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The implementation of the environmental impact assessment in Fukushima contaminated water discharge: an analysis of the international legal framework

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Japan is discharging nuclear contaminated water from the 2011 Fukushima incident into the sea after treatment with the Advanced Liquid Processing System (ALPS). This process is expected to continue for decades, as planned by the Japanese government. This decision sparks opposition from many countries and international organizations, as well as constant protests from people in Japan and neighboring countries. Although there are no international documents specifically addressing the discharge of contaminants from a nuclear accident, it is found that the LOS Convention, treaties on nuclear safety, and international environmental laws provide the basis and legal framework for requiring Japan to implement environmental impact assessments throughout the entire process of Fukushima contaminated water discharge. First, this paper evaluates the consistency between the measures taken before Japan's decision to discharge contaminated water into the sea and the requirements under international laws. Second, this paper further examines the substantive and procedural requirements under international law for the entire process of Fukushima contaminated water discharge. It identifies substantive criteria to be applied in assessing the environmental impact of Fukushima contaminated water discharge based on international documents and explores the procedural requirements to assure transparency, prudence, and accountability of the assessment. Finally, given the potential transboundary damage caused by the discharge of nuclear-contaminated water into the sea, this paper proposes that a new multi-stakeholder cooperative mechanism is necessary to achieve effective and credible monitoring and respond to the claims of potentially affected parties. In addition to providing a legal framework for the environmental impact assessment in the Fukushima case, this paper may also contribute to the proper disposal of nuclear contaminants in future nuclear accidents.

KEYWORDS

environmental impact assessment, Fukushima nuclear accident, nuclear contamination, transboundary damage, precautionary principles

1 Introduction

On August 24, 2023, the Japanese government officially launched the discharge of nuclear contaminated water from the 2011 Fukushima nuclear accident that has been treated through its “Advanced Liquid Processing System (ALPS)” into the Pacific Ocean (IAEA, 2023; Reuters, 2023). On March 11, 2011, an earthquake with an epicenter 130 kilometers east of Sendai and a magnitude of 9.0 struck Japan, triggering a tsunami that exceeded 14 meters above the site of the Fukushima Daiichi nuclear power plant (World Nuclear Association, 2022). The 2011 Fukushima nuclear accident resulted in a massive release of radioactive materials, exposing more than 2,000 workers to dangerous doses of radiation, and radioactive elements from the accident soon spread worldwide (Anzai et al., 2011). The Fukushima nuclear accident was finally recognized as a “Level 7” nuclear accident (the highest level) by the Nuclear and Industrial Safety Agency (NISA) of Japan, the same level as that of the Chernobyl nuclear accident in 1986 (IAEA, 2011).

As a result of the tsunami, the cores of Units 1 to 3 of the Fukushima Daiichi nuclear power plant melted. To avoid more explosions and the further spread of radioactive contamination, the Tokyo Electric Power Company (TEPCO) decided to continuously inject water into the units to cool the cores and recycle the water. TEPCO stored contaminated water in storage tanks near the nuclear plant (IAEA, 2022a). Simultaneously, a large amount of groundwater flowing below the surface of the Fukushima Daiichi nuclear power plant, as well as infiltrated rainwater, which comes into contact with highly radioactive substances in the case of damaged buildings and pipes of the units, constitutes another source of nuclear contaminated water (Prime Minister of Japan and His Cabinet, 2021b). As of March 2021, more than 1.25 million tons of nuclear effluent had been stored in these tanks, with 140 tons added daily. TEPCO has repeatedly complained that there is so much nuclear-contaminated water constantly generated that long-term storage is unsustainable and economically unaffordable (Yamaguchi, 2017).

Therefore, since 2013, the Japanese government has evaluated five options for the disposal of nuclear-contaminated water, including geosphere injection, vapor release, discharge into the ocean, and underground burial, and the evaluation report issued by the ALPS Subcommittee concluded that directly releasing Fukushima’s water into the Pacific Ocean is the most convenient and least costly, which drove the Japanese government’s decision to discharge Fukushima nuclear-contaminated water into the ocean (Prime Minister of Japan and His Cabinet, 2021b). Recently, the Japanese government stepped up the implementation of its discharge plan. However, the decision has aroused strong concern and opposition at home and abroad. Among the criticisms from various countries, international organizations, and citizen groups, an important point was that Japan’s action was considered irresponsible and found not in conformity with international law, because it rushed to the decision before conducting adequate environmental impact assessments (EIAs) (Ministry of Foreign Affairs of the PRC,

2021).¹ There are concerns that the discharge of Fukushima nuclear-contaminated water may cause unknown ecological and environmental impacts. In other words, Fukushima water discharge, from their perspective, may become another radioactive disaster after the 2011 Fukushima nuclear accident.

In fact, such concern is proving to be valid. In 2011, Japan discharged a portion of the contaminated water into the sea without conducting proper EIAs or informing relevant countries and international organizations, which led to widespread international condemnation (CNN, 2011). There are numerous studies and reports stating that the treatment system that Japan relies on cannot guarantee the harmlessness of Fukushima nuclear-contaminated water and that the reliability of the storage and treatment facilities for Fukushima water has been questioned due to repeated problems (Men, 2021). Even TEPCO and the Japanese government have admitted that the relevant indicators of radioactivity have fluctuated and exceeded standard values on several occasions, but have not provided a reasonable explanation and have continued to promote the discharge plan under these circumstances (NHK, 2021). It is noted that claims about the safety of nuclear-contaminated water have not been scientifically supported by available information and data (Greenpeace East Asia, 2021).

It has been commonly accepted, since the beginning of the twenty-first century, that states bear the legal obligation to conduct EIAs on activities that can potentially impact the environment, as determined by multiple treaties, customary international law, and general principles of law (Preiss, 1999; Yang, 2018; Rajamani and Peel, 2021). As international lawyers have pointed out, the EIA is considered the first and perhaps the most significant barrier in international law to protect ecology and the environment from possible transboundary damage (Kersten, 2009). However, from the perspective of potentially affected states, the requirements of international law for the EIA seem to have failed to play an appropriate role in achieving the goal of regulating the actions of the state. The Japanese government is still fast-tracking the implementation of its discharge plan without the necessary EIA, while rebutting that its conduct is in conformity with EIA obligations. It should be noted that Fukushima nuclear contaminated water discharge is the first attempt in human history to discharge pollutants from a nuclear accident into the sea, where the fragmentation of international law norms makes it challenging for states, international organizations, and international law scholars to apply and interpret the relevant rules. In this context, a systematic review of the international law rules and requirements for the EIA and achieving their concretization in specific circumstances would contribute to reducing the arbitrariness of Japan’s decisions and actions in the Fukushima

1 Environmental impact assessment (EIA) is generally defined as a systematic process that identifies, predicts, evaluate, and mitigating the biophysical, social and other relevant effects of development actions, in advance. The emphasis, compared with many other mechanisms for environmental protection, is on prevention. See Glasson, J.; Therivel, R.; Chadwick, A. Introduction to Environmental Impact Assessment, New York: Routledge, 5.

incident; it could also contribute to the proper disposal of post-accident nuclear contaminants in the future.

This paper aims to provide an analysis of the international legal framework for the implementation of Fukushima contaminated water discharge. Part 2 examines the compatibility of Japan's discharge, taking into account the conducted testing of ALPS water at the current stage, with its international legal obligations for EIAs. It is found that the Japanese government bears the duty to further conduct the assessment to determine the environmental safety of its discharge plan. Part 3 systematically analyzes the procedural and substantive EIA requirements in the Fukushima incident under treaties, customary international, as well as general principles of law, and discusses the full-process approach to advancing the implementation of EIAs in the Fukushima incident in accordance with international law. In Part 4, to address the disposal of nuclear contaminants from the Fukushima incident and future occasions, we propose a feasible EIA mechanism initiative based on established international legal rules.

2 Japan's discharge and the EIA obligations in international law

Before discussing how the EIA of the disposal of Fukushima nuclear-contaminated water can be improved through international law, it is necessary to identify the consistency between Japan's discharge plan and activities at the current stage and obligations under international conventions, customary international law, and general legal principles. This section analyzes whether the Japanese government's discharge plan conforms with international law on nuclear safety, the law of the sea, and international environmental law. Particularly noteworthy is the fact that the EIA obligation in international law contains comprehensive requirements, and the mere detection or monitoring of the content of some radioactive elements in nuclear contaminated water may not be sufficient.

2.1 Japan's discharge and the EIA obligations under the law of the sea

The United Nations Convention on the Law of the Sea (UNCLOS), adopted in 1982 and referred to by some authors as the "Constitution of the Oceans," is a legal document with comprehensive provisions on marine environmental protection (Koh, 1982). Part XII of the Convention provides the concerned systematic rules, including EIA obligations for all contracting states. As a contracting party, Japan is obliged to act in accordance with UNCLOS and relevant rules of international law.

2.1.1 Obligations to implement EIA under the UNCLOS

At the beginning of Part XII of the UNCLOS, Article 192 as "the leading principle for a reasonable and careful maintenance of the sea" generally prescribes the obligation for states to "protect and preserve the marine environment" and the following terms specify

the content of such obligation (Proelss, 2017). Article 194 of the UNCLOS further states that

"States shall take ... all measures ... that are necessary to prevent, reduce, and control pollution of the marine environment from any source, using ... the best practicable means at their disposal and in accordance with their capabilities, and they shall endeavor to harmonize their policies in this connection."²

Although there is no direct reference to the EIA, this paragraph imposes the requirement of due diligence, which requires Japan and any other parties to take all possible measures to "prevent, reduce, and control pollution of the marine environment" within their best capabilities, which, as the "general provisions," must be read together with the specific provisions that follow (Gold, 2006).

