TULANE MARITIME LAW JOURNAL

VOLUME 47 SPRING 2023 NUMBER 2

Coastal State vs. Flag State: Countries' Mitigation of Environmental Harm from Scrubbers?

Shams Al-Hajjaji*

This research argues that countries should adopt unified regulations regarding the release of the wash water from the Exhaust Gas Cleaning Systems in their port, territorial, and Exclusive Economic Zone (EEZ). Ships use scrubbers to decrease their greenhouse gases emission in order to comply with the International Maritime Organization sulphur content of ships' fuel limit. In January 2020, the global upper limit reached 0.5%. Ships release scrubbers' wash water (SWW) into the sea. The SWW includes toxic materials. The 2008 and 2015 Guidelines for the Exhaust Gas Cleaning Systems regulates the level of the SWW. However, there is uncertainty related to the SWW harm to the marine environment and human health. This uncertainty reflects as well on the national level. Currently, countries fall under one of three main categories. The first is countries that adopt a complete ban against using scrubbers in their territorial water, such as Egypt and Qatar. The second is countries that partially ban the use of scrubbers. The second form is a ban against the type of the discharge/disposal from open loop discharge (Argentina, China, and France). The third type is countries that do not regulate the discharge of scrubbers. Hence, this research is divided into three Parts. After a brief Introduction, Part II tackles who bears the responsibility to investigate environmental harm, especially the transboundary harm of the scrubbers' wash water. Part III deals with the legal models that are adopted by the national regulations related to SWW. These models are (1) limited ban, versus unlimited ban, (2) specific regulations, versus general regulations, and finally (3) binding, versus non-binding regulations. Part IV deals with the solution to the uncertainty.

* © 2023 Shams Al-Hajjaji is postdoctoral research associate at The Walther Schücking Institute for International Law at the University of Kiel, Germany. This Article is a part of the ShiptTrase project and was funded jointly by Belmont Forum (USA) and the Federal Ministry of Education and Research (Germany).

I. INTRODUCTION

The research argues that states should adopt unified regulations regarding the release of the wash water from the Exhaust Gas Cleaning Systems (Scrubbers) in their ports, territory, and Exclusive Economic Zone (EEZ). Ships use scrubbers to decrease their greenhouse gases emission in order to comply with the International Maritime Organization (IMO) sulphur content of ships' fuel limit.[1] In January 2020, the global upper limit reached 0.5%.[2] The shipping industry has three choices to comply with the IMO new levels.[3] (1) Ships can use an alternative fuel, such as LNG, methanol or electricity.[4] (2) Ships can use heavy fuel oil (HFO), which includes low sulfur fuel and ultra-low sulfur fuel oil.[5]

---

1. Liudmila Osipova, *Global Scrubber Washwater Discharges Under IMO's 2020 Fuel Sulfur Limit*, INT'L COUNCIL ON CLEAN TRANSP. (Apr. 2021), https://theicct.org/sites/default/files/publications/scrubber-discharges-Apr2021.pdf.

2. Marine Environment Protection Committee, Res. MEPC.320(74), 2019 Guidelines for Consistent Implementation of the 0.50% Sulphur Limit Under MARPOL Annex VI.

3. Pei Chi Wu & Cheng Yuan Lin, *Cost Benefit Evaluation on Promising Strategies in Compliance with Low Sulfur Policy of IMO*, 9 J. MAR. SCI. ENG. 3-6 (2021).

4. Julia Hansson, Stina Mansson, Selma Brynolf & Maria Grahn, *Alternative Marine Fuels: Prospects Based on Multi- Criteria Decision Analysis Involving Swedish Stakeholder*, 126 BIOMASS AND BIOENERGY 159-73 (2019); *see* Julia Hansson, Selma Brynolf, Erik Fridell & Mariliis Lehtveer, *The Potential Role of Ammonia as Marine Fuel- Based on Energy Systems Modeling and Multi-Criteria Decision Analysis*, SUSTAINABILITY 12 dx.doi.org/10.3390/su12083265.

5. Minna Alhosalo et al., HELCOM-Helsinki Commission, Baltic Marine Environment Protection Commission, *Alternative for Shipping in the Baltic Sea Region, Baltic Marine Environment Protection Commission*, HELCOM-HELSINKI COMM'N (2019).

(3) Ships can continue to use the non-compliant fuel oil (high sulfur dioxide), on the condition that these ships must install scrubbers.[6]

While scrubbers help ships comply with the IMO standards,[7] there is scientific uncertainty related to the SWW's harm to the marine environment and human health.[8] Ships that use scrubbers release the SWW into the sea,[9] which includes toxic materials like trace metals, pollutant, nutrients, and pH, among many other elements that are still under further scientific investigation by the IMO.[10] The 2015 Guidelines for Exhaust Gas Cleaning Systems (the 2015 Guidelines) state the required levels of the SWW.[11] Table (1) includes the elements and their limits that SWW should abide by. Yet, the 2015 Guidelines, and previously those of 2008,[12] urge states to revise these limits. These 2015 Guidelines state, "[t]he criteria should be revised in the future as more data becomes available on the contents of the discharge and its effects."[13]

Currently, there are three official country reports submitted to the IMO regarding the environmental harm of SWW. The first report was submitted by the Japanese government.[14] It argued that the SWW complies with the 2015 Guidelines.[15] It also concluded that there is no environmental harm incurred by the SWW.[16] The second report is by the Panamanian Government.[17] The report lobbies for further investigation

---

6. Directive 2016/802 of the European Parliament and of the Council of 11 May 2016 relating to a Reduction in the Sulphur Content of Certain Liquid Fuels, 2016 O.J. (132/58).

7. *Id.*

8. *Id.*

9. Erik Ytreberg et al., *Effects of Scrubber Wash Water Discharge on Microplankton in the Baltic Sea*, 145 MARINE POLLUTION BULLETIN 316-19 (2019).

10. Danish Ministry of the Environment, Environmental Protection Agency, *Exhaust Gas Scrubber Installed Onboard MV Ficaria Seaways*, Public Test Report-Environmental Project No. 1429 (2012), https://www2.mst.dk/udgiv/publications/2012/06/978-87-92903-28-0.pdf.

11. Marine Environment Protection Committee, Res. MEPC.259(68), 2015 Guidelines for Exhaust Gas Cleaning Systems.

12. Marine Environment Protection Committee, Res. MEPC.170(57), 2008 Guidelines for Exhaust Gas Cleaning Systems.

13. Marine Environment Protection Committee, *supra* note 11, at 23.

14. Jirou Koyama et al., *Report by the Expert Board for the Environmental Impact Assessment of Discharge Water from Scrubbers (Japan)*, Marine Environmental Protection Committee-74th Session (Mar. 8, 2019), https://globalmaritimehub.com/wp-content/uploads/2019/04/Report-by-the-expert-board-for-the-environmental-impact-assessment-of-discharge-water-from-Scrubbers-Japan.pdf.

