



Responsibility under international law to prevent marine pollution from radioactive waste

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ABSTRACT

On April 13, 2021, the Japanese government announced its decision to discharge the nuclear-contaminated water from the Fukushima Daiichi Nuclear Power Station into the ocean, which drew widespread opposition from the international community. Japan bears traditional state responsibility to prevent marine pollution from radioactive waste, which includes the obligation to immediately notify interested parties and implement preventive measures based on the precautionary principle. Further, Japan needs to fulfil the obligation to prevent transboundary harm, take measures to protect the marine environment from radioactive contaminants via various sources, and not to allow land-based discharge and dumping or any other form of discharge into the ocean. In the process of analysing the responsibility that Japan should bear, this paper discusses the potential contamination of nuclear-contaminated water and reached a conclusion that it should not be discharged into the ocean. To urge Japan to fulfil its international responsibilities, international cooperation among States should be strengthened to monitor the disposal of Japan's nuclear-contaminated water. In addition, getting advisory opinions from International Tribunal is a feasible method for relevant stakeholders. Moreover, it would be highly desirable if relevant treaties or organisations were created in order to better implement international environmental law.

1. Introduction

When the tsunami struck Japan's Fukushima Daiichi Nuclear Power Station in 2011, three reactors melted and were destroyed. The contaminated water that was produced during the process of cooling the three damaged reactors is stored in more than 1000 water tanks. According to the Tokyo Electric Power Company (TEPCO), these tanks will reach their maximum capacity in the summer of 2022 (Jiji Press, 2019). On April 13, 2021, the Japanese government announced that it would begin discharging more than one million tonnes of water treated with tritium isotope, but which is still radioactive, from the crippled Fukushima nuclear plant into the Pacific Ocean in around two years (Prime Minister of Japan and His Cabinet, 2021; BBC News, 2021). The Japanese government claims that the discharged 'wastewater' poses no threat to humans or the environment and that their choice of oceanic release is predicated on strict compliance with the regulatory standards that are already in place. To persuasively promote the oceanic release plan, Japanese politicians have even claimed that the discharged water

would be safe to drink (NPR, 2021). The Reconstruction Agency of Japan has also gone to great lengths to increase public relations funding for the Fukushima nuclear accident to two billion yen in the 2021 fiscal year's budget. It is also attempting to allay national concerns and confuse the international community by releasing posters and videos with cartoon images of the radioactive element tritium (Ministry of Foreign Affairs of the People's Republic of China, 2021a, 2021b, 2021c, 2021d). However, Japanese scholars stated in 2020 that the tritium isotope separation technologies that have been tested to date cannot directly be used to separate tritium from tritiated water obtained from the Advanced Liquid Process System (ALPS technology). Moreover, among the five currently proposed treatment options, there are no options that are recommended for the treatment of tritiated water (Toshihiko et al., 2020).¹ In a joint statement issued on April 15, 2021, UN human rights experts stated that Fukushima nuclear wastewater may contain significant amounts of other radioactive isotopes, including radioactive carbon-14, strontium-90, and tritium (United Nations Human Rights, 2021). ALPS technology does not remove radioactive

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¹ The five treatment methods are (1) geosphere injection (2) discharge into the ocean (3) vapour release (4) hydrogen release (5) underground burial.

tritium or carbon-14, and tritium in the water can organically combine with other molecules, move up the food chain, and ultimately affect plants and fish as well as humans (United Nations Human Rights, 2021).

