pollution Federation Ltd (ITOPF).

Since Thailand does not have the Particular Oil Spill Act, would any damages use similar law enactments to claim oil spill compensation from the damagers? Nowadays, we have five relevant laws.

1. Thailand's civil and commercial law code in the section on Wrongful Acts.

Section 420 states, "A person who, willfully or negligently, unlawfully injures the life, body, health, liberty, property or any right of another person, is said to commit a wrongful act and is bound to make compensation".

Section 425. An employer is jointly liable with their employee for the consequences of a wrongful act committed by such an employee during their employment.

Section 425. An employer is jointly liable under Section 437. A person is responsible for injury caused by any conveyance propelled by the mechanism, which is in his possession or control, unless he proves that the injury results from force majeure or fault of the injured person, or his employee, for the consequences of a wrongful act committed by such an employee during his employment.

The Civil and Commercial Code does not have a system for limiting the liability of tanker owners, such as those commonly applicable in foreign countries.

2. NAVIGATION IN THE THAI WATERS ACT, B.E. 2456 (1913) Section 119.69 No person shall pour, dump or act in any way that will drop rocks, pebbles, sand, soil, mud, ballast, object or any other waste substance, except oil and chemical substances, into any river, canal, marsh, reservoir or lake that is used as a public travelling route or for common use, or any sea within the Thai waters which will render them shallow, sedimentary or dirty, unless he or she has obtained permission from the Harbor Master. Whoever violates this provision shall be liable to imprisonment for a term not exceeding six months or to a fine not exceeding ten thousand baht or to both and shall also make compensation for the expenses paid for the disposal of such substances.

Section 119 bis. No person shall pour, dump or act in any way that will drop any oil, chemical substances or any other thing into any river, canal, marsh, reservoir or lake that is used as a public travelling route or for common use, or any sea within the Thai waters which will be harmful to the living things or environment or cause danger to the navigation on such river, canal, marsh, reservoir or lake. Whoever violates this provision shall be imprisoned for a term not exceeding three years or fined not exceeding sixty thousand dollars.

In this perspective, the Navigation in Thai Waters Act broadly speaks of navigation. There are no actions that cause pollution. There are two types of causes of pollution. Firstly, the non-oil and chemical substances according to Section 119. And secondly, the cause of pollution of oil and chemicals according to Section 119 bis. In this regard, the offending person is guilty of criminal penalties and has to indemnify the detoxification; however, it differs in the higher criminal penalty for oil and chemical pollution.

Although this Act requires polluting people to pay their expenses, it is enforced only in the case of A person who willfully made actions. Any negligence action is out of the scope of this Thai Act. Also, this law would not apply to the economic zone because there are no rules regarding the ownership of oil spills or the boat's obligation.

3. Enhancement and conservation of the national environmental quality act, B.E. 2535 (1992). This Act is legal regarding the liable parties responsible for the environmental damages and pollution. However, the liable party can claim the exception clause under the three conditions mentioned below:

a. Force majeure and War.

b. Actions lead to the occurrence under the order of the government/official ordinances.

c. Actions or omissions under the legal Acts in Thailand.

However, this Act does not specify any limitation on the liability of perpetrators.

4. Regulation of the Prime Minister's Office on the Prevention and Elimination of Water Pollution.

According to the guidelines provided by the International Convention on Civil Liability for Damage caused by Pollution 1992, the Thai government has issued the Regulation of the Prime Minister's Office on the Prevention and Elimination of Water Pollution. Thailand, along with the other members of ASEAN, signed a Memorandum of Understanding (MOU) on May 20, 2536, as the ASEAN Oil Spill Response Action Plan (ASEAN-OSRAP in Tokyo, Japan. Thailand followed this Memorandum to formulate this regulation.

Under Articles 6, 10, and 17: The objective of the regulation is to establish and organize a special committee on prevention and elimination of water pollution (Kor Por Nor) for monitoring oil spill cases, oil transfer, and the contamination caused by the oil spill disaster. This committee is responsible for the announcements and

awareness of the procedural steps to be followed at the local community level, enhancing the coastal restoration process.