15. *Id.*

16. *Id.*

17. John Heywood & Emmanuel Kasseris, *Pollution Prevention and Response Scrubbers Environmental Impact Literature Review (Panama)*, Marine Environmental Protection Committee-74th Session (Feb. 8, 2019), https://1u594u31nvw01cjgyx4gvsr15ge-wpengine.net

on environmental harm.[18] The study is a literature review of several official reports from Denmark-EPA, US-EPA, and the German Federal Environmental Agency.[19] The report concludes that the materials included in SWW have harmful effects on marine life and the ocean's ability to absorb CO_2.[20] The third report is that of Greece,[21] and it adopts two models that are near field model and the far field model.[22] The report concluded that while there might be no environmental harm on the near field model, there is a harmful effect on marine life based on the far field model.[23]

Table (1): SWW Criteria According to the 2015 Guidelines

Elements	Limits
pH- 10.1.2	Less than 6.5 measured at the ship's overboard discharge-at 4 m from the overboard discharge point.
PAHs-10.1.3	Less than 50 μg/L above the inlet water PAH concentration.
Turbidity/suspended Particulate Matter-10.1.4	–Less than 25 FNU (formazin nephelometric units) or 25 NTU (nephelometric turbidity units) above the inlet water turbidity. –It should be measured after 15 mins.
Nitrates 10.1.5	Treatment system should prevent the discharge of nitrates beyond that associated with a 12% removal of NOx from the exhaust or beyond 60 mg/l normalized for wash water discharge rate of 45 tons MWh, whichever is

dna-ssl.com/wp-content/blogs.dir/1/files/2019/08/MEPC-74-INF.10-Scrubber-Environmental-Impact-Literature-Review-Panama-2019.pdf.

18. *Id.*
19. *Id.*
20. *Id.*
21. Emmanuel Kasseris et al., *Evaluation and Harmonization of Rules and Guidance on the Discharge Of Liquid Effluents From EGCS into Waters, Including Conditions and Areas (Greece)*, Marine Environmental Protection Committee-75th Session (Jan. 23, 2020), https://www.gob.mx/cms/uploads/attachment/file/546370/MEPC_75-INF.13_-_Evaluation_and_harmonization_of_rules_and_guidance_on_the_discharge_of_liquid_effluents_fr . . . __Greece_.pdf.
22. *Id.*
23. *Id.*

	greater.
Wash Water Additives and other substances 10.1.6	Additional wash water discharge criteria should be established.

SWW raises four legal problems. These problems are:

(1) the uncertainty of the science, as shown earlier;

(2) the uncertainty of legal status of the SWW, either pollution from the ship or pollution by dumping. To answer this question, one must distinguish between: (a) If there is an environmental harm from SWW, it is considered as pollution by dumping.[24] (b) if there is not any environmental harm from SWW, it is considered as pollution from the ship. [25]

(3) the uncertainty of who is responsible to mitigate the environmental damage from the SWW, either Flag state or Coastal State; and

(4) the uncertainty in the legal model adopted by national authorities to regulate SWW.

This research focuses on the last two problems, which are numbers (3) and (4). On the international level, the United Nations' Convention on the Law of the Sea (UNCLOS) imposes duties on the state to avoid transferring pollution from one type to another or from one location to another.[26] However, there is uncertainty regarding who is responsible for the alleviation of environmental harm from SWW in international law, whether Coastal state or Flag state. The responsibility to mitigate the environmental harm from SWW also depends on categorizing the SWW as pollution by dumping or pollution from the ship (normal discharge).

On the national level, the uncertainty has a severe effect on national regulations. While the majority of countries do not adopt unified or semi-unified regulations—as in the case of sulphur limits—other countries enacted regulations to SWW and then suspended these regulations. In Argentina, the coast guard banned the open loop SWW directly after the

24. Detlef Czybulka, *Commentary on Article 192 to 196, in* UNITED NATIONS CONVENTION ON THE LAW OF THE SEA: COMMENTARY, 1299 (Alexander Proelss ed., 2017).

25. Stefan Schmolke et al., *German Environment Agency, Environmental Protection in Maritime Traffic Scrubber Wash Water Survey*, UMWELT BUNDESAMT (Sept. 2020), https://www.umweltbundesamt.de/sites/default/files/medien/479/publikationen/texte_162-2020_environmental_protection_in_maritime_traffic_-_scrubber_wash_water_survey.pdf.

26. Article 195 of the UNCLOS states that "In taking measures to prevent, reduce and control pollution of the marine environment, States shall act so as not to transfer, directly or indirectly, damage or hazards from one area to another or transform one type of pollution into another." U.N. Convention on the Law of the Sea, *opened for signature* Dec. 10, 1982, 1833 U.N.T.S. 397 (entered into force Nov. 16, 1994) (UNCLOS).

IMO new levels. They issued disposition 15 of 2020 in August 2020.[27] However, the ban was suspended in October 2020.[28] The ban was based on the right of inhabitants to enjoy a healthy, balanced environment, suitable for human development. The ban includes all the territorial water in Argentina, internal water, contiguous zone, and the exclusive economic zone. Besides, other countries shift the burden of proof to the ship master to prove that there is no environmental harm from the SWW. In Australia, the Maritime Safety Authority issued the Marine Notice number 05/2019. It mandates that the master of the ship is to notify the Authority with "results of all wash water testing that has been undertaken in accordance with 2015 Guidelines for Exhaust Gas Cleaning Systems."[29] The Authority would have the right to ban the ship from releasing the SWW in Australian water, if the SWW did not comply with the guidelines.[30]

This research applies the comparative law method. This method includes comparing legal rules related to SWW in different countries in order to investigate which countries share the same legal approach (either banning scrubbers, permitting scrubbers, or mixture between ban and permission). The research does not adopt the case study method, which could include a macro comparison and detailed focus on general aspects of pollution from the ship regulation. Instead, the research shows the general themes under which each country's legislation falls. Currently, countries fall under one of three main categories. The first is countries that adopt a complete ban against using scrubbers in their territorial water, such as Egypt and Qatar. The second category is countries that place a limited ban on using scrubbers—a ban takes two forms. First, countries limit the use of scrubbers in certain areas of their internal water (Germany) or ports (Sweden and Finland). Second, countries limit their ban to the type of the discharge/disposal from open loop discharge (Argentina, China, and France). The third category is countries that do not regulate the discharge of scrubbers. These countries either depend on the general legal rules related to pollution from the Ships (article 192-237 of