The announcement of Japan's sea discharge plan drew widespread international condemnation and discussion (Marianne, 2021). China, South Korea, Russia, several Special Rapporteurs from the Office of the High Commissioner for Human Rights (OHCHR), ecologists and environmental activists, and even local Japanese fishermen have protested Japan's decision to discharge nuclear-contaminated water into the ocean (Anh, 2021). Wang Wenbin, a spokesperson for China's Ministry of Foreign Affairs, said 'It is an extremely irresponsible, selfish, and hasty move of Japan to unilaterally decide to release the Fukushima nuclear-contaminated water into the ocean before exhausting all safe ways of disposal, without fully disclosing relevant information or consulting with neighbouring States and the international community.'² Zhao Lijian, another spokesperson for China's Ministry of Foreign Affairs, also said, 'How the nuclear-contaminated water is handled bears on the global ecological and environmental safety and concerns the lives and health of people in all States. Naturally, Japan is obliged to have a full consultation with all stakeholders, especially its neighbours, before making any decisions. The matter also needs to be assessed and discussed within the framework of the United Nations, the World Health Organisation, and the International Atomic Energy Agency.'³ Meanwhile, the Korean government expressed strong regret over the Japanese government's "unilateral" choice to release the radioactive water, saying the decision was made without discussions or negotiations with Korea, is outright unacceptable, and "that the government would take the necessary measures to keep Koreans safe from radioactive water from the Fukushima plant."⁴ Moreover, the Russian Foreign Ministry ask Japan to approach the important issue with all responsibility and "expect the Japanese government to demonstrate a proper degree of transparency and inform all States concerned of its actions that may pose a radiation hazard."⁵

Based on the background provided above, this paper intends to analyse Japan's international state responsibility in terms of the prevention of marine pollution from nuclear radioactive waste, transboundary harm, and of the dumping of nuclear waste. Concerning Japan's decision to discharge nuclear-contaminated water into the ocean, it has the obligation to immediately notify interested parties and implement preventive measures based on the precautionary principle, prevent transboundary harm, and take measures to protect the marine environment from radioactive contaminants from various sources. In discussing these obligations concerning Japan, this paper will examine the potential impact of Japan's conduct under the aspects of sustainable development and conservation concerning oceans and coasts, and see whether Japan should revoke its decision on discharging plan. Moreover, this paper will offer some solutions, for example, all stakeholders could cooperate and seek for advisory opinion from International Tribunals and the international community should draft a global convention to regulate transboundary harm and strengthen cooperation among States. These methods can be applied not only to the case of Japan discussed in this paper, but also to deal with similar situations regarding

conservation of oceans and coasts.

2. Japan has traditional state responsibility to prevent marine pollution from radioactive waste

Traditional State responsibility refers to the responsibility of a subject of international law when it breaches international law or an international obligation it bears (Wang, 1995). In other words, the subject of international law is responsible to other States for internationally wrongful acts (Starke, 1977). The constituent elements of State responsibility include the following: first, the act is attributable to the State and can be regarded as an act of the State; second, the act violates the international law obligation, that is, it is an internationally wrongful act or an international crime; third, the subject acts intentionally or negligently in the subjective sense (Dong, 2008). From these constituent elements, it is clear that the violation of international legal obligations, even if no damage is caused, is also subject to traditional State responsibility. However, if a State can prove that it has taken all available measures to prevent the breach, it can be exempted from liability even if it is ultimately unsuccessful in the action taken against it (Lin, 2004). In the case of Japan's decision to discharge nuclear-contaminated water into the ocean, it has an obligation to immediately notify interested parties and to implement preventive measures in accordance with the precautionary principle of risk.

2.1. Japan is responsible for immediate notification

In terms of traditional international legal responsibility, Japan's decision to discharge radioactive nuclear-contaminated water into the ocean without immediately notifying potential vulnerable States in its vicinity violates the immediate notification obligations of the 1982 United Nations Convention on the Law of the Sea (UNCLOS)⁶ and the 1986 Convention on Early Notification of a Nuclear Accident.⁷ Article 198 of UNCLOS provides that 'When a State becomes aware of cases in which the marine environment is in imminent danger of being damaged or has been damaged by pollution, it shall immediately notify other States it deems likely to be affected by such damage, as well as the competent international organisations.' Article 2, Paragraph 1, of the Convention on Early Notification of a Nuclear Accident provides that, following a nuclear accident, a State Party shall 'forthwith notify, directly or through the International Atomic Energy Agency (hereinafter referred to as the 'Agency'), those States which are or may be physically affected as specified in Article 1 and the Agency of the nuclear accident, its nature, the time of its occurrence and its exact location where appropriate.' Article 6 of the Convention on Early Notification of a Nuclear Accident provides that a State Party providing information in accordance with Article 2 shall respond as promptly as practicable to requests from affected State Parties seeking further information and consultations with a view to minimising the radiological consequences for that State. According to the above-mentioned provisions, when a State Party's conduct is likely to affect the environment of other States, it is obliged to fully, timeously, and accurately inform those vulnerable States of the specific circumstances and possible effects of their conduct, so that those States can implement timeous response measures, and also facilitate the notifying State to seek international cooperation and consult with other States to find the best solution.