Meanwhile, the language of the Convention makes it clear that the requirement of due diligence applies not only to marine pollution within a state's jurisdiction, but also to transboundary marine pollution, where the state shall ensure that activities under their jurisdiction not cause transboundary damage to other states, and that "pollution arising from incidents or activities under their jurisdiction or control does not spread beyond the areas."³ In a word, Japan is required, under the UNCLOS, to minimize polluting the marine environment from their activities "to the fullest possible extent."⁴

It may be argued that these "general" provisions are not sufficient to determine Japan's EIA obligations in international law, but the existence of Articles 204-206 of the Convention responds well to this viewpoint. Article 204 is entitled "monitoring of the risks or effects of pollution" and provides that States shall "observe, measure, evaluate, and analyze, by recognized scientific methods, the risks or effects of pollution," and Article 205 requires the State to make the data and reports obtained from monitoring available to all States Parties.⁵ Furthermore, According to Article 206,

"[w]hen States have reasonable grounds for believing that planned activities under their jurisdiction or control may cause substantial pollution of or significant and harmful changes to the marine environment, they shall, as far as practicable, assess the potential effects ... and shall communicate reports..."⁶

The purpose of these provisions is to ensure that planned activities can be effectively controlled, and that potentially affected states are informed of the potential risks and impacts of these activities. As such, it is an essential component of a State's environmental obligations and a specific application of the obligation declared in Article 194.2, to adopt all necessary measures to ensure that activities under their jurisdiction or

2 UNCLOS, Montego Bay, 10 December 1982, United Nations Treaty Series, Vol.1833, No. 31363, p. 3, Art. 194.1. Available at <https://treaties.un.org/doc/Publication/UNTS/Volume%201833/volume-1833-A-31363-English.pdf>.

3 UNCLOS, Art. 194.2.

4 UNCLOS, Art. 194.3.

5 UNCLOS, Art. 204.1 & 205.

6 UNCLOS, Art. 206.

control are carried out without causing damage to other States and their environment by pollution (Nandan and Rosenne, 1995). Specifically, in understanding Article 206, it should be noted that it imposes two kinds of different, but related EIA obligations: the first is a preliminary assessment of “planned activities” to determine whether there are “reasonable grounds for believing” that there will be significant environmental damage, and the second is the obligation to assess the potential effects of such activities on the marine environment “as far as practicable.” (Proelss, 2017)

Therefore, only if Japan performs a “preliminary EIA” and properly concludes that there is no significant environmental risk associated with the discharge plan, or if, after conducting both EIAs, it is ultimately determined that no such risk exists or that the potential environmental harm is proportional, can its obligations under Article 206 and relevant provisions of the UNCLOS of the EIA be properly discharged.

2.1.2 The “preliminary EIA”

With respect to the “preliminary EIA” defined above, publicly available information indicates that Japan seems to have already conducted such an assessment to initially determine whether its discharge plan would “cause substantial pollution of or significant and harmful changes to the marine environment.” (TEPCO, 2020) Currently, Japan has repeatedly emphasized in its public reports and statements that the radioactive impact of the discharge of Fukushima contaminated water is extremely low (Prime Minister of Japan and His Cabinet, 2021a). Assuming that this is the conclusion of Japan’s “preliminary assessment,” it seems to imply that it believes that the planned discharge activities will not cause substantial pollution or changes to the environment, and therefore, there is no need to initiate a formal EIA. The language of Article 206 requires the State to provide “reasonable grounds” for its conclusion, but does not offer specific criteria for the existence of “substantial pollution” or “significant and harmful changes to the marine environment.”

Nevertheless, the content of this obligation has been affirmed in international adjudications. It was observed that a preliminary assessment must be implemented based on an objective assessment of all relevant factors, which means that all impacts that can be reasonably assumed to occur should be examined objectively.⁷ Meanwhile, it was observed that only “transitory” pollution or the less significant outcome should be considered without the risks of causing “substantial pollution” as prescribed (Proelss, 2017). In this regard, it is noted that the claim by a considerable number of countries that Japan should assess radioactive elements other than tritium in the Fukushima nuclear contaminated water and the possible cumulative effect of the discharge that can cause permanent, rather than “transitory” pollution to the oceans has not been responded to by the Japanese government.

A series of facts indicate that the environmental safety of Fukushima nuclear effluent is of concern. On September 16, 2021,

TEPCO reported that the purification unit had stopped operating and the reason for the phase stoppage was unknown (KFB, 2021). A few months later, according to the Japanese Ministry of Health, Labor, and Welfare, on February 8, 2022, the radioactive cesium activity of catches caught off the coast of Fukushima Prefecture reached 1,400 becquerels per kilogram, far exceeding the Japanese food hygiene standard of 100 becquerels per kilogram. It is noteworthy that the catches offshore from Fukushima Prefecture exceeded the radioactivity limit in February and April 2021 and were once suspended from sale until December 2021, when the suspension was lifted (Ryall, 2022). Under these circumstances, it seems difficult to assert that Japan has duly fulfilled its obligations of the preliminary assessment.

Furthermore, in the 2016 South China Sea case, the arbitral tribunal issued an opinion on the state’s EIA obligations, although China challenged the facts upon which it relied. For the purposes of the preliminary assessment, the judgment found that “the scale and impact” of the relevant activities alone would leave the state no choice but to believe that they “may cause significant and harmful changes.”⁸ Applying this jurisprudence, given the scale of the nuclear-contaminated water being discharged, the significance of the environmental damage, and the geographic area potentially affected, it seems that any state “could not reasonably have held any belief” other than that the discharge plan could “cause significant and harmful changes.” Therefore, proceeding to the “substantive EIA” stage is of necessity.

2.1.3 The “substantive EIA”

In terms of the “substantive EIA,” the detailed analysis of the State’s domestic law in the South China Sea case seems to imply that the arbitral tribunal believes that EIA obligations under the UNCLOS are not a mere ambiguous statement, but must be fulfilled in accordance with some standards.⁹ Although the 2016 judgement did not elaborate further on this point and has been criticized for its excessive harshness and lack of evidence to support its jurisprudence, there is value in the idea of limiting the state’s discretion in the “substantive EIA.” It is useful to recall the “general provisions” mentioned earlier in this context.

As the Vienna Convention on the Law of Treaties (VCLT) points out, a specific provision should be read together with the context to achieve a correct interpretation of the law.¹⁰ When considering EIA obligations under the UNCLOS, the requirements of due diligence that have been emphasized several times in its context should be applied. In previous reports, the International Law Commission (ILC) emphasized the need for EIAs to be commensurate with the nature and magnitude of the planned

8 PCA, The South China Sea Arbitration (The Republic of Philippines v. The People’s Republic of China), Award of 12 July 2016, para. 987–988.

9 PCA, The South China Sea Arbitration (The Republic of Philippines v. The People’s Republic of China), Award of 12 July 2016, para. 990.

10 VCLT, Vienna, 23 May 1969, United Nations Treaty Series, Vol.1155, No. 18232, p. 331, Art. 31. Available at <https://treaties.un.org/doc/Publication/UNTS/Volume%201155/volume-1155-I-18232-English.pdf>.

7 ICJ, Certain Activities Carried Out by Nicaragua in the Border Area (Costa Rica v. Nicaragua), Judgment of 16 December 2015, para. 153–156.

activity and to avoid underestimating the potential for adverse environmental impacts.¹¹

Moreover, the use of the term “as far as practicable” should not be construed as a derogation of EIA obligations for Japan, one of the most developed countries, since the provision was included in the provision of the UNCLOS only to relieve the undue burden on developing countries that lack the necessary capacity.¹² This means that in the Fukushima incident, the Japanese government is not only obligated to conduct an EIA of the discharge plan, but also all measures “that are necessary to prevent, reduce, and control pollution” to the best of its capacities for the EIA. Hence, the threshold of the test is clearly much higher than that of the “preliminary assessment.” As what has been discussed above, it is even doubtful that Japan has met the requirement of “preliminary assessment,” let alone met this higher threshold, which makes it convincing that Japan has not fulfilled its EIA obligations and therefore breached Article 206 of the Convention.

Last but not least, it is important to note that, while the international standards referred to in Article 197 may be used in the EIA process, they are comprehensive, integrated standards and do not merely include “the international standards” already established by the IAEA or World Health Organization (WHO). In fact, the incomplete standards are provided only for specific radiation sources, which cannot be applied unchanged to the disposal of nuclear contaminated water after a major accident. (Chen and Xu, 2022) Even if the discharge by Japan meets the IAEA standards, it does not mean that Japan has fulfilled its obligation to implement the EIA under the Convention. In addition to this, IAEA’s comprehensive report has made it clear that many of the technical topics reviewed and evaluated by the Working Group will need to be revisited with the discharges in order to assess whether the activities during the treated water discharge operations are in compliance with the relevant international safety standards. (IAEA, 2023) This issue will be further clarified in Part 3.

2.2 Japan’s discharge and the EIA obligations under international laws on nuclear safety

Compared to the elaborate rules concerning the EIA and transboundary EIA under the law of the sea regime, international law on nuclear safety fails to provide sound regulations regarding the disposal of nuclear waste and contaminants. This is mostly due to the fact that nuclear regulation and restraint, even merely on civilian nuclear facilities or technology, is often regarded by most states as a sensitive topic directly related to their national interests,

making it exceptionally difficult to construct international law rules in this area (Elbaradei et al., 1995). Nevertheless, the requirement for states to conduct proper EIAs can still be established under the international nuclear safety regime. In this section, we consider the consistency between Japan’s discharge and the Convention on Nuclear Safety (CNS) as well as the Convention on Early Notification of a Nuclear Accident (CENNA), respectively.