27. Disposicion 15/2020, Prefectura Naval Argentina, August 03, 2020, B.O.

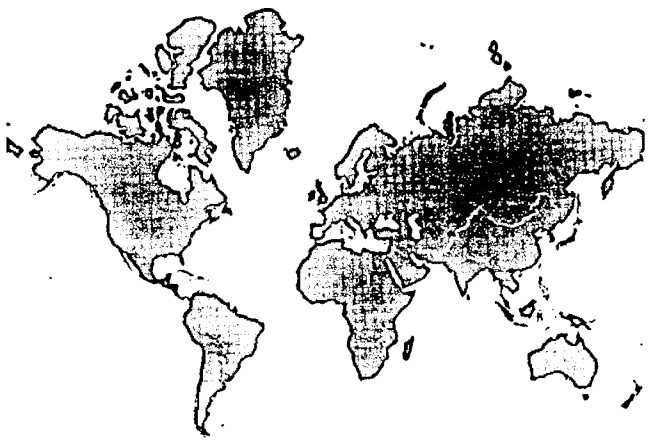
28. Ship and Bunker Newa team, Argentina Makes Provisional U-Turn on Scrubber Discharge Ban, SHIP AND TANKER (Oct. 16, 2020), https://shipandbunker.com/news/am/239054-argentina-makes-provisional-u-turn-on-scrubber-discharge-ban#:~:text=Argentina%20has%20suspended%20rules%20that,effect%20on%20August%2010%2C%202020.

29. Marine Notice 05/2019, Australian Maritime Safety Authority, *Requirements for the Use of Exhaust Gas Cleaning System in Australian Water and Reporting to AMSA.*

30. Akshar Arora, *News: Requirements for the Use of Scrubbers in Australian Waters & Reporting to AMSA,* STANDARD CLUB (Dec. 20, 2019), https://www.standard-club.com/knowledge-news/news-requirements-for-the-use-of-scrubbers-in-australian-waters-reporting-to-amsa-1244/.

the UNCLOS) or adopt a complete permission standard to the discharge of scrubbers in their internal water. Figure (1) shows countries that have an effective regulation towards SWW. Countries in red have regulations with either limited ban or full ban of SWW, while countries in blue do not have regulations as to SWW.

Figure (1): Countries Regulate Scrubbers



The research is divided into three sections. Part II investigates who bears the responsibility of investigating environmental harm, especially the transboundary harm of the scrubbers' wash water. UNCLOS recognizes three major actors in the field of marine environment. These actors are the Coastal state, the port state, and the Flag state, and this section presents the role of each. It also tackles ways to harmonize their action, especially with the increasing number of countries regulating SWW. Part III tackles with the four major trends in regulating SWW on the national level. These trends are (1) states with SWW regulations, either limited ban (port jurisdiction only) or unlimited ban (territorial water and EEZ); (2) states that apply general environmental rules; (3) states that enact specific regulations to SWW; and (4) states that issue non-binding temporary rules. Part IV deals with the solution to the uncertainty. The research proposes two solutions, which are answering the pending scientific uncertainty and the adoption of unified regulations.

II. UNCERTAINTY ON THE INTERNATIONAL LEVEL: COASTAL/PORT STATE VERSUS FLAG STATE

There are two types of pollution related to SWW: pollution by dumping and pollution from the ship.[31] One of the major complexities of the SWW regime is the uncertainty of its legal status.[32] The reason why it is complicated to determine the legal status is the uncertainty of environmental harm.[33] This uncertainty will lead to two legal regimes that potentially apply to SWW. The first is pollution by dumping.[34] There are several conventions that regulate pollution by dumping.[35] The following legal texts will be applicable with the existence of environmental harm from the SWW.[36] The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (London Convention-came into force on August 30, 1975), the 1982 UNCLOS, and 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (London Protocol—entered into force in 2006) are the three main legal texts dealing with dumping from the ship.[37] The second is pollution from the ship or discharge.[38] This type of pollution is only applicable with the absence of environmental harm from the SWW. The UNCLOS and the MARPOL Annex V are the most relevant legal texts dealing with pollution from the ship.[39] The MARPOL includes six annexes, of which Annex IV-the Prevention of Pollution by Sewage from Ships (entered into force on September 27, 2003) —and Annex V—the prevention of Pollution by Garbage from the Ships (entered into force on December 31, 1988)—are the applicable

31. Olena Lstyria & Alla Ivanova, *International Legal Protection of the Marine Environment from Pollution from Ships on the Example of the Black Sea*, 21 LEX PORTUS 41 (2020); *see* Joshua Ozymy & Melissa Jarrell, *Illegal Discharge: Exploring the History of the Criminal Enforcement of the US Clean Water Act*, 32 FORDHAM ENV'T L. REV. 206 (2021); *see also* Hakeem Ijaiya, *Responsibility of Transnational Environmental Pollution Under International Environmental Law*, 6 HARAMYA L. REV. 117 (2017).

32. Lstyria, *supra* note 31.

33. *Id.*

34. Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, International Maritime Organization (IMO) (1972) (The London Convention).

35. *Id.*

36. *Id.*

37. *Id.*

38. Schmolke, *supra* note 25.

39. Damien Cremean & Erika Techera, *Marine Pollution Law*, *in* ROUTLEDGE HANDBOOK OF INTERNATIONAL ENVIRONMENTAL LAW 285-89 (Shawkat Alam, MD Jahid Hossain Bhuiyan, Tareq M.R. Chowdhury, & Erika J. Techera eds., 2013).

Annexes on the SWW.[40] Hence, this section shows the competent authorities, measures, and auditing mechanism from the perspective of the each type of pollution.

A. The Competent Authority to Mitigate Environmental Harm

Under pollution by dumping, UNCLOS has created a balance between international competent actors. First, the coastal state is the competent state to handle cases and permissions related to dumping.[41] Second, the IMO is considered the competent international organization, whose members are obliged to follow its rules.[42] The EU has not been a member of the UNCLOS.[43] However, most of the decisions issued by the IMO have been incorporated into the EU directive.[44] In May 2021, the EU issued its European Climate law, which raised the standard to zero pollution/emission.[45] Third, the Flag state has to receive an explicit approval from the Coastal state in case the ship wants to dump any materials in the territorial waters of the Coastal state.[46] Article 210 (5) mandates an "express prior approval" in order to carry any licensed dumping action.[47]

In pollution by the ship, the regulation of the competent authority is based on several factors under UNCLOS. First, UNCLOS tries to create a balance between the coastal state, the flag state, and the port state on one hand and the IMO on the other hand. It delegates to the state the obligation to establish international rules and standards. However, they have to act through a competent international organization, which is IMO (article 211/1). This article authorizes IMO and its Marine Environment Protection Committee (MEPC) to issue all the detailed rules related to the pollution from the ship. It also includes the authority to negotiate

---

40. International Convention for the Prevention of Pollution from Ships, IMO (1973 as amended) (MARPOL).

41. Article 210.5 states "Dumping within the territorial sea and the exclusive economic zone or onto the continental shelf shall not be carried out without the express prior approval of the coastal State, which has the right to permit, regulate and control such dumping after due consideration of the matter with other States which by reason of their geographical situation may be adversely affected thereby." UNCLOS, *supra* note 26, pt. XII, art. 210, ¶5.