The nuclear accident at the Fukushima Daiichi Nuclear Power Station meets the definition of a nuclear accident in Article 1 of the Convention on Early Notification of a Nuclear Accident (Chen, 2021). Japan's decision to discharge nuclear-contaminated water into the

² Foreign Ministry Spokesperson Wang Wenbin's Regular Press Conference on June 3, 2021, https://www.fmprc.gov.cn/web/fyrbt_673021/t1881158.sh.html, Last Visited: 2021/10/30.

³ Foreign Ministry Spokesperson Zhao Lijian's Regular Press Conference on May 27, 2021, https://www.fmprc.gov.cn/web/fyrbt_673021/jzhsl_673025/t1879058.shtml, Last Visited: 2021/10/30.

⁴ Korea condemns Japan's decision to release water from Fukushima, Apr 13, 2021, <http://www.koreaherald.com/view.php?ud=20210413000889>. Last Visited: 2022/05/15.

⁵ Russia calls for responsible approach of Japan over nuclear wastewater, 2021-04-16, [xinhuanet, http://www.xinhuanet.com/english/2021-04/16/c_139883339.htm](http://www.xinhuanet.com/english/2021-04/16/c_139883339.htm). Last Visited: 2022/05/15.

⁶ United Nations Convention on the Law of the Sea, opened for signature 10 December 1982, 1833 U.N.T.S. 397 (entered into force 16 November 1994).

⁷ Convention on Early Notification of a Nuclear Accident, opened for signature 26 September 1986, 1439 U.N.T.S. 275 (entered into force 27 October 1986).

ocean is a follow-up action to the Fukushima nuclear accident. As a party to the Convention on Early Notification of a Nuclear Accident, after the decision was made and before the official discharge, Japan has obligations to notify, inform, consult, and make a detailed report on the Fukushima nuclear accident in accordance with the Convention, which should include information on how to deal with the Fukushima nuclear-contaminated water. At the same time, Japan needs to respond promptly to requests for further information and consultation from potentially affected State Parties. Following Japan's announcement of its plans, China made serious representations regarding the Japanese government's decision and proposed that 'a joint technical working group, which includes Chinese experts, should be set up under the framework of the relevant international institutions, to ensure that the disposal of nuclear wastewater is strictly under international evaluation, checks, and supervision (Ministry of Foreign Affairs of the People's Republic of China, 2021a, 2021b, 2021c, 2021d).' The South Korean Foreign Ministry also summoned the Japanese ambassador to South Korea so that a serious protest could be lodged (Zhong, 2021). Nevertheless, Japan insists on implementing the plan without adequate consultation with neighbouring States and the international community, in defiance of the international community's objections and questions, which might be a violation of its immediate notification obligation. After repeated calls from China, South Korea, and other stakeholders, in July 2021, the Agency convened a technical working group on the disposal of contaminated water from the Fukushima nuclear accident in Japan (Ministry of Foreign Affairs of the People's Republic of China, 2021a, 2021b, 2021c, 2021d). In the spirit of being responsible for the actions of the State, and fulfilling the obligations as a State party to the treaties mentioned above, it might be better if Japan fully cooperates with the work of this group, conducts full consultations with relevant stakeholders with an attitude of high responsibility for an international public interest, and deals with the relevant issues in an open, transparent, scientific, and prudent manner.