2.2.1 The CNS

The 1994 Convention on Nuclear Safety, in its preamble, reaffirms the responsibility for “the State having jurisdiction over a nuclear installation” to assure nuclear safety, and it specially notes that “accidents at nuclear installations have the potential for transboundary impacts.”¹³ In light of this, the CNS requires contracting states to take the appropriate steps to “give due priority to nuclear safety” and ensure adequate financial resources available for that safety.¹⁴ More importantly, Art.16 of CNS provides rules on emergency preparedness that the appropriate steps shall be taken to ensure that “its own population and the competent authorities of the States in the vicinity of the nuclear installation are provided with appropriate information for emergency planning and response,” when there is a radiological emergency.¹⁵

Nonetheless, the question we need to consider is whether the Convention for Nuclear Facilities is applicable in the case of Fukushima water discharge. The CNS provides that “[t]his Convention shall apply to the safety of nuclear installations,” and nuclear installations are defined as “any land-based civil nuclear power plant.”¹⁶ The Fukushima Daiichi nuclear power plant is obviously a civilian nuclear power plant, but whether the Fukushima nuclear-contaminated water discharge falls within the scope of the safety of nuclear installations requires further clarification. It should be noted that the discharge of Fukushima water was not an isolated incident, but rather a follow-up to the Fukushima nuclear accident in 2011. This means that discharge should be considered together with the Fukushima nuclear accident in this regard. Looking back at the CNS description of the “radiological emergency,” it is clear that an accident of the installation that results in a nuclear release is within the scope of application of this legal document; only then do the provisions for radiological emergencies make sense. Therefore, the discharge of water from Fukushima is directly related to the nuclear safety of the Fukushima Daiichi nuclear power plant, and CNS is the applicable rule.

Although the CNS does not directly stipulate that state parties shall undertake EIA measures before the disposal of the

11 ILC, Report of the International Law Commission: Draft Articles on the Prevention of Transboundary Harm from Hazardous Activities with Commentaries, UN Doc. A/56/10 (2001), 404-405.

12 ITLOS Seabed Dispute Chamber, Responsibilities and Obligations of States Sponsoring Persons and Entities With Respect to Activities in the Area, Advisory Opinion of 1 February 2011, ITLOS Report (2011) - 10, para. 160.

13 CNS, Vienna, 20 September 1994, United Nations Treaty Series, Vol. 1963, No. 33545, p. 293, preamble. Available at <https://treaties.un.org/doc/Publication/UNTS/Volume%201963/v1963.pdf>.

14 CNS, Art. 10-11.

15 CNS, Art. 16.2.

16 CNS, Art. 2-3.

contaminant after a nuclear accident, without appropriate EIAs, it is not convincing to claim that “appropriate information” has been provided or that nuclear safety has been prioritized. Simultaneously, VCLT indicates that the provisions of treaties should be interpreted in accordance with the purpose for which the parties entered into the treaty, whereas in the CNS we can see that the treaty is intended to mitigate the “radiological consequences” in the event of the nuclear accident.¹⁷ In the absence of proper EIA, it implies that the relevant countries are not clear about the consequences, and therefore, it is impossible to achieve the so-called “mitigation of radiological consequences.”

However, as previously noted, Japan’s EIAs of the discharge plan were inadequate. Greenpeace notes that Japan’s current EIA report fails to apply the basic principle of radiation protection, which requires that low-level increases in radiation risk are justified and that the net benefit to society is demonstrated as well. Simultaneously, Japan’s EIAs ignore the cumulative effects of radioactive elements and the long-term impacts on marine ecology, species, and food chains. The basic consensus is that Japan’s assessments on the discharge of Fukushima nuclear contaminated water into the sea are “extremely limited,” not considering long-term environmental risks, including impacts on the larger region of Japan’s east coast or the Pacific Ocean (Greenpeace East Asia, 2021). In this case, it is difficult to convince that the EIA conducted by Japan conforms to the requirements under the CNS, since it neither qualifies as the appropriate step, nor provides for “its own population and the competent authorities of the States in the vicinity” with appropriate information for emergency planning and response.

2.2.2 The CENNA

Additionally, the 1986 Convention on the Early Notification of a Nuclear Accident (CENNA) also constitutes a source of the EIA obligation. The CENNA applies to the activity that may result in an international transboundary release that could be of radiological safety significance for another state, where the discharge of the Fukushima water obviously falls.¹⁸ Indeed, the definition of the scope of application implies that the state conducting such activities should bear the burden of determining whether they are likely to cause significant transboundary effects.

Furthermore, according to Article 5 of CENNA, Japan is required to provide information when deciding to release nuclear-contaminated water, which at least includes “the foreseeable development ... relevant to the transboundary release” and “the general characteristics of the radioactive release, including ... the nature, probable physical and chemical form and the quantity, composition and effective height of the

radioactive release.”¹⁹ Unfortunately, the apparent failure of the Japanese government or TEPCO to provide all of the above information constitutes a breach of its treaty obligations and violates the treaty’s purpose of minimizing transboundary radiological consequences.²⁰

2.3 EIA obligations under the international environmental law

The Stockholm Declaration of 1972 is commonly accepted as the foundation of international environmental law, and Principle 21 accurately summarizes the environmental obligations of sovereign states under international law (Pallemarts, 2014). Principle 21, on the one hand, affirms that states have “the sovereign right to exploit their own resources,” and on the other hand, it prescribes their “responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.” With the recognition of Principle 21 as customary international law, or more precisely as the core of international environmental law, the international legal obligations of States to prevent, reduce, and control transboundary environmental damage are established.²¹

Subsequently, the state’s obligations of transboundary environmental protection have been continuously crystallized in different areas through the path of treaties or customary international law (Knox, 2002). Among others, the requirement for transboundary EIA is widely recognized and accepted, and its practice has become *custom* in international law.

The Pulp Mills case, which was decided by the ICJ in 2010 is a landmark case in the development of the transboundary EIA rule. The court stated in paragraph 204 of its judgment that if a State’s proposed activity carries a risk of causing significant adverse environmental effects across a border, general international law requires the State to carry out an EIA.²² It found that the state practice of transboundary EIA had been accepted by states for some years prior to the case and could be considered a rule of general international law.²³ Although Argentina brought the Pulp Mills case under the Statute of the River Uruguay, the Court’s determination of the obligation of transboundary EIA was established based on customary international law. Since then, international adjudications, including the International Seabed Development Advisory Opinion, have repeatedly confirmed the

17 CNS, Art. 1.

18 CENNA, Helsinki, 17 March 1992, United Nations Treaty Series, Vol. 2105, No. 36605, p. 457, Art. 1. Available at <https://treaties.un.org/doc/Publication/UNTS/Volume%202105/v2105.pdf>.

19 CENNA, Art. 5.

20 CENNA, preamble.

21 Rio Declaration on Environment and Development, Principle 21.

22 ICJ, Pulp Mills on the River Uruguay (Argentina v. Uruguay), Judgment of 20 April 2010, para. 204.

23 ICJ, Pulp Mills on the River Uruguay (Argentina v. Uruguay), Judgment of 20 April 2010, para. 204.

customary international law status of transboundary EIAs.²⁴ Simultaneously, from the perspective of state practice, transboundary EIA has been increasingly applied since the 1980s to activities that may cause transboundary harm “in many parts of the world,” and developing countries have gradually accepted this rule (Chen and Xu, 2022).

Concerning the Fukushima incident, the next question that needs to be answered is regarding the specifics of a transboundary EIA as an obligation of international law. In this regard, the Costa Rica/Nicaragua case before the ICJ is useful for understanding cross-border EIA. In that case, it is broadly agreed that under general international law, a state has an obligation to conduct a transboundary EIA for activities within its jurisdiction that present the risk of causing significant damage to other states.²⁵ Furthermore, it is observed that transboundary EIA should reasonably include all potential impacts, and perhaps more importantly, if the state claims that its activity does not have a significant environmental impact, and the potentially affected state believes that it may have such impacts, according to the ICJ, the party that decides to conduct the activity is obliged, according to the ICJ, to carry out the EIA and thus present evidence to prove the non-existence of the impact, not by the potentially affected state.²⁶

Moreover, in the Costa Rica/Nicaragua case, Nicaragua asserted that Costa Rica had an obligation under the CIL to notify and negotiate with Nicaragua. In considering this Nicaraguan claim, the tribunal confirmed that if the EIA determines that there is a risk of substantial environmental damage, a State planning such a risky activity should notify and negotiate in good faith with the potentially affected state on the appropriate measures to prevent and mitigate such risk.²⁷ In this regard, although the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) does not bind Japan, China or Korea, it may be used as an appropriate reference. The Espoo Convention requires countries to implement planned activities that may have significant transboundary impacts to actively include potentially affected countries and their citizens in the assessment process by providing early notification and proper negotiation at the time the EIA is conducted.²⁸

Overall, the EIA obligation under international law, which has been elaborated by international adjudications, reminds us once again that in the Fukushima incident, Japan has the duty to reasonably assess all the possible environmental impacts on other countries of such a worrisome activity as the discharge of Fukushima nuclear-contaminated water. Obviously, the questions and comments raised by China, Korea, and the Pacific Islands are potentially valid; however, in the absence of scientific certainty regarding the environmental safety of the discharge plan, Japan insists on proceeding with the plan rather than doing so after a proper transboundary EIA. Such recklessness *per se* constitutes a violation of the requirement of transboundary EIA and counters the precautionary principle and due diligence requirements in international environmental law. In addition, Japan has no intention of including potentially affected countries and their citizens when conducting EIAs, which is one of the major reasons for protests and criticisms.