42. *Id.*

43. *Id.*

44. Directive 2005/33/EC of the European Parliament and the Council of July 6, 2005 amending Directive 1999/32/EC, O.J. (191/59).

45. European Commission, *European Climate Law*, https://ec.europa.eu/clima/policies/eu-climate-action/law_en.

46. UNCLOS, *supra* note 26, pt. XII, art. 210, ¶5.

47. *Id.*

MARPOL, its protocols, annexes, and the guidelines that interpret the practice to the member state and shipping industry alike.[48] In addition, UNCLOS requires the state and IMO to re-examine its rules related to the pollution from the ship from time to time. Even though this is not always the case (as in the case of 2008 and 2015 guidelines related to the wash water), it is still an effective way to ensure the rules and standards related to the pollution of the ship are not rigid. The MARPOL puts the general rules for the competent authority to tackle the issue of pollution from the ship.[49] As a rule, the flag state, if it is a member of the MARPOL, shall enforce the rules of the pollution from the ship.[50] If the flag state of the ship is not a member, it is up to both the coastal state and the port state to enforce the MARPOL rules.[51] The MARPOL Annex V gives the port state the lion's share of the responsibility for ship operation.[52] According to regulation 7, ships are subject to inspection by the port authorities regarding their operation.[53] The authorities have the right to prevent the ship from sailing in case of violation of the Annex V's rules until the ship's crew is able to settle any fragmentation of the discharge of garbage.[54]

B. The Competent Authority's Measures to Mitigate Environmental Harm

Under pollution by dumping, UNCLOS adopts several measures to make sure that dumping rules are effective. UNCLOS mandates that states and international organizations examine the rules from time to time.[55] This obligation is meant to ensure continuous abolishment of obsolete rules and the continuous adaptation of new rules related to dumping materials.[56] While states can adopt their own rules, they should act in accordance with competent international organizations-especially

48. To read about the governing legal system of the marine pollution *see* Arup Poddar, *Marina Pollution and its regulation*, 3 INT' J. L. STUD. & RES. 148-55 (2014); *see also* Liu Nengye, *International Legal Framework on the Prevention of Vessel-Sourced Pollution*, 2 CHINA OCEANS L. REV. 240-45 (2010).

49. MARPOL, *supra* note 40, art. 3.

50. *Id.*

51. *Id.*

52. MARPOL, *supra* note 40, Annex V.

53. *Id.*

54. *Id.*

55. UNCLOS, *supra* note 26, pt. XII, art. 210, ¶4.

56. Wacht, *Commentary on Article 210*, UNITED NATIONS CONVENTION ON THE LAW OF THE SEA: A COMMENTARY 1415 (Alexander Proelss ed., 2017).

IMO.[57] States are expected to adopt either international standards or higher standards.[58]

As for Annex III of the 1972 London Convention, it regulates three issues. Part A regulates characteristics and composition of the matter.[59] It includes the element that should be included, the amount, average composition of the matter dumped, its form, properties of the dumped materials, toxicity, persistence, accumulation, biotransformation in biological materials, susceptibility to physical/chemical effects as well as the probability of reducing the marketability of resources.[60] Part B regulates characteristics of the dumping site and the method of deposit.[61] It stipulates the elements that should be included in the permit for the dumping location.[62] These elements are: coordination of the dumping area, rate of disposal per scientific period, methods of packaging, initial dilution achieved by the proposed method of release, water characteristics, bottom characteristics (topography or geochemical), existence of other dumping in the chosen site, and considering the scientific evidence of the effect of dumping.[63] Part C regulates the general considerations and conditions of dumping. This part includes four general considerations:[64] (1) the possible effect on amenities, (2) the possible effects on marine life, (3) the possible effects on other uses of the sea, and (4) the practical availability of alternative land based methods of treatment.[65] As for the 1996 London Protocol amended in 2006, it mandates contracting parties not to transfer, directly or indirectly, damage or likelihood of damage from one part of the environment to another or transform one type of pollution into another.[66]

In pollution by the ship, UNCLOS ensures specific measures to each type of state in addition to their general requirement to effectively cooperate with IMO. For the flag state, it shall adopt laws that have the same enforcement power as the international standards or higher standards.[67] If the flag state adopts higher standards than the international

57. UNCLOS, *supra* note 26, pt. XII, art. 214.
58. *Id.*
59. The London Convention, *supra* note 34, Annex III A.
60. *Id.*
61. The London Convention, *supra* note 34, Annex III. B.
62. *Id.*
63. *Id.*
64. The London Convention, *supra* note 34, Annex III. C.
65. *Id.*
66. The London Convention, *supra* note 34, article 3.3.
67. Michael Tsimplis, *The Liability of the Vessel, in* MARITIME LAW 250-55 (Yvonne Baatz ed., 5th ed. 2021).

one, there is no legal problem as these rules are for the best of the environment.[68] However, the problem arises when the flag state adopts more lenient measures than the international one. UNCLOS obliges states to raise their standards to the minimum threshold, which is the international rules or standards.[69] UNCLOS, which adopts a higher standard related to the pollution from ships, requires the coastal state to distinguish between its rules in ports, internal water or offshore terminals, and its rules in EEZ.[70] In the first case, the coastal state shall give due publicity to all the requirements through IMO. This obligation is meant to inform the ships' crews of foreign vessels that they should comply with the new rules in the coastal state territory. The legal publicity of the rules by IMO helps to establish the assumption of *Ignorantia juris non excusat*.[71]

In the second case, the coastal state shall take into consideration three conditions: (1) The coastal state shall follow the general requirements related to the publication of the pollution limits;[72] (2) The coastal state shall "recognize technical reasons in relation to its oceanographical, and ecological conditions, as well as its utilization or the protection of its resources and the particular character of its traffic;"[73] (3) The coastal state cannot force foreign vessels in its EEZ to comply with requirements related to the "design, construction, manning or equipment standards, other than generally accepted international rules and standards."[74] The only exception to that is when IMO accepts the coastal state's higher standards.

As for MARPOL, it imposes several measures regarding the violation of its rules. (1) States have an obligation to detect any violation of the convention. This obligation does not violate the freedom of the high seas mentioned in UNCLOS.[75] (2) States, especially coastal states, have

---

68. Kristin Bartenstein, *Commentary on Article 211 to 215*, *in* UNITED NATIONS CONVENTION ON THE LAW OF THE SEA: COMMENTARY,1429 (Alexander Proelss ed., 2017).

69. *Id.*

70. *Id.*

71. *Id.*

72. UNCLOS, *supra* note 26, pt. XII, art. 211, ¶6(b).

73. *Id.* at ¶6(a).

74. *Id.* at ¶6(c).