2.2. Japan is responsible for risk precautions

The precautionary principle is an important legal principle for addressing environmental risks where there is scientific uncertainty (Gao and Sun, 2007). It is reflected in many international declarations and treaties such as the Rio Declaration on Environment and Development (Rio Declaration), Agenda 21, and the Treaty establishing a Constitution for Europe (now replaced by the Treaty of Lisbon), and has become an important legal tool for decision-making (Erik, 2016). The application of the precautionary principle requires two prerequisites: the scientific uncertainty of the risk posed by the activity and the risk threshold for its application (Gao and Sun, 2007). When mentioned to the precautionary principle, the most essential factor, or to say, the core, is scientific uncertainty. Many international treaties, such as the Bamako Convention and the Convention on Biological Diversity (CBD),⁸ refer to this condition of scientific uncertainty in different terms (Hu, 2002). However, these conventions cannot accurately depict the actual state of development of scientific knowledge, so there is no explicit standard for the application of the scientific uncertainty element in practice. In the *Southern Bluefin Tuna Case*,⁹ the Tribunal stated that there was scientific uncertainty about the conservation measures for Bluefin tuna and that it was unable to assess whether the available evidence could prove that Japan's fishing practices posed a threat to the Bluefin tuna population, but that it was necessary to take appropriate measures to address the potential risk of a continued decline in the population and to restrict the fishing rights of Japan, Australia, and New Zealand. For the risk

threshold, international treaties and regional legislation differ in their formulation of the risk threshold for the application of the principle (Erik, 2016), which is based on the proportionality of the risks and benefits of an activity. Principle 15 of the Rio Declaration, for example, refers to situations where there is a serious threat and a risk of irreversible damage as the risk threshold.¹⁰ The Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa (Bamako Convention)¹¹ sets the risk threshold as activities 'which may cause harm to humans or the environment'.

Japan's plan to discharge nuclear-contaminated water into the ocean is the cheapest and easiest option to implement (Zhong, 2021), bringing economic benefits to Japan while having the potential to cause significant and unpredictable harm to the marine environment. Regarding the element of scientific uncertainty of the risk posed by the activity, since there is no precedent in the world for such a large-scale discharge of nuclear-contaminated water, it is difficult to determine the specific damage that will be caused at this stage, but various professional organisations have already raised arguments regarding the extent of damage that may be caused. According to a German marine scientific research institute, radioactive materials may spread to most of the Pacific Ocean within 57 days from the date of discharge and have the potential reach all global waters within a decade because of the fact that the world's strongest currents are found off the coast of Fukushima.¹² Nuclear experts from Greenpeace state that the levels of the radioactive isotope carbon-14 in Japan's nuclear-contaminated water might be dangerous for thousands of years and there is a risk of genetic damage.¹³ Regarding the elements of risk threshold, Japan should apply the precautionary principle with a lower risk threshold to this decision. When considering the potential risk that the discharge of dangerous substances brings to the ocean, an environmental impact assessment must be conducted (Sonja and Stephan, 2021). Environmental impact assessments were established as an international law obligation by the International Court of Justice (ICJ) in the *Uruguay Pulp Mills Case*.¹⁴ Taking into account both scientific accuracy and social needs (Erik, 2016), the precautionary principle should be applied here and Japan should be required to implement precautionary measures, evaluate the possible impact of nuclear-contaminated water discharge activities on the marine environment, and report the results of the evaluation to competent international organisations such as the agency and States parties.¹⁵

3. Japan needs to fulfil its obligation to prevent cross-border damage

The *Sic Utere* rule (*sic utere tuo ut alienum non laedas*) has long been

¹⁰ Principle 15, Rio Declaration: 'In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.'

¹¹ *Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa*, opened for signature 30 January 1991, 2101 U.N.T.S. 177 (entered into force 22 April 1998).

¹² Foreign Ministry Spokesperson's Remarks on Japanese Government Decision to Discharge Nuclear Wastewater from Fukushima Nuclear Plant into the Sea, April 23, 2021, <http://fb.china-embassy.org/eng/fyrth/t1868528.htm>. Last Visited: 2021/06/08.