3 Advancing proper EIAs in the Fukushima contaminated water discharge through international law

After considering the gap between the Japanese government’s discharge activities and its EIA obligations under international law, we can conclude that Japan’s discharge has raised concerns about its compliance with the UNCLOS, nuclear safety treaties, and international environmental laws. Although the international community has urged Japan to suspend the discharge plan until the environmental risks of Fukushima nuclear contaminated water discharge have been properly assessed, it seems unlikely that the Japanese government or TEPCO will revisit their decisions considering the current situation. In this context, this section systematically discusses the procedural and substantive requirements of international law for EIA implementation throughout the full process of discharge, and provides pathways and guidelines to be followed for possible discharge activities to reduce the risk of Fukushima water discharge from a realistic perspective.

3.1 Comprehensive assessments and information transparency of the discharge

In terms of Japan’s EIA obligations concerning the discharge of the Fukushima contaminated water, treaties, customary international law, and general principles of law provide procedural and substantive requirements applicable in this incident. Simultaneously, it is equally necessary to ensure the transparency of the assessment and insert the principle of proportionality. It should be noted that this is not the same as what Japan is doing now, which is only measuring the content of some radioactive substances in the ALPS water to be discharged, but is a comprehensive assessment of the environmental impact.

24 ITLOS, Responsibilities and obligations of States sponsoring persons and entities with respect to activities in the Area, Advisory Opinion of 1 February 2011, para. 147.

25 ICJ, Certain Activities Carried Out by Nicaragua in the Border Area (Costa Rica v. Nicaragua), Judgment of 16 December 2015, para. 101.

26 ICJ, Certain Activities Carried Out by Nicaragua in the Border Area (Costa Rica v. Nicaragua), Judgment of 16 December 2015, para. 154–155.

27 ICJ, Certain Activities Carried Out by Nicaragua in the Border Area (Costa Rica v. Nicaragua), Judgment of 16 December 2015, para. 168.

28 Espoo Convention, Espoo, 25 February 1991, United Nations Treaty Series, Vol. 1989, No. 34028, p. 309, Art. 3 & 5. Available at <https://treaties.un.org/doc/Publication/UNTS/Volume%201989/v1989.pdf>.

3.1.1 Procedural and substantive requirements of the EIA

As discussed above, before each batch of the Fukushima nuclear contaminated water is discharged into the sea, Japan may have to adopt two types of EIAs for different purposes, according to international law.²⁹ The first type, or the “preliminary assessment,” is designed to determine whether there is a risk of substantial pollution or significant environmental damage from the planned discharge activities that would necessitate a formal EIA process.

Even though the first type of EIA is referred to as the “preliminary assessment,” it does not mean that no applicable criteria exist or that there is a very low bar that would allow Japan to easily claim that its planned discharge of the Fukushima water does not pose sufficient environmental risks to warrant a formal assessment. In terms of procedural requirements, there is no specific rule in international law that explicitly states that the “preliminary assessment” needs to follow one step or the other; therefore, Japan can decide this with a certain degree of flexibility.

In terms of substantive requirements, Japan is obligated under international law to include all possible environmental impacts of its discharge plan within the scope of the assessment and to set up appropriate steps to adequately examine whether these possible impacts will constitute a significant environmental risk, as defined in international documents (Popiel, 1994). In this process, Japan does have some freedom to decide what is a “possible” impact and what is not, and the latter does not need to be assessed. To prevent states from abusing this freedom, and prevent the slightest possibility of being exaggerated, the ICJ requires that such impacts be “reasonable.” (Dong, 2022) Considering the general meaning of the term in the interpretation of international law, this means that speculation about the existence of certain impacts should be considered “reasonable” if it is consistent with logic and scientific common sense (Corten, 1999).

With this in mind, as we look at the challenges and criticisms raised by potentially affected states and international organizations, it is rather difficult to deny that their concerns about the potential environmental risks of Japan’s discharge are “reasonable.” For example, some opponents have argued that it is irresponsible for the Japanese government to claim that all radioactive elements in the Fukushima water other than tritium are at safe levels without adequate assessment, and the Fukushima nuclear-contaminated water may also contain large amounts of components that are harmful to humans (The Government of the PRC, 2021). Given the severity of the 2011 Fukushima nuclear accident and the limited design of Japan’s ALPS systems, it is necessary for Japan to test all nuclear-contaminated water to be discharged to assess whether it may contain other radioactive elements that exceed this limit. In addition, the possible cumulative effects of nuclear-contaminated

water containing radioactive elements that meet the discharge criteria should also be considered by the Japanese government.

As for formal EIA, the legal requirements to be observed by the Japanese government in this process are expected to be more stringent. First, the scope of the assessment includes, but is not limited to, the factors identified in the preliminary assessment. It should be noted that all factors identified in the preliminary assessment that possibly pose significant environmental risks should be further assessed at this stage to determine the “possible impacts” of the environmental damage from the discharge of Fukushima nuclear-contaminated water.³⁰ Neither international treaties nor international adjudication has emphasized the scope of implementation of the formal EIA, but the context has suggested that ignoring any risk identified in the “preliminary assessment” would be illogical and inconsistent with the purpose of preventing, mitigating, and controlling marine pollution in international treaties, customary international law, and general principles of law. Rather, as stipulated in the UNCLOS, Japan should conduct EIAs on all potential impact factors, “as far as practicable,” which further suggests that the scope of the formal assessment should remain open to including all possibilities and not be limited to the scope of the “preliminary assessment.”³¹ Meanwhile, the expression “as far as practicable” mainly considers the special needs and limited capacity of developing countries, which cannot be used as an excuse to avoid or reduce the obligations of EIA for developed countries with greater capacity (Proelss, 2017). In contrast, Japan, as a developed country, is subject to higher requirements than developing countries.

It is also necessary to clarify the substantive criteria for the implementation of the EIA in the Fukushima accident. In the Mox Plant case, Ireland alleged that the United Kingdom’s 1993 Environmental Statement was not a qualified EIA in violation of Article 206 of the UNCLOS.³² In its separate opinion, Judge *ad hoc* Székely of the International Tribunal for the Law of the Sea (ITLOS), in dealing with Ireland’s request for provisional measures, specifically considered the Environmental Statement as a superficial environmental impact statement that is wholly incompetent by any criteria: the document contains only the unilateral claims of the proponents establishing the nuclear fuel plant, without the most basic appropriate scientific or technical support; none of these claims have been independently verified; the document does not provide a specific assessment of the impact on the marine environment, the release or transport of radioactive material, etc.³³

In addition, some authors note that the document should also include details of methods for dealing with radioactive discharges

30 UNCLOS, Art. 204.

31 UNCLOS, Art. 206.

32 ITLOS, The MOX Plant Case (Ireland v. United Kingdom), Provisional Measures, Order of 3 December 2001.

33 ITLOS, The MOX Plant Case (Ireland v. United Kingdom), Provisional Measures, Separate opinion of Judge *ad hoc* Székely.

29 According to the plan of the Government of Japan, each batch of ALPS treated water is different in terms of radioactivity equivalence and discharge arrangements, and therefore their environmental impacts may differ. This makes it necessary to properly fulfill the EIA obligations prior to each discharge.

and their alternatives, possible mitigation measures, data for assessing radioactive doses to key populations, a discussion of the radiological effects on marine life and ecosystems in Ireland, and special attention to gaps or uncertainties in the knowledge of marine biology (Tanaka, 2003). In other cases, the ICJ has also observed that the state should conduct the EIA with due diligence and tailor it to specific circumstances.³⁴

3.1.2 Assuring information transparency and sufficient negotiation

Ensuring information transparency and sufficient negotiation with potentially affected states are also part of EIA's obligations under international law. According to UNCLOS Article 206, once a country has implemented an EIA, it is obligated to submit a report regardless of the outcome. In terms of how EIA reports are delivered, countries have two options: one is to publish the EIA report themselves or make it available to all countries individually; the other is to provide the report to a competent international organization, which in turn makes it available to all countries.³⁵

As far as the content of the report is concerned, Japan should provide all the information produced in the EIA to the extent possible, although this should not constitute an undue adverse impact on its industrial and commercial secrets or national security. In this regard, given that the Convention does not provide a specific list of the content, relevant international documents can provide some assistance for the Fukushima incident. Annex II of the Espoo Convention provides a detailed list of information that should be provided in an EIA report at a minimum, including but not limited to (1) a description of the proposed activity and its purpose, (2) a description of reasonable alternatives to the proposed activity, as appropriate, (3) a description of the potential environmental impacts of the proposed activity and its alternatives, and (4) measures to reduce adverse environmental impacts.³⁶

Furthermore, although Article 206 does not provide for interstate consultation, it is a by-product of the obligation to submit reports. Specifically, Japan is required to publish an EIA report not only to simply make the relevant information known to other countries, which is hardly meaningful, but also to enable other countries to express their opinions based on such information to monitor and promote the proper implementation of the EIA.

3.1.3 Applying the principle of proportionality

Finally, the principle of proportionality has become significant in international law. Countries worldwide not only agree that the principle of proportionality is a necessary limitation on the exercise of executive power by governments, but also accept it as an important constraint on the behavior of states under international law (Cottier et al., 2012). The EIA is not just a procedural

requirement; its results should be fully considered in the decision-making process for the disposal of Fukushima nuclear-contaminated water in conjunction with the principle of proportionality. Given the critical and unshakable position of environmental health, biodiversity, and human rights in our international community, the environmental damage and risks identified by the assessment of the discharge plan must be prioritized under the "proportionality test" by the Japanese government as a basis for decision-making, along with other factors such as feasibility, economics, and reputational impacts.