75. Article 87 of the UNCLOS states that the high seas are "open to all States . . . . It comprises, inter alia, both for coastal and land-locked States:(a) freedom of navigation; (b) freedom of overflight; (c) freedom to lay submarine cables and pipelines, subject to Part VI; (d) freedom to construct artificial islands and other installations permitted under international law, subject to Part VI; (e) freedom of fishing, subject to the conditions laid down in section 2; (f) freedom of scientific research, subject to Parts VI and XIII.2. These freedoms shall be exercised by all States with due regard for the interests of other States in their exercise of the freedom of the

the right to inspect any ship within their territorial waters to identify any violation.[76] However, the burden of proof is always on the state. It has to prove that the discharged materials are harmful to the environment.[77] (3) The state shall inform the master of the ship of any fragmentation that the state authorities find in the ship under investigation.[78] If the state wishes to proceed with legal action against the alleged violation, it shall do so promptly. These procedures shall not be the reason for any undue delay of the ship.[79] In case of any undue delay, the ship owner is entitled for compensation for any damages.[80] (4) The state shall inform IMO and the flag state, upon the request of the state, of all the procedures and the results of the investigation.[81]

As for the MARPOL Annex V, it includes general rules to all member states and specific rules to the port authorities.[82] As for the general rules to the member states, the Annex puts some conditions that all member states should follow.[83] (1) Parties shall exercise their authority only if they are a flag state or a port state. If they are a coastal state, they shall not exercise this jurisdiction over the ships in the high seas.[84] (2) Parties shall notify IMO of any cases of violation to the Annex's regulations.[85]

As for the specific rules to the port authorities, the MARPOL Annex V ensures the right of the port state to inspect, through its authorized officers, any violation related to the operation of the ship, including any potential allegation of pollution.[86] Moreover, the Annex also gives this authority the right to prevent the ship from sailing in case of an unsolved situation of pollution.[87] A reading of the port state's right to suspend the

---

high seas, and also with due regard for the rights under this Convention with respect to activities in the Area." UNCLOS, *supra* note 26, pt. VII, art. 87.

76. MARPOL, *supra* note 40, art. 6/1.

77. *Id.* at art. 6/3.

78. *Id.* at art. 6/4.

79. *Id.*

80. *Id.* at art. 7.

81. Article 2 of Protocol 1 states "Discharge above the permitted level or probable discharge of oil or of noxious liquid substances . . . Discharge or probable discharge of harmful substances in packaged form . . . Discharge during the operation of the ship of oil or noxious liquid substances in excess of the quantity or instantaneous rate permitted." MARPOL, *supra* note 40, Protocol I.

82. MARPOL, *supra* note 40, Annex V reg. 7-8.

83. *Id.*

84. *Id.*

85. *Id.*

86. *Id.*

87. *Id.*

violated crew and ship has to be done in conjunction with the principle of prompt release of the vessels.[88] According to Article 292 of UNCLOS, authorities of state parties shall release any detained ship or crew promptly upon paying a reasonable bond and other financial security.[89] In the *M/V Saiga* case, the court found that releasing a ship after eighty days of detention is not considered as prompt release.[90] So, port states should deal with the articles related to their right to detain ships with high caution.[91]

III. LEGAL MODELS ADOPTED ON THE NATIONAL LEVEL: DISCREPANCIES IN STATES' POSITIONS

A. Limited versus Unlimited Ban

The first legal model adopted on the national level is a limited versus unlimited ban.

First, Countries adopt the limited ban to SWW on the port's jurisdictions only. This means that the ship can still release the SWW to other national waters, including territorial waters and EEZ. In Canada, Vancouver Fraser Port Authority issued new guidelines on SWW.[92] The Guidelines to restriction came into effect on March 1, 2022. The new guidelines prohibit the release of the SWW from all types of scrubbers (open loop, close loop, or hybrid).[93] The guidelines are limited to the vessels at the "anchorage or at berth within the port of Vancouver."[94] Ships with hybrid and close loop scrubbers are required to shift to zero discharge mode.[95] This means that SWW must be kept in tanks until disposed of at an authorized shore reception facility.[96]

China is considered the largest country investing in scrubbers.[97] It is estimated that the number of vessels that have installed scrubbers is more

---

88. Gunther Jaenicke, *Prompt Release of Vessels—The M/V "Saiga" Case*, 2 MAX PLANCK YB. U.N. L. 393 (1998).

89. UNCLOS, *supra* note 26, pt. XV, art. 292.

90. The M/V "SAIGA" (No. 2) (Saint Vincent and the Grenadines v. Guinea, 165, Judgment, ITLOS Reports 1999, p. 10).

91. *Id.*

92. *Port Information Guide*, PORT OF VANCOUVER (Mar. 2022), http://www.portvancouver.com/marine -operations/port-information-guide/.

93. *Id.*; *see* Sargun Sethi, *A Guide to Scrubber System on Ship*, MARINE INSIGHT (Dec. 30, 2021), https://www.marineinsight.com/tech/scrubber-system-on-ship/.

94. PORT OF VANCOUVER, *supra* note 92.

95. *Id.*

96. *Id.*

97. Michelle Wiese Bockmann, *Chinese Owners and Leasing Banks Dominate Scrubber Investment*, LLOYD'S LIST (Feb. 14, 2020), https://lloydslist.maritimeintelligence.informa.com/LL1131043/Chinese-owners-and-leasing-banks-dominate-scrubber-investment.

than 2,700 ships in early 2020. In October 2019, China Maritime Safety Administration issued a notice on the Implementation Plan of 2020 global sulphur limit that was set by IMO.[98] Article 4 of the Notice prohibits the release of the wash water "from open-loop scrubbers in China's emission control areas."[99] As a result, ships must shift to closed loop scrubbers as long as they do not release the water into the sea.

This also applies to several ports. In India, Adani Ports issued circular numbers (APSEZL/Marine/16/2020) to regulate scrubbers. It was issued on October 3, 2020.[100] In Ireland, three ports prohibit the release of SWW from any kind of scrubbers. The first port is Waterford, with a ban that came into effect in January 2019.[101] The second port is Port of Cork, which issued Notice to Mariners number 15 of 2018.[102] The third port is Dublin Port, which issued notice to Mariners number 21 of 2019.[103] In Lithuania, the SWW is banned in port water areas. The discharge of SWW from open loop scrubbers in port jurisdictions in Kenya,[104] ports of Singapore,[105] and within the jurisdiction of the Panama Canal[106] is prohibited.

Second, other countries adopt an unlimited ban on SWW. This means that the release of SWW in water is totally forbidden. This includes internal water, port water, territorial water, and EEZ. In Bahrain, the discharged scrubbers' wash water is held under strict procedures. The ministry of transportation and telecommunication issued Marine Notice PMA/03/2019 effective on 31/12/2019 to regulate SWW.[107] The Main Notice distinguishes between two waters: port water and territorial water. For port water, the Notice prohibits any release of SWW.[108] As for

98. China Maritime Safety Administration, *Implementation Plan Of 2020 Global Sulphur Limit*, China Classification Society Information Bulletin (Nov. 2019).