¹³ Greenpeace warns that radioactive Fukushima wastewater contains substances that 'may damage human DNA', October 26, 2020, <https://eminetra.co.nz/greenpeace-warns-that-radioactive-fukushima-wastewater-contains-substances-that-may-damage-human-dna/59337/>, Last Visited: 2021/06/08.

¹⁴ *Pulp Mills on the River Uruguay (Argentina v. Uruguay)*, Judgment, I.C.J. Reports 2010, p. 14, para 204.

¹⁵ United Nations Convention on the Law of the Sea, Article 206.

⁸ *Convention on Biological Diversity*, opened for signature 5 June 1992, 1760 U.N.T.S. 79 (entered into force 29 December 1993).

⁹ *Southern Bluefin Tuna Case (Australia v. Japan)*, Provisional Measures, ITLOS Nos. 3&4, Order of 27 August 1999.

recognised as a general principle of law, which means that it can be invoked as a source of law by the ICJ, according to Article 38 of the Statute of the ICJ. Specifically, this rule refers to the use of one's property to the detriment of the property of others and includes the doctrine of 'good neighbourliness' (Linda, 1987).¹⁶ Principle 21 of the 1972 Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration) and Principle 2 of the 1992 Rio Declaration both incorporate this general legal principle into the environmental field, namely: 'States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their resources pursuant to their environmental policies, and the 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.'¹⁶ This is referred to as the obligation to prevent transboundary harm. This principle is also reflected in UNCLOS, in which Article 194(2) states that 'States shall take all measures necessary to ensure that activities under their jurisdiction or control are so conducted as not to cause damage by pollution to other States and their environment and that pollution arising from incidents or activities under their jurisdiction or control does not spread beyond the areas where they exercise sovereign rights in accordance with this Convention.'

To analyse this rule, it is necessary to start with some of the cases that established and developed it. In the *Trail Smelter Arbitration*,¹⁷ the Tribunal held that 'under the principles of international law, as well as of the law of the United States, no State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein when the case is of serious consequence and the injury is established by clear and convincing evidence.' The Tribunal also noted that pollutants from the territory of Canada could attract the liability of Canada for transboundary harm only if it caused substantial harm to the United States. In the *Lac Lanoux Arbitration*,¹⁸ the Tribunal, based on this principle that 'A State has the right to utilise unilaterally that part of a river which runs through it so far as such utilisation is of a nature which will affect on the territory of another State only a limited amount of damage, a minimum of inconvenience, such as falls within what is implied by good neighbourliness.'

In terms of the principle of attribution, the regime of liability for transboundary harm focuses on the result of the act of the acting State causing damage to another State, without requiring that the acting State's act be a wrongful act prohibited by international law. Thus, liability for transboundary harm is governed by strict liability (Lin, 2004),

as evidenced by a series of cases. The *Corfu Channel Case*¹⁹ has contributed significantly to the development of the doctrine of liability for transboundary harm. In that case, the Tribunal held that any State has a duty to ensure that its territory is not used to the detriment of the rights of another State. This principle of strict liability is also applicable to the attribution of State liability for international environmental damage, as in the *Trail Smelter Arbitration* and the *Lac Lanoux Arbitration* (Sharon, 1984a,b).

It is clear from the analysis of these cases that transboundary harm is characterised by the following features: first, the conduct of a State must cause substantial harm, i.e., tangible consequences. As the *Trail Smelter Arbitration* reveals, such damage must be supported by clear and convincing evidence, and it is not enough to prove that the emission of pollutants from one State across a national boundary into the territory of another State does not *ipso facto* give rise to the result of compensation for damage (Linda, 1987), even if there is a risk of damage (Constance, 1989–1990). Second, the damage is serious and significant. This can be derived from the *Lac Lanoux Arbitration*: limited or minimal damage does not constitute transboundary harm. Again, the consequences must be transboundary in nature. A State cannot be held liable for the use of its territory without affecting the territory of another State (Yang, 2007).