5. Civil liability for oil pollution damage caused by ships act, B.E. 2560 (2017).

Thailand has ratified and is a member of the International convention on civil liability for oil pollution damage, 1992; therefore, it created the Civil Liability for Oil Pollution Damage Caused by Ships Act, B.E. 2560 (2017). This Act signifies the responsibility and liability of the oil spill perpetrators for releasing the oil in the ocean, leaking oil, or committing accidents caused by oil companies while transferring the oil from ships to storage at ports. The affected parties will receive adequate compensation, and the ship owner is described as the strictly liable party to cover damages and losses. It is ensured that the shipowner will cover any financial offer regarding any collateral damage caused by oil pollution as the liable and responsible party. A special court, called the Court of Intellectual Property and International Trade, was established and is responsible for resolving the disputes arising from the legal cases of oil spills and collateral damages.

The findings depict the lack of a legal framework for effective oil spillage clean-up mechanisms and insufficient resources at all levels of oil spill disaster governance in Thailand.

Thailand has a defined legal framework to govern any disaster effectively. However, it was found that the existing framework is still inadequate and inefficient in curbing the damages and losses in terms of disasters. The framework consists of the laws, Acts, policies, ordinances, and other ministerial announcements under the constitution of Thailand. However, these different levels are bound by a strict hierarchy, making it almost impossible for the local disaster response and recovery officials. The previous literature and oil spill disaster event recordings are limited in Thailand, with gaps in the understanding and analysis of oil spill disaster response and recovery mechanisms; absence of ground-level implementations, surveillance, and registration of small-sized boats and sea activities, which are not adequately monitored.

Most local-level oil spill response agencies were unequipped with adequate equipment, human resources, or a technical support system. These discrepancies were found to exist up to the provincial level. When the question was raised to one of the respondents from the marine department, she added,

"It is imperative to have ready-to-use equipment at the local levels. However, it becomes a hard reality due to budgetary constraints and dependence upon the approval from various levels of national government offices!".

Such responses lead to an understanding of the inadequate perception of the oil spill disaster at the national, provincial, and local levels of government. Such scenarios are adversely affected by other more catastrophic disaster types, which result in direct human or economic losses. Thailand has been experiencing other disasters such as floods, droughts, tsunamis, and cyclones. However, the oil spill may seem less threatening regarding direct human losses. Still, the environmental and economic damages are far greater and should be included in Thailand's legal framework of disaster management and disaster governance.

These practices are linked with the strict top-to-bottom management approach at almost every level of disaster governance in Thailand. The strict top-to-bottom approach among three-tier cleaning procedures and over-dependence upon the eyewitness to report the incident results in the delay of oil spill response and recovery mechanisms. One of the respondents from the local search and rescue department in the coastal areas of Thailand adds,

"I have been volunteering as a government employee to rescue wild animals during the oil spill event. However, I need to wait until I get approval from the higher authorities. I understand the official procedures, but I could have acted faster and reduced the damages if I could have had limited autonomy at the incident level."

On the other hand, the provincial and national-level officials contradicted the idea of providing enhanced authorities at the local level. One of the national-level program coordinators for oil spill incidents adds,

"I know it is hard to search and rescue and reduce the damages; however, to ensure the oil spill event's transparency, responsibility, and fair dealing, the higher-level authorities must follow the designated procedures. However, this could be revised further to enhance the response's promptness towards the oil spill event."

These changes depend upon the national level policies and guidelines, which have a ripple effect upon the promptness and effectiveness of the response and recovery actions at the local levels. The existing laws, policies, and entire infrastructure for combating oil spills in Thailand exclude consideration of the environmental factor. The laws are found to be lacking in protecting the marine life and environmental flora and fauna.

One of the NGO members working extensively for the environmental issues in Thailand adds,

"OK. No human loss. I accept that. How about the fish that die due to an oil spill? Humans cannot visit the coastal areas until the clean-up process is complete. The corals and seabed environment are expected to change over the next years. It affects tourism as well."

The statement is true as tourism is a prominent factor in Thai people's economic and social development in the coastal belts. Unawareness leads to inefficient policies and legal guidelines that adversely affect the entire region. This unawareness, in turn, hurts the environmental sustainability in Thailand.

4.1 Case study

The recent Oil spill incident encountered by the Thai oil spill governance framework was on 25th January 2022. Star Petroleum Refining Company (SPRC) was responsible for this incident. The quantity of oil spilled was 47,000 liters of crude oil spilled in the Gulf of Thailand in the Rayong province, affecting 47 sq. km of the sea area. The cleaning process of the oil spill resulted in the utilization of 5,000 liters of water to mitigate the oil spill.

The first responder among government organizations was the Pollution Control Department, supported by the Royal Thai Navy and the Royal Air Force. Other agencies, such as Geo-Informatics and Space Technology Development Agency (GISDA), provided satellite imagery; however, the absence of inclusion of these GIS-

based data into the ground-level clean-up process was found to be lacking in Thailand.