3.2 Ensuring continuous monitoring and openness to adjustments during the discharge

Considering the Japanese government's recent positions and policies, it seems unlikely that suspending the implementation of its planned discharge of Fukushima water would be an option (Yamaguchi, 2023). From the perspective of legality in international law, this would be a violation of international law, assuming that Japan would hastily move forward with the implementation process without meeting its obligations. International law differs from domestic legal regimes, as there is no centralized authority that could force Japan to abandon its discharge plan, should it insist on doing so (Koskeniemi, 2017). Nevertheless, this does not mean that international law has failed. As noted, it can still contribute to regulating the discharge of Fukushima nuclear contaminated water and minimizing environmental risks by providing substantive and procedural rules.

In the Fukushima incident, the Japanese government's EIA for the discharge plan as well as for its implementation cannot be a one-time event; continuous monitoring, assessments, and timely adjustment to its policy on this ground are essential for marine environmental safety. Maintaining continuous monitoring of Fukushima's water discharge constitutes Japan's obligation under pertinent international treaties and customary laws. Regarding "monitoring of the risks or effects of pollution," the UNCLOS prescribes that "[i]n particular, States shall keep under surveillance the effects of any activities which they permit or in which they engage in order to determine whether these activities are likely to pollute the marine environment."³⁷

Moreover, reports of the results obtained from such surveillance, according to Article 205, should be published or provided to "the competent international organizations, which should make them available to all States." The two articles, when read together, reveal that if the risks to the marine environment from the discharge of Fukushima nuclear-contaminated water into the sea remain, Japan is obligated not only to maintain continuous monitoring of factors that potentially cause damage but also to make the results public or report them to contracting states through international organizations. The monitoring and reporting obligations should, of course, be observed by Japan for the

34 ICJ, *Pulp Mills on the River Uruguay (Argentina v. Uruguay)*, Judgment of 20 April 2010, para. 204.

35 UNCLOS, Art.205.

36 Espoo Convention, ANNEX 2.

37 UNCLOS, Art.204.

duration of the discharge - from 2023 to 2041 or 2051 as estimated - and even after the Fukushima water is fully discharged because the radioactive elements contained may still pose threats to the oceans. Considering the possible effects of ocean currents on the transport of radioactive elements in Fukushima water, the geographical scope of such continuous monitoring should not be limited to the waters under Japanese jurisdiction, but should extend to all potentially affected areas, indicating that Japan must work closely with relevant countries and national organizations to fulfill its obligations under international laws.

In addition to the requirement of continuous monitoring and information transparency, it is necessary to adjust the implementation of discharge plans accordingly. While emphasizing these obligations of conduct, it must be recognized that continuous monitoring is not conducive to the safety of the marine environment if Japan rejects the adjustment to its discharge plan accordingly. It is recalled that the requirements under the UNCLOS, nuclear safety treaties, and international environmental laws are intended to oblige states to achieve the result of minimizing damage to the marine environment. Therefore, it is necessary for Japan to remain open to adjustments of the discharge plan during the whole process and to take full account of the results of monitoring and evaluation for the purpose of minimizing the damage to the marine environment “as far as practicable.”

3.3 Planning the complete restoration of marine ecology and full compensation for potential losses after the discharge

As mentioned above, Japan is obligated to conduct continuous and comprehensive EIAs prior to and during the discharge of Fukushima nuclear-contaminated water to develop preventive policies as well as to prevent, control, and reduce environmental damage and significant transboundary adverse impacts. In addition, EIAs can play an even more important role. Planning the complete restoration of marine ecology and full compensation for potential losses after discharge should be considered an integral step in the overall EIA process.

On the one hand, the Draft Articles on Responsibility of States for Internationally Wrongful Acts remind us that “[E]very internationally wrongful act of a State entails the international responsibility of that State.”³⁸ An internationally wrongful act is a breach of an international obligation committed by a state, and it consists of two elements:

(a) There is conduct consisting of an action or omission attributable to the State under international law; (b) that conduct constitutes a breach of an international obligation of the State.³⁹

It is noteworthy that Japan has violated several international obligations, including the duty to conduct EIA and international cooperation, prior to the implementation of its discharge plan; therefore, it is likely to be immediately subject to state responsibility to compensate affected countries and repair the damage if the discharge of nuclear contaminated is found to cause any transboundary environmental damage. Simultaneously, assuming that Japan’s conduct is in accordance with international law, the rules of international law on transboundary damage liability provide that such liability need not be based on wrongfulness, but depends solely on the consequences of the damage (Sucharitkul, 1995). In other words, whenever any environmental damage is caused by the Fukushima water discharge, the state that is thus harmed can immediately claim transboundary damage from Japan in this regard.

On the other hand, the “polluter pays principle” refers to the duty of polluters who cause environmental damage to pay compensation and repair the damage. The Rio Declaration on Environment and Development clearly states the following:

National authorities should endeavor to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution.⁴⁰

The “polluter pays principle” can be traced back as far as several conventions that prescribe responsibilities for damage caused by hazardous activities, and the original purpose of these conventions was to make the party that caused the result of the damage to compensate the victim (Luppi et al., 2012). The “polluter pays principle” suggests that the cost of pollution should be borne by those who cause it. The meaning of this principle and its application to cases and situations remain open to interpretation; however, there is no doubt that the principle is accepted in the domestic laws of almost all countries (Bugge, 2009). It should be noted that in the *Rhine Chlorides* case, the tribunal observed that the principle is embodied in several bilateral and multilateral international conventions and is enforced to varying degrees, but the tribunal did not consider it to be part of general international law.⁴¹

Nevertheless, regardless of whether the “polluter pays principle” applies in inter-state relations, at least in the case of the Fukushima nuclear contaminated water discharge, the principle can be applied to defend the rights and interests of coastal neighbors who may be severely affected by its pollution and suffer damage to their own interests. In fact, according to the domestic laws of the countries concerned, residents of the Fukushima coast and citizens of South Korea and China can file lawsuits against the Japanese government and TEPCO, either individually or in the form of a delegation, regarding the discharge of Fukushima nuclear-contaminated water.

38 Draft Articles on Responsibility of States for Internationally Wrongful Acts, Yearbook of the International Law Commission, 2001, vol. II (Part Two), Art. 1.

39 Draft Articles on Responsibility of States for Internationally Wrongful Acts, Art. 2.

40 Rio Declaration on Environment and Development, A/CONF.151/5/Rev.1, Principle 16.

41 PCA, The Rhine Chlorides Arbitration concerning the Auditing of Accounts (The Netherlands/France), Award (English Translation) of 13 May 2014, para. 103.

According to the international law regime, a proper EIA is not only required to determine potential damage, but also requires the parties to clarify possible preventive and remedial measures on that basis (Craig, 2008). In view of the potential claims for compensation, Japan should plan for the complete restoration of marine ecology and full compensation for potential losses in each phase of environmental impact assessment based on the assessment results, that is, the likelihood and severity of transboundary damage from the discharge. Although there are no specific rules to follow with respect to such preventive measures, some approaches common to environmental law can be considered. Specifically, the Japanese government may set up a special fund in advance for the payment of possible civil and interstate claims, which is not difficult considering Japan's financial capacity (ISA, 2017). Furthermore, regarding possible problems including excess and cumulative effects of radioactive elements, it is necessary for Japan to develop a viable contingency plan so that the adverse environmental effects can be effectively eliminated or mitigated at that time.

Overall, the Japanese government's decision to discharge post-accident nuclear contaminated water into the sea has no precedent in human history. However, the current system of international law still demonstrates its applicability and extensibility, providing a series of rules and guidelines for the necessary EIA procedures to be applied. Nevertheless, we also note that a considerable number of rules are too general or vague to fully address the complex legal issues related to EIAs in the Fukushima incident and do not demonstrate sufficient enforceability. It is necessary for the international community to consider from a long-term perspective, jointly develop the legal regime, and establish effective mechanisms for international cooperation to effectively implement EIAs and prevent potential damage from the disposal of post-accident nuclear contaminants.

4 Constructing the EIA cooperative mechanism for the disposal of nuclear accident contaminants

While international law has provided Japan with procedures and substantive criteria for the proper implementation of the EIA concerning the discharge of Fukushima water into the sea, the ultimate settlement of the international dispute among relevant parties is a far more complex issue, including the approach to ensuring Japan's compliance with these requirements and establishing the reliability of the results of the EIA. This reflects the lack of cooperation and mutual trust among states and its causes as the Fukushima incident has developed to date, which has triggered international disputes and weakened the potential of the international community's co-governance on this common problem. Therefore, it further proposes that, given the risk of nuclear accidents in the future, it is necessary for states to establish a collaborative EIA mechanism of a permanent nature to address related issues arising from the disposal of nuclear contaminants post-accidents.

4.1 Reflections on the international legal framework for EIAs on the disposal of nuclear accident contaminants

4.1.1 Dysfunction of the international legal framework

In the Fukushima incident, although international legal documents and general laws provided the legal framework as well as some specific requirements for the EIA, as discussed above, the rules in the paper failed to work as well as they should. Ever since the discharge plan was announced, Japanese citizens, potentially affected states, and international organizations have expressed strong criticism toward the Japanese government's decision. The essential dispute mainly lies in whether the Fukushima water planned to be discharged meets environmental standards and what potential effects it has on the marine environment. Even though the risks of Fukushima nuclear contaminated water to the marine environment, biodiversity, and human health have not been scientifically confirmed, the international community's concerns do not appear to be unfounded.