Japan's nuclear-contaminated water discharge plan has not yet been put into action and the full harm caused by nuclear-contaminated water will not be seen in the short term once the act of discharging begins. 'The consequences of nuclear radiation contamination will not be visible in the short term, and its impact is a cumulative process. If Japan continues to discharge nuclear-contaminated water into the ocean, then the process of nuclear contamination accumulation will be longer and the harm may intensify (China Youth Daily, 2011).' From this perspective, it is impossible to judge the significance and transboundary nature of the damage without substantial damage or tangible consequences. Nonetheless, the ocean is a highly mobile and continuous whole, and due to ocean circulation, radioactive isotopes will eventually appear outside the territorial waters of the discharging State (Sonja and Stephan, 2021). If Japan discharges nuclear-contaminated water into the ocean, it might affect not only the Northwest Pacific Ocean but also the global marine environment.

This incident also reveals one of the disadvantages of liability for transboundary harm. The types of contamination are diverse, with some being obvious and detectable in the short term, while others are potential and require a long-term cumulative process (Nie, 1991). As mentioned earlier, radioactive contamination is potential and cumulative over time. Concentrations of radioactive isotopes increase exponentially in the body as the food chain moves, posing long-term, unknown, and unforeseen risks to humans and the environment (Anh, 2021). In the long term, nuclear-contaminated water can have serious effects on fish. For example, it causes reduced reproductive capacity, morphological abnormality, decreased white blood cells, anorexia, inactivity, slow growth, and over activity (Seth, 1983–1984; Lomio, 1979–1980). In addition, nuclear-contaminated water will harm the food chain of marine life, and at the end of the food chain are often humans themselves, who can suffer genetic damage, develop cancer or other health problems, or even die from nuclear radiation (Seth, 1983–1984).

In practice, for the potential transboundary harm, a State should have the obligation to prevent, which is a positive obligation of conduct, instead of bearing the obligation of result solely. Prior prevention efforts should be made based on the potential risk of transboundary harm (Qiang, 2021). From the perspective of sustainable development, prevention is more important than cure for environmental protection, and measures should be taken at the potential stage. The ICJ in *Certain*

¹⁶ Principle 21, The Stockholm Declaration: 'States have, in accordance with the Charter of the United Nations and the principles of environmental law, the sovereign right to exploit their resources pursuant to their environmental policies, and the 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.'; Principle 2, Rio Declaration: 'States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their resources pursuant to their own environmental and developmental policies, and the 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.'

¹⁷ *The Trail Smelter Arbitration (the U.S. v. Canada)* (1941), 3 RIAA 1905. Facts: The United States sued the sulfide released by a smelter near Terrell, Canada, which caused serious damage to crops, woods, and pastures in Washington State, the United States.

¹⁸ *The Lac Lanoux Arbitration (Spain v. France)* (1957), 24 I.L.R. Facts: Spain sued France for its unilateral decision to divert the water of Lac Lanoux to its hydroelectric power plant.

¹⁹ *Corfu Channel Case (the U.K. v. Albania)* (1949), I.C.J. 4. Facts: Britain sued Albania and demanded that it bear the responsibility for personal injury and damage caused by two British warships triggering mines in the Corfu Strait.

Activities Carried Out by Nicaragua in the Border Area Case stated that 'to fulfil its obligation to exercise due diligence in preventing significant transboundary environmental harm, a State must, before embarking on an activity having the potential adversely to affect the environment of another State, ascertain if there is a risk of significant transboundary harm, which would trigger the requirement to carry out an environmental impact assessment.'²⁰ Furthermore, when an acting State has already carried out activities that have the potential to adversely affect the environment, a reasonable principle of attribution should be that the acting State is liable for transboundary harm so long as there is sufficient evidence that the acting State's conduct will cause serious harm to the development of the environment in the long run, even if immediate material harm has not yet occurred.

It might be too late if Japan to fulfil its international obligations based on substantial damage occurs. Due to the highly potential contamination discussed above, Japan has the obligation to carry out preventive measures in advance in order to avoid the occurrence of transboundary damage caused by nuclear-contaminated water. Japan is suggested to carry out the environmental impact assessment for the potential transboundary harm as an obligation of conduct.