99. *Id.*

100. Anubhav Jain, *Subject: Guidelines On Compliance With Annex VI Compliance*, Circular no: APSEZL/Marine/16/2020 (Oct. 3, 2020) (referencing Engineering Circular No.02 of 2019, Directorate General of Shipping, Mumbai, 28 August 2019).

101. Port of Waterford, *Notice to Mariners No. 01 of 2019*, January 2019.

102. Port of Cork, *Notice to Mariners no. 15 of 2018*, Ireland.

103. Port Of Dublin, *Notice to Mariners No. 21 of 2019*, January 2019.

104. Republic of Kenya, National Guideline on Implementation IMO 2020: MARPOL Annex VI Requirement for Maine Fuel Oil, art. 7.1 (Dec. 2019).

105. MARITIME AND PORT AUTHORITY OF SINGAPORE, *Guide for Ships Calling to Port of Singapore IMO 2020 Fuel Oil Sulphur Limit*, (2d ed. June 2019).

106. PANAMA CANAL AUTHORITY, *Notice to Shipping No. N-1-2020 Vessel Requirements* (Jan. 1, 2020).

107. Kingdom of Bahrain Ministry of Transportation and Telecommunications, Marine Notice PMA/03/2019 (Dec. 31, 2019).

108. *Id.*

territorial water and EEZ, the Notice distinguishes between open loop scrubbers and other types of scrubbers. (1) The Notice prohibits any release of SWW from open loop scrubbers. There are only two conditions to permit such a release: either the wash water must comply with the 2015 guidelines, or the master of vessel must prove that it does not harm the marine environment.[109] (2) The Notice requires that for other types of scrubbers, the master of the vessel should deliver ashore SWW residues, as they are prohibited.[110] In all cases, the Notice requires that the process of releasing SWW must be monitored and recorded.[111] The master of the vessel should have a special permit from "Marine Safety and Environment Protection Directorate."[112] Before releasing the water, the shipmaster must inform the directorate with such release, including the "[r]esults of all wash water testing that has been undertaken in accordance with 2015 Guidelines for Exhaust Gas Cleaning Systems."[113]

In Germany, there is a distinction between territorial water/EEZ and inland water.[114] For the territorial water and the EEZ, paragraph 13.7 of *Umweltverhaltensverordnung* prohibits the release of SWW, unless it can be proven that there is no harm to the environment or humans.[115] As for the inland water, it is governed by two legal texts. The first is the Water Management Act (*Wasserhaushaltsgezetz*). SWW falls under the regulation of Paragraph 9.1.4. The Act requires prior authorization to release such water inland.[116] The second is the Strasbourg Convention on the Collection, Deposit and Reception of Waste during Navigation on the Rhine, and in Land Waterways adopted in September 1996. The

109. *Id.*
110. *Id.*
111. *Id.*
112. *Id.*
113. *Id.*
114. Schmolke, *supra* note 25.
115. Paragraph 13.7 states that "Discharge of wash water from waste gas cleaning systems on sea waterways and in the exclusive economic zone is prohibited unless it is demonstrated that the wash water discharge does not have a significant negative impact on human health and the environment. If the chemical used is caustic soda, it is sufficient that the washing water meets the criteria of the guidelines for exhaust gas cleaning systems 2009 (VkBl. 2010 p 341) and its pH is not more than 8.0." Bundesamt für Justiz, Maritime Environmental Behavior Ordinance, *Ordinance On Environmentally Friendly Behavior In Maritime Shipping* (Aug. 13, 2014), https://www.gesetze-im-internet.de/seeumwverhv/BJNR137110014.html.
116. Bundesamt für Justiz, Water Management Act, para 9.1.4. (July 31, 2009), https://www.gesetze-im-internet.de/whg_2009/.

Convention prohibits the release of any "ship-generated waste."[117] The official position of the German Environmental Agency is to classify SWW as "other waste generated from the operation of a vessel."[118]

In Malaysia, the Marine Department Malaysia issued a shipping notice MSN 07 for 2019 that bans the release of SWW within twelve nautical miles. A ship will have to shift to either a compliance fuel oil or to an alternative loop system within the previous jurisdictions.[119]

B. Specific versus General Regulations

Countries also choose between two legal models to regulate SWW, which are specific or general regulations.

Certain countries apply the general rules of environmental law on SWW. In Slovenia, the prohibition of SWW falls under the general rules of the Water Act. Article 66 paragraph 4 states that, "It is forbidden to discharge waste water generated on vessels directly from vessels into the waters, except for uncontaminated cooling water."[120]

Meanwhile, other countries have issued a special regulation to regulate SWW. In Estonia, the Minister of Environment issued Regulation No 73,[121] banning the release of SWW. The only exception is if the ship's owner manages to prove that the water is not harmful to the environment or human health. In addition, the ship's owner must show that the wash water meets the criteria mentioned in the 2015 Guidelines related to SWW.[122] In this case, the ship's owner must get the required permission from the port authorities in order to release such wash water.[123] As for the close loop scrubbers, the circular permits its use as long as the wash water is not released in the Estonian territorial water.[124] The circular did not propose how to handle the wash water from the closed loop scrubbers.

---

117. Article 3 states "Prohibition of dumping and discharging: (1) Dumping or discharging waste generated on board or any part of the cargo from vessels into the waterways referred to in Annex 1 shall be prohibited."
The Strasbourg Convention on the Collection, Deposit and Reception of Waste Generated during Navigation on the Rhine and Other Inland Waterways (CDNI), adopted in September 1996, https://www.ccr-zkr.org/files/conventions/convdechets2019_en.pdf.

118. Schmolke, *supra* note 25.

119. Marine Department Malaysia, *Malaysia Shipping Notice MSN 07/2019* (July 2019).

120. Republic of Slovenia, *Water Act—ZV-1 No. 67/02 of 26 July 2002*, art. 66/4.

121. Republic of Estonia Maritime Administration, *Circular No 4* (2019), https://www.egcsa.com/estonia/.

122. *Id.*

123. *Id.*

124. *Id.*

In France, the Ministry of the Sea has issued a new measure to ban SWW.[125] It came into force in January 2022 and included a full ban on the release of SWW.[126] The ban includes both the port water and territorial waters within three nautical miles. The Decree issued also includes criminal environmental responsibility on the ship's captain.[127] The ship's safety inspectors from the Ministry have the right to monitor the compliance of the ship against the new measures.[128] The penalties applicable in the event of an infringement may start at €4,000 for the captain of the ship and escalate to seven years in prison and a fine of €10.5 million depending on the vessel concerned.[129]