In fact, shortly after the Fukushima nuclear accident, TEPCO discharged 11,500 tons of nuclear-contaminated water directly into the sea without reporting or negotiating with potentially affected countries and the public, the radioactivity of which exceeded Japan's domestic law standards on nuclear water discharge by tens of times (CNN, 2011). Consequently, within 57 days, the radiation would spread to most of the Pacific Ocean (GEOMAR Helmholtz Centre for Ocean Research Kiel, 2012). After the Japanese government officially announced its discharge plan, TEPCO released in 2022 that the concentration of strontium-90 was found to be about three times the national standard value during testing, and it was defended as a temporary phenomenon, but its cause remains unreported (Global Times, 2022). Experts from Japan also noted that more than 60 percent of Fukushima water contains excessive radioactive substances, and it is doubtful whether they can be effectively removed. Moreover, the Japanese media reported multiple times that fish with excessive radioactive elements were found in neighboring waters (China Nuclear Power Website, 2022).

Nevertheless, Japan unilaterally decided and promoted the discharge of Fukushima nuclear-contaminated water into the sea under the circumstances of inadequate EIA, non-transparent information, and existing bad records, which sparked a lot of opposition in the international community. At the 31st Meeting of States Parties to the UNCLOS, China vehemently criticized that the Japanese side did not fully consult with stakeholders, including neighboring countries, and did not seriously respond to the concerns of all parties, let alone address them. More importantly, the Japanese government has failed to ensure that information is transparent and reliable, especially that provided unilaterally by the TEPCO (Greenpeace, 2020). Similarly, the Republic of Korea states that Japan's plan to release nuclear-contaminated water into the sea poses a threat to the security of neighboring countries and the safety of the marine environment. Japan's unilateral decision without adequate consultation with potentially affected countries is

intolerable (Ministry of Foreign Affairs of the Republic of Korea, 2021). Countries including Russia and the Philippines, international organizations such as the Pacific Islands Forum (PIF), and non-governmental organizations such as Greenpeace have also explicitly expressed their concerns about the lack of proper assessment and opaque information about Japan's discharge plan.

Nevertheless, despite the Japanese government's discharge plan and its implementation having been found to be in violation of EIA obligations, Japan continues to press ahead with the discharge, which opponents have been unable to do anything about except repeatedly protest against. From this perspective, the established international legal framework for EIAs, which was once considered sound and strong, faced the challenge of difficult enforceability and lack of effectiveness during the Fukushima Incident.

4.1.2 Deficiencies of the international legal framework

Unlike the domestic law system, there is no centralized authority in international law that is responsible for compelling a state to fulfill its international legal obligations or bear international responsibility for an internationally wrongful act. The interaction between the subjects of international law, mainly states and international organizations, drives the implementation of international law and determines its effectiveness (Fitzmaurice, 1956). Furthermore, in the contemporary regime of international law, as the aversion of most members of the international community to unilateral coercion has deepened, international cooperation has become the dominant mode of such state interaction (Hofer, 2017). When further reflecting on the dysfunction of our international legal framework for EIAs in the Fukushima incident, we find that the reasons behind it may be complex, but two aspects related to international cooperation should be focused on.

On the one hand, the inter-state cooperation required by the legal framework between planning relevant activities and those potentially affected has not been fully achieved. In the Fukushima incident, Japan and most of the potentially affected parties have failed to cooperate; instead, they see each other as "adversaries" due to a lack of mutual trust and communication.

Since the beginning, the Japanese government and TEPCO have repeatedly emphasized that the radiation impact of the "treated water" stored in the tanks is extremely low, but they have not provided comprehensive information on the testing or assessment result of the potential environmental impacts (China Daily, 2022). However, because tanks storing the Fukushima water are located in Japanese territory and the discharge will take place in waters under Japanese jurisdiction, the opposition is not given an opportunity to obtain credible data and other evidence without the consent of the Japanese government and can only repeatedly express its apprehension. It has left the two sides in a stalemate: the opposing side continues to exert diplomatic pressure, while Japan tends to ignore it and sticks to the implementation of its discharge plan.

In this regard, it can be found that the root cause of the current disputes between Japan and opposing parties is the lack of mutual

trust and necessary collaboration. On the one hand, the Japanese government has tried to prove to the international community the harmlessness of its discharge plan by submitting reports on the testing of nuclear-contaminated water and by IAEA endorsement (IAEA, 2022b). On the other hand, potentially affected states do not trust the information provided by the Japanese government, suspecting that it has not provided all the assessment results, and complaining that EIAs should include more factors and be conducted under effective supervision (The Government of the PRC, 2021).

The international legal framework for nuclear waste disposal is a topic that has been discussed for a long time (Spector and Shields, 1979; Swazo, 1996). So far, the IAEA has developed a guiding classification scheme for nuclear waste management, which includes, among other things, estimating the requirements for safe isolation time based on the radiotoxicity of the nuclear waste and determining the disposal method according to the degree of hazard (Ojovan and Steinmetz, 2022). The problem is that this guideline is not binding and its appropriateness for disposing of contaminants after a nuclear accident has not been demonstrated. In other words, there is an under-appreciated gap in international law between the disposal of nuclear waste generated during conventional activities, and the disposal of nuclear contaminants abnormally generated after a nuclear accident.

The lack of cooperation among all potentially affected parties is equally worrisome. As mentioned earlier, many countries, international organizations, and non-governmental organizations have expressed deep concern for or protested the Japanese government's decision to discharge Fukushima water into the sea in a frank manner. Each has different or the same views on how the EIA on Japan's discharge plan should be conducted, but communication and collaboration have not been sufficiently achieved.

For the relevant parties, this singular fight is detrimental. Their concerns can easily be ignored, as a lone protest does not put enough pressure, including "the reputational and direct sanctions," on the Japanese government, let alone elicit the reconsideration of the implementation of the EIA prior to the discharge (Guzman, 2022). For Japan, this lack of cooperation may also be troubling. This is because the Japanese government must deal with pressure from each side separately, where different suggestions, claims, and complaints are presented, not only increasing the difficulty of the task of information sharing but also consuming more resources. This situation makes it likely that the Japanese government will be confused about the specific items on its "need-to-be-resolved" list.

In other words, while established international law on EIA has provided the international community with the framework and specific requirements of the Fukushima incident, the flaws in the design of the cooperative mechanism became a source of undermining mutual trust and reducing the effectiveness of the rules. Therefore, the issue of how to achieve healthy interaction among states to facilitate the proper implementation of EIA in this incident now and in the future is extremely critical.

4.2 Turning crisis into opportunity: toward a collaborative EIA mechanism with multi-stakeholder participation

Japan and potentially affected states are at odds with the EIA of Fukushima nuclear contaminated water discharge, and it is expected that the dispute may intensify as Japan's discharge plan enters the implementation phase. The EIAs conducted and the information provided by the Japanese government is not sufficient to dispel the relevant parties' concerns on environmental safety. In this case, while international treaties, customary international law, and general principles of international law provide some procedural and substantive rules to oblige Japan to fulfill its EIA obligations, the authority in the house of international law is the state, after all (Sohn, 1995[405-406]). As in so many moments in history, "law is not enough," and the effectiveness of international law ultimately depends on the decisions and actions of states (Sohn, 1995[399]). It is more difficult to concretize general rules in international law to induce the relevant states to properly implement their obligations than to formulate and identify rules.

Japan's plan to release Fukushima nuclear contaminated water is the first attempt in human history to discharge post-accident nuclear contaminants into the sea, but it will likely not be the last, especially with the precedent set by the Japanese government. This has forced international lawyers and all researchers concerned with the safety of the marine environment to consider how the EIA can be made more effective in practice to avoid or minimize environmental risks. From a more general perspective, we should be aware that the Fukushima incident not only poses a major crisis for the marine environment and inter-state relations, but also provides a valuable opportunity for the international community to revisit the issue of the EIA of post-accident nuclear contaminant disposal. To make EIA and transboundary EIA effectively contribute to marine environmental protection, the international law framework needs to be improved through the development of treaties or soft laws. Perhaps more importantly, given the problems and disputes exposed in the Fukushima incident, it is necessary to establish a cooperative EIA mechanism of a permanent nature to respond appropriately to future nuclear accidents that are probable to occur as long as there are nuclear installations in operation.

Regarding membership under the envisaged mechanism, it is obvious that countries, especially those with deployed nuclear facilities, should be included, and potentially affected countries, such as small island states and those with long coastlines, should also be given significant consideration. It is also necessary for international organizations, including the IAEA, the International Food and Agriculture Organization (FAO), the World Health Organization (WHO), the International Maritime Organization (IMO), and the United Nations Human Rights Council (UNHRC), to be included as formal members. This is partly because of their essential position in current international environmental governance in terms of intellect, policy, law, etc., and partly to help more countries that have not yet decided to join the mechanism to contribute indirectly to nuclear and environmental security. In addition, representatives of NGOs and citizen groups with an interest in the subject should consider granting informal membership or observer status to support and

monitor the operation of the mechanism (Vance and Rangeley, 2019). In particular, the presence and expression of the views of representatives from potentially affected areas should be considered necessary when specific events occur.

In terms of purpose and function, the envisaged mechanism among states and international organizations may contribute transparency, credibility, and accountability to the more appropriate and effective EIA of contaminant disposal post-nuclear accident. However, it should be recognized that attempts to set overly detailed binding rules may make countries more hesitant to join, as issues related to nuclear energy use and regulation have always been considered to be of great relevance to national security and national interests. In general, a more prudent and feasible design for the positioning of the envisaged mechanism, especially in the initial stage, is regarding it as a platform for political negotiation/consultation to advance the proper EIA under a framework agreement that reaffirms existing EIA obligations and international cooperation obligations under international law, without expecting to prescribe too many specific normative requirements once and for all. Of course, during the operation of the collaborative mechanism, relevant treaties as well as customary international law may be developed according to the needs and practices of states.