The level of the oil spill was Tier 2 as the leak was around 47,000 tonnes. The local governor declared a provincial emergency to curtail the losses and speed up the cleaning process. The vulnerabilities in human losses were negligible, as no injuries were reported among humans. However, a crucial threat was observed to marine life. Mae Ram Phueng beach was shut down, adversely affecting tourism and local businesses. One of the local affected community members added,

"The impact was severe and lasted over two weeks, with the local shops closed. The government departments took almost three days to start the procedures to assist."

One of the respondents from the local pollution control department added,

Our department requires authorization before implementing the action. We have to collaborate with the military personnel, company officers, and local affected people. It took almost 78 hours to complete all these procedures. We, as a department, need more comprehensive planning and resources for a future oil spill incident."

The major limitations were found regarding mismanagement of the cleaning process as Army and Company employees joined efforts. However, this joint cleaning operation had no government policy, procedure, or planning. The absence of oil spill contingency planning in Thailand was a critical gap at the governance level. Given the current scenario, this case study provided the learning experiences of Thailand's most recent oil spill scenario.

MARPOL Convention 73/78 aims to prevent and reduce pollution caused by ships, whether it occurs from operations or is caused by an accident (Mitsilegas et al., 2022). For instance, it sets a framework of obligations of the parties, provides mechanisms to enforce conventions and dispute resolution, and details the prevention and reduction of various types of pollution caused by ships. MARPOL Convention 73/78 consists of six annexes: Firstly, Annex I: Regulations for the Prevention of Pollution by Oil. Secondly, Annex II: Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk. Thirdly, Annex III: Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form. Fourthly, Annex IV: Prevention of Pollution by Sewage from Ships. Last, Annex V: Prevention of Pollution by Garbage from Ships. Finally, Annex VI: Prevention of Air Pollution from Ships.

Importantly, Annexes 3, 4, 5, and 6 are the optional annexes, which means that the Parties of the MARPOL 73/78 Convention may not ratify and accede by declaration. Even if Thailand is currently a party to the MARPOL 73/78 Convention, Thailand has not yet ratified Annexes 3-6. In other words, Thailand is a party to the MARPOL 73/78 Convention Annexes 1 and 2. The Convention and its annexes do not cover all sources of pollution on the ships. In particular, it does not cover air pollution on board, which is a major contributor to global warming and environmental problems worldwide, because ships have many sources of air pollution, such as exhaust machines, chiller equipment, etc.

There are advantages and disadvantages of ratifying the rest of the Annexes in MARPOL Convention 73/78 (Gollasch et al., 2007). Considering becoming a party, Thailand shall take time to determine the availability of internal laws for the government and private sector. In addition, becoming a party would burden government agencies in terms of personnel preparation and budgeting in many aspects. Therefore, Thailand should weigh the benefits of becoming a party and improve its internal law by providing the regulations of Annexes 3, 4, 5, and 6 to enhance future party accession. Nowadays, Thailand is not yet ready to become a party in Annexes 3, 4, 5, and 6 for many reasons; Firstly, Thailand's existing internal law is insufficient to enhance the obligations under the Annex. Secondly, Thailand's ratification method and internal legislative implementation are inappropriate for fulfilling the obligations of the MARPOL 73/78 Convention. Thirdly, Thailand does not have the readiness of personnel and obligation fulfillment tools, which can cause problems in fulfilling obligations and may affect Thailand's reputation.

4.2 SWOT analysis

This research found the ground-level realities of the response, recovery, and overall disaster management framework and procedures relating to an oil spill disaster event. These are further analyzed through the following SWOT analysis. The SWOT analysis was conducted through a structured review of primary legal documents, academic literature, and case studies of oil spill incidents in Thailand. Each factor was coded into the four SWOT categories using predefined criteria: (a) Strengths were identified as provisions demonstrating legal enforceability and institutional efficiency; (b) Weaknesses referred to gaps in law enforcement capacity and limited jurisdictional authority; (c) Opportunities highlighted areas where best international practices could be adopted; and (d) Threats reflected external challenges such as increasing maritime traffic and climate-related risks. This systematic approach ensured reproducibility and transparency in the analytical process (Konopka et al., 2023; Rim-Rukeh, 2015).