In Ghana, the Maritime Authority issued a Shipping Notice number 12.[130] This notice bans ships from releasing scrubbers and washing water.[131] The ban includes both the port and territorial waters of Ghana,[132] the aim of which is to prevent marine pollution.[133] The notice did not include any remedies for non-compliance.[134] In Mauritius (a member of MARPOL), the Ministry of Ocean Economy, Marine Resources, Fisheries and Shipping issued merchant shipping notice 2 of 2019 that focused on the sulfur cap.[135] The Notice bans the release of SWW within twelve nautical miles of Mauritius' shores, based on the national legislation.[136] The notice did not impose new restrictions, yet it is there to remind shipmasters of its existence. In Qatar (not a member), Qatar Petroleum Mesaieed Industrial City Port issued the Information and Regulations Guide in January 2020.[137] The Guidelines reiterate that the

125. Secrétariat d'État Chargé de la Mer, *Scrubbers: Entree en Application de L'interdiction de Rejets Des le 1er Janvier 2022* (May 17, 2022), https://mer.gouv.fr/scrubbers-entree-en-application-de-linterdiction-de-rejets-des-le-1er-janvier-2022.

126. *Id.*

127. *Id.*

128. *Id.*

129. *Id.*

130. Ghana Maritime Authority, *Maritime Authority Bans Discharge Of Wash Water From Open Loop* (Feb. 14, 2022), https://ghanamaritime.org/web/archives/2668.

131. *Id.*

132. *Id.*

133. *Id.*

134. *Id.*

135. Republic of Mauritius Ministry of Ocean Economy, *Merchant Shipping Notice Ref: 2 of 2019*, para. 3.9 (Oct. 1, 2019).

136. *Id.*

137. Qatar Petroleum, *Mesaieed Industrial City Port Information and Regulations Guide*, para. 6.73 (Jan. 2020).

release of the scrubbers wash water is banned based on the Qatarti Environmental Law.[138]

On the other hand, countries can use a mixed approach, in which the regulatory authorities issue specific regulations to SWW on port jurisdiction while applying the general rule on the territorial water and EEZ. In Egypt, the regulation of SWW falls under both general and specific legal frameworks. For the general regulation, the Environmental Law number 4 for 1994, and its amendment law number 9 for 2009, includes rules related to general prohibition against the release of any harmful substance in the Egyptian territorial sea.[139] Article 66 prohibits any discharge from ships in the Egyptian territorial sea or EEZ.[140] Article 65 holds the shipmaster responsible for compliance with the implementation of the Egyptian Environmental Law.[141] As for the specific framework, the Suez Canal Authority issued circular 8 of 2019,[142] which bans ships from releasing SWW during its transit in the Suez Canal.[143] The Circular did not distinguish between open loop scrubber or closed loop scrubber, which means that all types of wash water are banned.[144]

In Turkey, both the general environmental legal framework and the specific legal framework ban the release of SWW in the Turkish territorial water. Article 8 of the Turkish environmental code bans any "diffuse, direct and indirect, all kinds of waste and scraps into the recipient environment."[145] (1) s for the specific legal framework, the Ministry of Environment and Urbanization has issued a General Directorate for Environmental Management on April 6, 2021,[146] which focuses mainly on the release of SWW and that its release in the Turkish territorial water is prohibited.[147] (2) They require ships that use scrubbers to restore the wash water and not to release it.[148] The Directorate focuses on regulation and controlling water pollution (31.12.2004).[149]

---

138. *Id.*

139. Arab Republic of Egypt Ministry of State for Environmental Affairs, *Law Number 4 of 1994* (amended by Law No. 9 for 2009).

140. *Id.* at art. 66.

141. *Id.* at art. 65.

142. Arab Republic of Egypt Suez Canal Authority, *Circular NO. 8/2019.*

143. *Id.*

144. *Id.*

145. Republic of Turkey, Environmental Law of 11 August 1983, article 8.

146. Republic of Turkey, Ministry of Environment and Urbanization, *Announcement No. E-84973951-140.99-698452* (Apr. 6, 2021), https://alandia.wntr.io/uploads/2021/04/translation-of-the-official-announcement-1.pdf.

147. *Id.*

148. *Id.*

149. *Id.*

C. *Binding versus Non-Binding Regulations*

Legal rules are binding and permanent. However, States issue non-binding or temporary legal rules related to scrubbers. This is due to the uncertainty related to environmental harm. For example, the Ministry of environment in New Zealand issued *Guidance On The Use Of Exhaust Gas Cleaning Systems (Scrubbers) For Ports, Regional Authorities And Ships*. This guideline is recommendation for ports, regional authorities, and Ships adopts non-binding legal rules.[150] The Guidelines include non-binding (non-statutory) rules related to SWW.[151] The Guidelines urge the industry to release the wash water from open loop scrubbers outside the territorial water.[152] As for the close loop scrubbers, ships can operate them in zero discharge modes.[153]

Saudi Arabia is one of the countries that issues temporary regulations. The Saudi Ports' Authority issued Circular No. 55 /2020, which bans the release of SWW in all ports and territorial waters.[154] However, this ban is temporary until further scientific studies on the environmental impact of open loop scrubbers are concluded.[155]

IV. RECOMMENDATIONS TO SOLVE THE UNCERTAINTY: ADOPTION OF UNIFIED LEGAL MODEL

There are three main solutions to solve the uncertainty related to mitigating environmental harm from SWW. These solutions are: (1) the urgency to answer the pending scientific uncertainty; (2) resorting to precautionary principles to avoid environmental harm; and (3) states should adopt unified rules related to the SWW.

(1) The urgency to answer the pending scientific uncertainty: currently, very few states try to answer the question of the environmental effect of SWW on the marine environment and human health. Nonetheless, these endeavors increase the complexity of the SWW situation. Instead of helping to answer the question, studies increase the

150. New Zealand Government, Ministry for the Environment, *Guidance On The Use Of Exhaust Gas Cleaning Systems (Scrubbers) For Ports, Regional Authorities And Ships*, (Apr. 13, 2021), https://environment.govt.nz/guides/guidance-on-the-use-of-exhaust-gas-cleaning-systems-scrubbers-for-ports-regional-authorities-and-ships/.

151. *Id.*

152. *Id.*

153. *Id.*

154. Kingdom of Saudi Arabia, Mawani Saudi Ports Authority, *Circular No.(55) 2020.*

155. *Id.*

concerns regarding the uncertainty of science.[156] To end this uncertainty, IMO, in strong collaboration with states, either coastal or flag, must no longer postpone this issue. The question regarding the environmental harm of SWW must be addressed by a neutral scientific body, such as the Intergovernmental Panel on Climate Change (IPCC).[157] The role of independent scientific bodies is to avoid the uncertainty of science and any bias in scientific findings.[158] In case of the inability to find a solution to the uncertainty of the environmental harm, the IMO will need to resort to the precautionary principle.