To be specific, first, the collaborative mechanism should aim at promoting information transparency on the process and results of EIAs. Regarding acts that potentially cause transboundary environmental damage, international law imposes an obligation of international cooperation with potentially affected states and a strict obligation of environmental impact assessment on the state concerned.⁴² In view of the concerns and worries that nuclear contaminant disposal, especially in the form of discharge into the sea, vapor emissions, etc., may increase in the international community, it would be responsible for including potentially affected states and major international organizations whose purposes are relevant in the EIA decision and implementation process. The involvement of relevant parties helps them obtain credible information and remove concerns so that they can adjust their policies accordingly.

Second, as discussed above, during the Fukushima Incident, much of the distrust of the Japanese government stemmed from a lack of involvement in its EIAs. In this sense, the proper use of the collaborative mechanism can significantly improve the current lack of mutual trust. On the one hand, the envisioned mechanism could include potentially affected states in the decision and design process prior to the implementation of the EIA. This allows the relevant parties to better understand the decision-making process related to the disposal of nuclear contaminants. Meanwhile, sufficient cooperation will enable all parties to present their views on the scope and modalities of EIAs under the mechanism and to fully consult on them, avoiding reasonable concerns from being ignored, and effectively strengthening the comprehensiveness and scientific nature of the assessment. On the other hand, this mechanism allows EIAs to be conducted under adequate supervision, increases the credibility of the data produced and the conclusions drawn from them, and prevents countries from questioning the reliability of EIAs that have been conducted for reasons such as "prior convictions."

42 UNCLOS, Art. 197-206.

Finally, international cooperation will greatly enhance the capability of the EIA and help prevent and reduce environmental damage from the disposal of nuclear contaminants more accurately and effectively. The technology capability and resources that an individual state can devote to EIAs are limited, especially when considering the testing, monitoring, and assessment of such hazardous substances as post-accident nuclear contaminants. Simultaneously, considering the influence of ocean currents, trade winds, and other factors, EIAs are often conducted not only within a state's jurisdictional areas, but can also extend to a regional or even global scale (Bastmeijer, 2008). This significantly increases the difficulty of implementing a proper EIA. In this sense, collaborative mechanisms may help solve these real problems (Xu and Tan, 2023). All parties participating in the mechanism are encouraged or required, if they agree, to aid with EIA, including technical assistance, resource and personnel support, and jurisdictional facilitation.

After discussing the establishment of the collaborative mechanism to advance EIAs on the disposal of post-accident nuclear contaminants and reviewing the Fukushima incident and intractable disputes between countries, it can be seen as an opportune time to launch such a mechanism. Given that excessive disagreement has put the settlement of the dispute concerning the discharge of the Fukushima water into limbo, it is necessary and motivating for the states involved to consider finding another way out. In this context, an initiative to establish a collaborative mechanism under a general framework, with a vision of addressing immediate and longer-term challenges, may be a wiser choice for both potentially affected countries, Japan, and national organizations, other than to continue to blame each other under the circumstance that international rules are not sufficiently specific and sound. The collaborative mechanism is expected to be a valuable and necessary platform for relevant countries to move toward effective negotiation and resolution of current and future differences, especially when considering the decades-long monitoring and evaluation required for the discharge of Fukushima nuclear-contaminated water (TEPCO, 2022).

5 Conclusion

The Japanese government's decision to discharge contaminated water from the 2011 Fukushima nuclear accident into the sea sparked widespread protests and criticism as soon as it was announced. Much of the international community's concerns stem from the inadequacy and unreliability of Japan's EIA in its release plan. Although there has been no sufficient scientific evidence to prove the damage of the release of the Fukushima water to the marine environment and human health, it raises concerns about the conformity between Japan's discharge and its EIA obligations under the law of the sea, international laws on nuclear safety, and international environmental laws, as it has not properly included all potential impacts to the extent of its best capability, and the EIA was not conducted in accordance with the due diligence and proportionality principles.

Given Japan's insistence on promoting the implementation of its discharge plan, the constraints and guidelines of the EIA obligations

under international law for the various stages of discharge can contribute to the prevention and mitigation of potential environmental risks. The preliminary assessment or/and further formal assessment of all reasonable factors discovered is necessary for the discharge of each batch of treated water, and the obligation to cooperate with and notify relevant countries and international organizations should be considered. The rules of international law require Japan to maintain continuous monitoring and transparency of information during the discharge and adjust the discharge plan according to the results of the assessment. Considering the uncertainty of the impact of discharge and the geographical scope potentially affected, Japan is required to plan the complete restoration of marine ecology and full compensation for potential losses caused by the discharge in advance.

It is observed that the current legal regime offers applicable rules for Fukushima contaminated water discharge, but is far from being adequately specific to clarify all the ambiguities, and it fails to provide a suitable cooperative mechanism, which has led to disagreements and disputes between countries on this environmental impact assessment. Nevertheless, Fukushima provides a valuable opportunity for the international community to reflect on existing rules and develop them to better address the treatment of nuclear contaminants after a nuclear accident, which is not only happening now but will almost certainly cause problems in the future. In this regard, we propose that a collaborative mechanism incorporating national and international organizations, and citizen representatives is necessary to promote transparency, credibility, and scientific validity of EIAs and to enhance the limited capacity of the individual state. To achieve this common vision, all countries must work with solidarity to effectively safeguard the shared interests of the international community, avoid politicization of relevant issues, and ultimately achieve a proper solution to the issue.