Strength: The strengths found in this research are the existing framework, an abundance of volunteers pouring in during the oil spill incidents, and the growing economy, providing various opportunities to cope with an oil spill disaster faster (Sinlapapiromsuk, 2017). Under the various ministries and governmental departments, and with prompt assistance from the Royal Thai Army and the Royal Thai Navy, the oil spill cleaning process and curtailing of the extensive damages have been regulated. The NGO and company employees also assist in the cleaning process. Such regulations were found to be regulated as the authority level of the armed forces superseded by the other assistant groups. Thailand has been a leader in the ASEAN region in terms of leading the disaster management and response systems. The oil spill disaster has also been regulated with the assistance of Thailand in the ASEAN region. However, the resources are lacking in terms of ground-level implementations (Refer to Figure 1).

Weaknesses: The major finding of this research is the absence of prompt decision-making despite Thailand's existing legal and regulatory framework. In addition, there is overdependence on evidence for initiating the response and recovery mechanism, and there is a strict top-to-bottom approach at the local and national

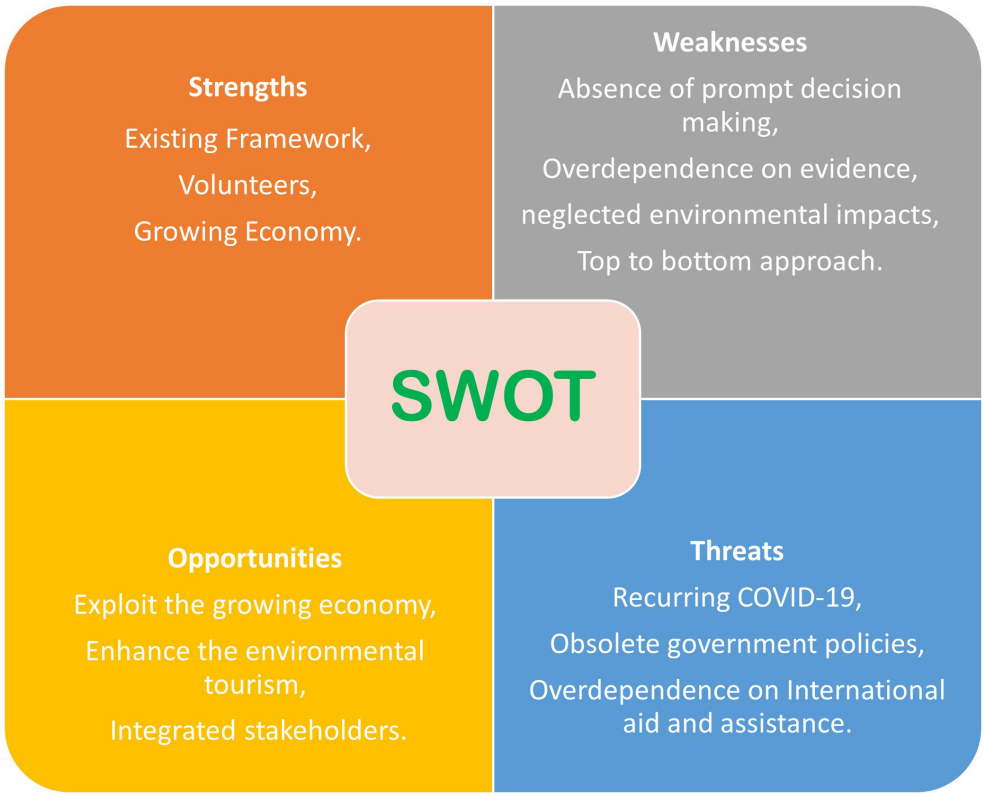

FIGURE 1
SWOT analysis of Oil Spill disaster in Thailand.

level of governance. The mismanagement of the oil spill cleaning process resulted in eradicating the coral reef within 24 hours of contamination by the oil and dispersants. The impact on marine animals such as turtles and dolphins was found to be lethal in most of the oil spill incidents in Thailand. Such discrepancies were recently noticed in the Rayong oil spill incident as well.

Opportunities: Several opportunities exist in Thailand's EEZ, and the government must exploit the growing economy. Such benefits could be achieved by revising the tax benefits, oil transfers at the port or harbors, and facilities for oil transfer in the open sea. Another opportunity is to enhance environmental tourism, such as the Pink Dolphin sighting tours in the GoT or the coral reef snorkeling in the Andaman Sea. To avail and adopt all possible opportunities, Thailand must include all the stakeholders to respond quickly to an oil spill event and further support the normalcy at the affected coastal region. A GIS-based database could be included in the oil spill and cleaning process. The pipeline could be monitored through the GIS-enabled data and provide for limited oil spillage in the future.