(2) Resorting to the precautionary principle to avoid any environmental harm: Precautionary principle is concerned with the uncertainty of environmental harm and uncertainty of science.[159] This principle is based on three elements.[160]

(i) Scientific uncertainty shall not be a reason for continuing environmental harm.[161] While states report that SWW increases scientific uncertainty, such uncertainty shall not restrain the law from protecting the marine environment.[162]

---

156. European Commission, Science for Environment Policy, *Future Brief: The Precautionary Principle: Decision-Making Under Uncertainty* (2017), http://ec.europa.eu/science-environment-policy.

157. *About the IPCC*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, https://www.ipcc.ch/about/.

158. *Id.*

159. Steve Maguire and Jaye Ellis, *Redistributing the Burden of Scientific Uncertainty: Implications of the Precautionary principle for State and Nonstate Actors*, 11 GLOBAL GOVERNANCE 518 (2005); *see* Natahsa Geiling, *Can the Precautionary principle Save the Endangered Species Act from an Uncertain Climate Future?*, 47 ECOLOGY L. Q. 326 (2020); *see also* Annecoos Wiersema, *Adversaries or Partners: Science and the Precautionary Principle in International Wildlife Treaty Regimes*, 11 J. INT'L WILDLIFE . & POL'Y 222 (2008).

160. David Kriebel, Joel Tickner, Paul Epstein, John Lemons, Richard Levins, Edward Loechler, Margaret Quinn, Ruthann Rudel, Ted Schettler, & Michael Stoto, *The Precautionary Principle in Environmental Science*, 109 (9) ENV. HEALTH PERP. 871 (2001).

161. Andreas Fischlin, *Scientific and Political Drivers for the Paris Agreement, in* THE PARIS AGREEMENT ON CLIMATE CHANGE: ANALYSIS AND COMMENTARY 3-8 (Daniel Klein, Maria Pia Carazo, Meinhard Doelle, Jane Bulmer, & Andrew Higham eds., 2017); *see also* Elizabeth A Kirk, *Science and the International Regulation of Marine Pollution, in* THE OXFORD HANDBOOK OF THE LAW OF THE SEA (Donald Rothwell, Alex Oude Elferink, Karen Scott, & Tim Stephens eds., (2015).

162. Daniel Bodansky, Jutta Brunnee & Lavanya Rjamani, INTERNATIONAL CLIMATE CHANGE LAW 128 (2017).

(ii) There is a necessity to explore alternatives to harmful substance or material to the environment.[163] Ships can use alternative fuels instead of scrubbers to avoid potential harm.[164]

(iii) The precautionary principle adds a new burden of proof.[165] The principle shifts the burden of proof on states that wish to continue to use scrubbers to prove that there is no harm from their use.[166] This means that countries, like Japan, which wish to continue to use scrubbers shall fund the independent research to prove that there is no harm from using scrubbers.

(3) States should adopt a unified rule related to SWW. A unified law would help to avoid the confusion among ships' owners on the applicable law on SWW. With the start of January 2020, all the ships' owners know that they should lower the emission from their ships to 0.5% to comply with the IMO new regulation.[167] However, there is no similar regulation to SWW. It is true that the 2015 Guidelines include levels to the substance in SWW. However, there are several critiques to these limits. As mentioned earlier, countries are either regulating SWW or not. Currently, there are regulations in more than forty-five countries that have legislation regulating SWW. The main reason that the below countries ban SWW is the potential environmental harm.[168]

V. CONCLUSION

This research presents in depth two problems that are associates to SWW. These problems are: (1) the uncertainty of who is responsible to mitigate the environmental damage from the SWW, either Flag state or Coastal State. This problem has three dimensions related to (a) the

---

163. Alan Boyle & Catherine Redgwell, BIRNIE, BOYLE AND REDGWELL'S INTERNATIONAL LAW AND THE ENVIRONMENT, 170-83 (4th ed. 2021).

164. Bryan Comer, Elise Georgeff, & Liudmla Osipova, *Air Emissions and Water Pollution Discharges from Ships with Scrubbers*, INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION (Nov. 2020), https://theicct.org/publication/air-emissions-and-water-pollution-discharges-from-ships-with-scrubbers/.

165. Svitlana Kravchenko, Tareq Chowdhury & MD Jahid Hossain Bhyiyan, *Principles of International Environmental Law, in* ROUTLEDGE HANDBOOK OF INTERNATIONAL ENVIRONMENTAL LAW 46-48 (Shawkat Alam, MD Jahid Hossain Bhuiyan, Tareq M.R. Chowdhury & Erika J. Techera eds., 2013).

166. Kevin M. Clermont, *Standards of Proof Revisited*, 33 VERMONT L. REV. 470-75 (2009).

167. Res. MEPC.320(74), *supra* note 2. *See also* Michael Tsimplis, *Marine Pollution from Shipping Activities*, IN MARITIME LAW 461 (Yvonne Baatz, 5th ed. 2021).

168. Sonja Endres et al., *A New Perspective at the Ship- Air- Sea- Interface: The Environmental Impacts of Exhaust Gas Scrubber Discharge*, 5 FRONTIER MARINE SCI. 3 (2018), https://oceanrep.geomar.de/42851/1/fmars-05-00139.pdf.

competent authority to mitigate environmental harm and (b) the competent authority to take the appropriate measure to mitigate environmental harm. The role of the coastal state or flag state is not clear cut in international law. It also creates conflict of jurisdiction over fighting environmental harm, especially with regard to the transboundary nature of the SWW.

(2) The uncertainty in the legal model adopted by national authorities to regulate SWW. The problem of these different legal models is that it increases the uncertainty and confusion to ship owners to the applicable rule to SWW. Currently, there are at least six conflicting legal models that are adopted on the national level. These models are (a) Limited ban, (b) Unlimited ban, (c) specific regulations to SWW, (d) general laws to regulate SWW, (e) binding legal regulations, and (f) non-binding legal regulations. In addition, some countries adopt temporary regulations, while others adopt and then suspend these regulations.

The research proposes three solutions to solve the uncertainty related to mitigating environmental harm from SWW. These solutions are: (1) The urgency to answer the pending scientific uncertainty. The IMO and the national authorities are obliged to answer the scientific questions, like the Japanese, Greek, and the Panama reports. In the case of the inability to do so, they have to turn to the second solution. (2) Resorting to precautionary principles to avoid environmental harm. This legal principle helps to overcome the problem associated with scientific uncertainty. (3) States should adopt unified rules related to the SWW. States can decide either to do extra scientific research on the environmental harm of SWW or to adopt precautionary measures to avoid the environmental harm until there is credible international opinion about the definitive nature of the harm. Yet, states cannot postpone their national process to adopt a unified legal model to SWW, similar to the sulfur limit. The current legal framework increases the complexity of the legal status of SWW, which national authorities shall address effectively.