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References

- Anzai, K., Ban, N., Ozawa, T., and Tokonami, S. (2011). Fukushima daiichi nuclear power plant accident: facts, environmental contamination, possible biological effects, and countermeasures. *J. Clin. Biochem. Nutr.* 50 (1), 2–8. doi: 10.3164/jcfn.D-11-00021
- Bastmeijer, C. J. (2008). *Theory and practice of transboundary environmental impact assessment* Vol. Vol. I (Leiden: Martinus Nijhoff Publishers).
- Bugge, H. C. (2009). "The Polluter Pays Principle: Dilemmas of Justice in National and International Contexts." in *Environmental Law and Justice in context*, 1st ed., ed. by J. Ebbesson and P. Okowa. (Cambridge: Cambridge University Press), 411–428. doi: 10.1017/CBO9780511576027.022
- Chen, X., and Xu, Q. (2022). Reflections on international dispute settlement mechanisms for the Fukushima contaminated water discharge. *Ocean Coast. Manage.* 226, 106282. doi: 10.1016/j.ocecoaman.2022.106278
- China Daily (2022) *Safety first must be priority for Fukushima water: China Daily Editorial*. Available at: <https://global.chinadaily.com.cn/a/202211/23/WS637e2ecaa31049175432b7ec.html> (Accessed 10 November 2023).
- China Nuclear Power Website (2022) *IAEA working group revisits Fukushima*. Available at: https://lite-ra.com/2021/04/post-5852_2.html (Accessed 10 November 2023).
- CNN (2011) *Japan official apologizes for dumping radioactive water into Pacific*. Available at: <http://edition.cnn.com/2011/WORLD/asiapcf/04/04/japan.nuclear.reactors/index.html> (Accessed 10 November 2023).
- Corten, O. (1999). The notion of "reasonable" in international law: legal discourse, reason and contradictions. *Int. Comp. Law Q.* 48, 613–625. doi: 10.1017/S0020589300063454
- Cottier, T., Ehandi, R., Leal-Arcas, R., Liechti-McKee, R. G., Payosova, T., Sieber-Gasser, C., et al. (2012). "The principle of proportionality in international law," in *NCCR Trade Regulation Working Paper*.
- Craik, N. (2008). *The international law of environmental impact assessment: Process, substance and integration* (New York: Cambridge University Press), 161–174.
- Dong, S. (2022). Study of marine environmental impact assessment of Fukushima's nuclear wastewater. *Pacific J.* 30, 87–89.
- Elbaradei, M., Nwogugu, E., and Rames, J. (1995). International law and nuclear energy: Overview of the legal framework. *IAEA Bull.* 37, 16–25.
- Fitzmaurice, G. G. (1956). The foundations of the authority of international law and the problem of enforcement. *Modern Law Rev.* 19, 1–13. doi: 10.1111/j.1468-2230.1956.tb00340.x
- GEOMAR Helmholtz Centre for Ocean Research Kiel. (2012). *Fukushima - The fate of contaminated waters*. Available at: <https://www.geomar.de/en/news/article/fukushima-the-fate-of-contaminated-waters> (Accessed 10 November 2023).
- Global Times. (2022). *The sea is not Japan's dustbin, nor the Pacific Ocean its sewer: Chinese FM*. Available at: <https://www.globaltimes.cn/page/202209/1275581.shtml> (Accessed 10 November 2023).
- Gold, E. (2006). *Gard Handbook on Protection of the Marine Environment* Vol. 64. Ed. E. Gold (Arendal, Norway: Gard AS).
- Greenpeace (2020) *Contaminated Water Crisis*. Available at: https://www.greenpeace.org/static/planet4-japan-stateless/2020/10/ba82306e-radioactivewater_jp_fin.pdf (Accessed 10 November 2023).
- Greenpeace East Asia (2021) *A Quick Read on the radioactive water in Fukushima - What makes it different?* Available at: <https://www.greenpeace.org/eastasia/blog/6540/a-quick-read-on-the-radioactive-water-in-fukushima-what-makes-it-different> (Accessed 10 November 2023).
- Guzman, A. T. (2022). A compliance-based theory of international law. *Calif. L. Rev.* 90, 1823–1888.
- Hofer, A. (2017). The developed/developing divide on unilateral coercive measures: legitimate enforcement or illegitimate intervention? *Chin. J. Int. Law* 16, 175. doi: 10.1093/chinesejil/jmx018
- IAEA. (2011). *Fukushima Nuclear Accident Update*. Available at: <https://www.iaea.org/newscenter/news/fukushima-nuclear-accident-update-log-15#:~:text=The%20Japanese%20Nuclear%20and%20Industrial%20Safety%20Agency%20%28NISA%29,as%20a%20level%207%20%22Major%20Accident%22%20on%20INES> (Accessed 10 November 2023).
- IAEA. (2022a). *Fukushima Daiichi Status Updates*. Available at: <https://www.iaea.org/newscenter/focus/fukushima/status-update> (Accessed 10 November 2023).
- IAEA. (2022b). *IAEA Releases First Report on Safety of Planned Water Discharge from Fukushima Daiichi Site*. Available at: <https://www.iaea.org/newscenter/pressreleases/iaea-releases-first-report-on-safety-of-planned-water-discharge-from-fukushima-daiichi-site> (Accessed 10 November 2023).
- IAEA. (2023). *Japan to release Fukushima water into ocean from Aug. 24*. Available at: <https://news.un.org/en/story/2023/08/1140037> (Accessed 10 November 2023).
- ISA. (2017). *Draft Regulations on Exploitation of Mineral Resources in the Area*. Available at: <https://isa.org.jm/files/files/documents/25c-wp1-en-advance.pdf> (Accessed 10 November 2023).
- Kersten, C. M. (2009). Rethinking transboundary environmental impact assessment. *Yale J. Int. Law* 34, 173.
- KFB (2021) 福島第一原発の設備でトラブル、汚染水の浄化処理を停止 (Equipment problems at the Fukushima Daiichi nuclear power plant The purification process of contaminated water was stopped). Available at: <https://www.yomiuri.co.jp/science/20210902-OYT1T50278/#:~:text=%E6%9D%B1%E4%BA%AC%E9%9B%BB%E5%8A%9B%E3%81%AF%E3%82%92%E6%97%A5%E3%80%81,%E3%81%84%E3%82%8B%E3%81%A8%E7%99%BA%E8%A1%A8%E3%81%97%E3%81%9F%E3%80%82> (Accessed 10 November 2023).
- Knox, J. H. (2002). The myth and reality of transboundary environmental impact assessment. *Am. J. Int. Law* 96, 291–319. doi: 10.2307/2693925
- Koh, T. (1982) *Remarks by Tommy T.B. Koh, of Singapore President of the Third United Nations Conference on the Law of the Sea*. Available at: https://cil.nus.edu.sg/wp-content/uploads/2015/12/Ses1-6.-Tommy-T.B.-Koh-of-Singapore-President-of-the-Third-United-Nations-Conference-on-the-Law-of-the-Sea-_A-Constitution-for-the-Oceans_.pdf (Accessed 10 November 2023).
- Koskenniemi, M. (2017). *The politics of international law* (Routledge: The Nature of International Law), 355–384.
- Luppi, B., Parisi, F., and Rajagopalan, S. (2012). The rise and fall of the polluter-pays principle in developing countries. *Int. Rev. Law Econ.* 32, 135–144. doi: 10.1016/j.irle.2011.10.002
- Men, W. (2021). Discharge of contaminated water from the Fukushima Daiichi Nuclear Power Plant Accident into the Northwest Pacific: What is known and what needs to be known. *Mar. Pollut. Bull.* 153, 112984–112987. doi: 10.1016/j.marpolbul.2021.112984
- Ministry of Foreign Affairs of the PRC (2021) *Foreign Ministry Spokesperson Wang Wenbin's Regular Press Conference on June 11, 2021*. Available at: https://www.fmprc.gov.cn/mfa_eng/xwfw_665399/s2510_665401/t1883214.shtml (Accessed 10 November 2023).
- Ministry of Foreign Affairs of the Republic of Korea (2021) *Japanese Government Provides Answer to ROK's Note Verbale Regarding Former's Position on Disposal of Treated Water at Fukushima Daiichi Nuclear Power Station*. Available at: https://www.mofa.go.kr/eng/brd/m_5676/view.do?seq=320650&srchFr=&srchTo=&srchWord=&srchTp=&srchBmulti_itm_seq=0&srchBbitm_seq_1=0&srchBbitm_seq_2=0&srchBcompany_cd=&srchBcompany_nm (Accessed 10 November 2023).
- Nandan, S. N., and Rosenne, S. (1995). *United nations convention on the law of the sea 1982: A commentary* Vol. Vol.II (Boston: Martinus Nijhoff), 122.
- NHK (2021) *Undersea tunnel planned to release treated water*. Available at: https://www3.nhk.or.jp/nhkworld/en/news/20210824_24/ (Accessed 10 November 2023).
- Ojovan, M. I., and Steinmetz, H. J. (2022). Approaches to disposal of nuclear waste. *Energies* 15 (20), 7804. doi: 10.3390/en15207804
- Pallemarts, M. (2014). *International environmental law from Stockholm to Rio: Back to the future?* (Routledge: Greening International Law), 1–19.
- Popiel, B. R. (1994). From customary law to environmental impact assessment: A new approach to avoiding transboundary environmental damage between Canada and the United States. *BC Envtl. Aff. L. Rev.* 22, 447.
- Preiss, E. L. (1999). The international obligation to conduct an environmental impact assessment: The ICJ case concerning the Gabčíkovo-Nagymaros project. *NYU Envtl. LJ* 7, 307.
- Prime Minister of Japan and His Cabinet (2021a) *Basic Policy on handling of ALPS treated water at the Tokyo Electric Power Company Holdings' Fukushima Daiichi Nuclear Power Station*. Available at: https://www.ca.enb-japan.go.jp/2021_shared_images/Basic_Policy_on_Handling_of_ALPS_treated_water.PDF (Accessed 10 November 2023).
- Prime Minister of Japan and His Cabinet (2021b) *Meeting of Ministers, etc. on Nuclear Decommissioning, Contaminated Water and Treated Water Countermeasures (5th)*. Available at: https://www.kantei.go.jp/jp/singi/hairo_osensui/dai5/index.html (Accessed 10 November 2023).

- Proelss, A. (2017). *United Nations Convention on the Law of the Sea. A Commentary*. Ed. C. H. Beck. (Munich, Germany: Verlag C. H. Beck oHG, Wilhelmstraße), 1278–1375.
- Rajamani, L., and Peel, J. (2021). *The Oxford handbook of international environmental law* (New York: Oxford University Press), 454–463.
- Reuters. (2023) *Japan to release Fukushima water into ocean from Aug. 24*. Available at: <https://www.reuters.com/world/asia-pacific/japan-release-fukushima-water-into-ocean-starting-aug-24-2023-08-22/> (Accessed 10 November 2023).
- Ryall, J. (2022) *Radioactive rockfish caught near Fukushima nuclear plant prompts Japan to suspend shipments*. Available at: <https://www.scmp.com/week-asia/health-environment/article/3166415/radioactive-rockfish-caught-near-fukushima>.
- Sohn, L. B. (1995). Sources of international law. *Ga. J. Int'l Comp. L.* 25, 399–406.
- Spector, L. S., and Shields, G. B. (1979). Nuclear waste disposal: an international legal perspective. *Nw. J. Int'l L. Bus.* 1, 569.
- Sucharitkul, S. (1995). State responsibility and international liability under international law. *Loy. LA Int'l Comp. LJ* 18, 821–822.
- Swazo, S. (1996). The future of high-level nuclear waste disposal, state sovereignty and the tenth amendment: Nevada v. Watkins. *Natural Resour. J.* 36 (1), 127–144.
- Tanaka, M. (2003). Lessons from the protracted MOX plant dispute: A proposed protocol on marine environmental impact assessment to the United Nations convention on the law of the sea. *Mich. J. Int'l L.* 25, 418–419.
- TEPCO. (2020). *TEPCO Releases Report on Treated Water Disposal*. Available at: <https://www.tepco.co.jp/en/hd/newsroom/reports/archives/2020/pr20200327-e.html> (Accessed 10 November 2023).
- TEPCO. (2022). *Our Responsibilities to Fukushima*. Available at: <https://www.tepco.co.jp/en/hd/responsibility/index-e.html> (Accessed 10 November 2023).
- The Government of the PRC (2021) *Fukushima nuclear contaminated water discharged into the sea has endless consequences*. Available at: http://www.gov.cn/xinwen/2021-05/17/content_5607536.htm (Accessed 10 November 2023).
- Vance, A., and Rangeley, R. (2019). *Non-Governmental Organization Roles in Shaping Future Ocean Governance and Management*. In *The Future of Ocean Governance and Capacity Development* (Boston: Brill Nijhoff), 53–58.
- World Nuclear Association (2022) *Fukushima Daiichi Accident*. Available at: <https://world-nuclear.org/information-library/safety-and-security/safety-of-plants/fukushima-daiichi-accident.aspx> (Accessed 10 November 2023).
- Xu, Q., and Tan, Z. (2023). Building a maritime community with a shared future: Scholarly reflections on China's new ocean vision. *Mar. Policy* 149, 105508. doi: 10.1016/j.marpol.2023.105508
- Yamaguchi, M. (2017) *Nuclear plant must release contaminated water*. Available at: <https://japantoday.com/category/national/nuclear-plant-must-release-contaminated-water?comment-order=latest> (Accessed 10 November 2023).
- Yamaguchi, M. (2023) *Fukushima nuclear plant operator says first round of wastewater release is complete*. Available at: <https://abcnews.go.com/International/wireStory/fukushima-nuclear-plants-operator-round-wastewater-release-complete-103084731> (Accessed 10 November 2023).
- Yang, T. (2018). The emergence of the environmental impact assessment duty as a global legal norm and general principle of law. *Hastings LJ* 70, 525.