Threats: The current threat, which takes away the limelight from any other disaster, is the recurring COVID-19 pandemic in Thailand. In these catastrophic times, it is imperative to lose concentration on small or non-human loss disasters such as an oil spill event. However, measures must be adopted to minimize damage during disaster events. Another threat is the unsealed attitude of the government to revise the obsolete government policies, which do not consider the tankers and companies involved in illegal oil spillage to reduce their taxation at the port levels. These old laws do not cater to the growing unethical oil smuggling, spillage to pay less taxes, and other unlawful acts at sea. Similarly, the laid-back attitude of the Thai government regarding the oil spill disaster is due to the overdependence on international aid and assistance rather than being self-sufficient.

The SWOT analysis shows that Thailand's legal framework contains strengths such as the Civil Liability for Oil Pollution Damage Act, but enforcement weaknesses remain due to limited sanctioning powers. To strengthen analytical clarity, the SWOT analysis results in a comparative format. For example, while the Marine Department's institutional authority is identified as a strength, enforcement gaps in sanctioning capacity remain a weakness. Opportunities such as harmonization with MARPOL standards contrast with threats posed by rising tanker traffic in the Gulf of Thailand.

5 Discussion

The research focuses on being the crucial study for the policy formulation and to assist the empowerment of the oil spill prevention and preparedness mechanism in Thailand (Li et al., 2016; Michel, 2000; Parviainen et al., 2022). It was found that governance negligence and inadequate policy implications were encountered in the oil spill disaster response and mitigation techniques. All the stakeholders involved found it lacking in adequate implementation at the ground level. Thailand's legal

framework demonstrates institutional strengths in maritime authority but also reveals weaknesses in sanctioning capacity.

In case of an oil spill incident, the Thai government and local bodies could legally sue the company responsible for the oil spill in the administrative court. This scenario is due to the oil spill's environmental impact, which might result in enhanced coastal populations and marine life vulnerabilities. However, the communities, which are first responders impacted by the oil spill, have the right to sue the Court of Justice as a private lawsuit. Such is also true in the case of pipeline leakage and oil spills from tankers or ships on the coastal boundary of Thailand. For instance, the legal measures must be adopted from the guidelines of the international Convention and the national Acts to preserve the environment and coastal communities. These laws and conventions are analyzed in this research to provide concrete recommendations to the policymakers and private stakeholders involved in the oil spill response and recovery phases.

The Legal measures to prevent oil pollution from oil spills of oil tankers are the best measures to conserve and protect the marine environment. Because crude oil is difficult to decompose, and toxic substances of crude oil can accumulate in nature for a long time. Therefore, preparing plans and legal measures to prevent the cause of the oil tanker is one of the most suitable solutions. Thailand will have a law on civil liability for damages from oil pollution that would apply in the future. In addition to making Thailand have special laws in specific cases, it would also be consistent with international principles. It would enable the judgments of the Thai courts to be enforceable against States Parties. This law shall implement the International Convention on Civil Liability for Damage from Oil Pollution, BE. 2512, as amended in BE. 2535. The Civil Liability for Oil Pollution Damage Act B.E. 2560 (2017) establishes strict liability for shipowners while mandating compulsory insurance coverage to ensure victim compensation, thereby internalizing the environmental costs of maritime activities.

To make it globalized, Thailand should have a special law on liability and limitation of liability at the local level, which could benefit those who suffer from oil pollution in the local area. Therefore, the person liable was identified when the damage occurred, and the ship-owner is liable automatically. This result would make it more convenient and easier than the rules under the Civil and Commercial Law Code (under section 420) and the Civil Liability for Damage from Oil Pollution Act BE.2560. For example, if the amount of such damage is greater than the liability limit prescribed by the bill. Considering the relevant international conventions, it can be seen that there are no legal measures between countries to prevent oil spills from war and terrorism in any way. The international obligations under the Convention relating to preventing oil pollution from the oil spills of the above tankers are as follows: Thailand is a party to all such international conventions. All of them are already in force. Therefore, Thailand has international obligations under conventions and must make its domestic laws consistent with the conventions to which it has been a party or implement them into domestic law.

Although relevant legal measures have been put in place and enforced in Thailand, in the case of willful human actions such as oil dumping and smuggling, it can be done by preparing and equipping waste handling equipment in the ports under the rules of the Marine Department in the five port zones, such as the Bangkok Port Area. Sriracha Port Area, Map Ta Phut Port Area, Songkhla Port, and Phuket Port Area. In addition, cooperation between states and the private sector has also contributed to promoting and supporting more effective preventive legal measures. To monitor oil spills in the sea, the authors consider that it is necessary to modernize the obsolete parts, such as expanding the scope of enforcement, which were originally only applicable within the inland waters, territorial seas and contiguous zones. as may be amended cover to the Economic Zone and Continental zone to comply with international obligations under the 1982 Convention on the Law of the Sea 1982.

6 Conclusion

The application of the precautionary principle and the corresponding jurisdiction of Thai courts directly influence how oil spills are managed today. Civil courts ensure that companies responsible for spills, like Star Petroleum Refining in the Rayong oil spill, are held financially accountable, enforcing the polluter pay principle and providing compensation to affected communities. Administrative courts compel government agencies to implement preventive and regulatory measures, such as monitoring pipelines, conducting environmental impact assessments, and enforcing cleanup standards. Therefore, these mechanisms encourage both private and public actors to adopt stricter safety practices, improve preparedness, and mitigate environmental damage, and reducing the risk and severity of future oil spills in Thailand.

The recommendations from this study are as follows:

Restructuring of the Standard Operating Protocol (SOP) to curtail damages from the oil spill events at the government level.

Empowerment of the local level government agencies in terms of oil spill response capacities and combating the illegal spillage and leakages by the companies.

The government must create a monetary fund to be self-sufficient and provide prompt financial assistance towards oil spill response and recovery.

The government must ensure and implement safety procedures for the small boats and tankers, as they are found to be lacking in adopting non-structural measures, such as insurance.

The government must ensure tourism development to support the small boat owners. For Instance, the sea tours to visit the Islands and see pink dolphins in Koh Samui.

All stakeholders, such as first responders in terms of communities, armed forces, and non-governmental organizations, should be included.

Rather than creating new, stand-alone legislation on oil pollution, it is recommended that Thailand strengthens its existing Environmental Law by expanding the authority to impose sanctions directly on polluters. This approach would streamline enforcement mechanisms and ensure timely accountability.

To enhance enforcement efficiency, Environmental Law should explicitly incorporate the principle of absolute liability. This would make polluters unconditionally responsible for environmental recovery efforts and sanctions, thereby empowering the government to act swiftly in law enforcement and ensure that polluters bear full responsibility for the damage they cause.

Expanding sanctioning powers under existing environmental law, adopting absolute liability principles, harmonizing with MARPOL obligations, and strengthening institutional enforcement capacity are essential to ensure timely and effective oil spill governance.

The oil spill disaster in Thailand may not be on the same scale as floods, droughts, and the COVID-19 pandemic. However, the economic and environmental impacts are catastrophic. This study provides recommendations through the in-depth analysis of the available data in Thailand. The legal framework exists. However, the implementation must be revisited and revised adequately. Revising these Acts includes the Navigation in the Thai Waters Act, B.E. 2456 (1913), Thailand's civil and commercial law code, and the International Fund for Compensation for Oil Pollution Damage Caused by Ships Act, B.E. 2560 (2017).

This study concludes that Thailand's oil spill governance requires expansion of sanctioning authority, adoption of absolute liability principles, and stronger institutional coordination to ensure effective environmental recovery and compensation.

This study demonstrates that Thailand's current legal framework provides a strong foundation for oil spill prevention, yet weaknesses in enforcement and sanctioning capacity remain critical. This study concludes that Thailand's oil spill governance requires expansion of sanctioning authority, adoption of absolute liability principles, and stronger institutional coordination to ensure effective environmental recovery and compensation.

This research paves the way for future research into oil spill disasters and their implications beyond national boundaries. The ASEAN region, led by Thailand, must conduct focused research to maintain the seas free from oil spills.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary Material. Further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by the Ethics committee in Human research Walailak University under project number WU-EC-LA-2-286-65 and approval number WUEC-22-255-01. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

SL: Visualization, Methodology, Investigation, Writing – original draft. SP: Data curation, Visualization, Methodology, Formal Analysis, Validation, Project administration, Conceptualization, Supervision, Software, Writing – original draft, Investigation, Funding acquisition, Writing – review & editing, Resources. MY: Validation, Writing – original draft.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fmars.2025.1632601/full#supplementary-material

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