4. Japan should fulfil its international legal obligations to prevent pollution from land-based sources

International conventions on pollution from land-based sources mainly include the Convention for the Prevention of Marine Pollution from Land-Based Sources (Paris Convention)²¹ and UNCLOS. However, the Paris Convention is only applicable to some waters in the Atlantic, the Arctic Ocean, and some waters affiliated to the Arctic Ocean. The main sea areas involved in Japan's discharge of nuclear-contaminated water are not included (Gao and Qian, 2021a,b). Article 207 of UNCLOS provides that States shall take all other measures as may be necessary to enact laws and regulations to prevent, reduce, and control pollution from land-based sources, taking into account internationally agreed rules, standards, and recommended practices and procedures. Among them, pollution from land-based sources refers to 'pollution of the marine environment from land-based sources, including rivers, estuaries, pipelines, and outfall structures.' In addition to international conventions, some soft law instruments such as the Montreal Guidelines for the Protection of the Marine Environment against Pollution from Land-Based Sources (Montreal Guidelines)²² and Agenda 21 regulate marine land-based pollutants. According to Article 1 of the Montreal Guidelines, 'land-based sources' refers to sources of land discharge which reach the marine environment from the coast including outfalls, run-offs, through rivers, canals, and underground watercourses. Agenda 21 contains national proposals for action on marine environmental pollution from land-based sources (Wang and Chen, 2011), Article 24, Chapter 17 of which stipulates that States should take action to deal with the degradation of the marine environment from land-based activities and take account of the Montreal Guidelines. As a follow-up to Agenda 21, the Global Programme of Action for the Protection of the Marine

Environment from Land-based Activities (GPA)²³ guides States in dealing with land-based activities that may affect the marine environment, supports them in formulating their plans, and identifies radioactive substances as one of the source categories of marine and coastal pollution (Delia, 2021). In terms of international jurisprudence, Ireland has filed a lawsuit against the UK in the International Tribunal for the Law of the Sea (ITLOS) for pollution of the Irish Sea from land-based sources. Ireland asked the court to confirm that the UK had not assessed the potential impact on the Irish Sea's marine environment of the international transport of radioactive materials to and from the MOX Plant.²⁴

On August 25, 2021, the Japanese government and TEPCO decided to build submarine pipelines to discharge the nuclear-contaminated water of Fukushima Daiichi Nuclear Power Station into the ocean and to start the investigation for construction preparation in September 2021.²⁵ As a party to UNCLOS, as well as a participant in the Montreal Guidelines, Agenda 21, and GPA, Japan has obligations to prevent, reduce, and control pollution from land-based sources under the framework of UNCLOS and abide by the contents and purposes of the relevant international soft law instruments to protect the marine environment against pollution from land-based sources. This obligation is to endeavour or to strive to realise a certain result,²⁶ where to take measures to maximise the protection of the marine environment from pollution. Paragraphs 1 and 5 of Article 207 of UNCLOS provide that, 'States shall adopt laws and regulations to prevent, reduce, and control pollution of the marine environment from land-based sources, taking into account internationally agreed rules, standards, and recommended practices and procedures' and state that 'laws, regulations, measures, rules, standards, and recommended practices and procedures shall include those designed to minimise, to the fullest extent possible, the release of toxic, harmful, or noxious substances, especially those which are persistent, into the marine environment.' Accordingly, when identifying Japan's responsibility for pollution from land-based sources, it is appropriate to refer to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention),²⁷ especially the standard of the prohibition on dumping radioactive waste in the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (1996 Protocol to the London Convention),²⁸ which states that 'Contracting Parties shall prohibit the dumping of any wastes or other matter with the exception of explicitly permitted substances with no or extremely

²⁰ *Certain Activities Carried Out by Nicaragua in the Border Area* (Costa Rica v. Nicaragua) and *Construction of a Road in Costa Rica along the San Juan River* (Nicaragua v. Costa Rica), Judgment, I.C.J. Reports 2015, p. 665.

²¹ *Convention for the Prevention of Marine Pollution from Land-Based Sources*, opened for signature 4 June 1974, 1546 U.N.T.S. 103 (entered into force 6 May 1978).

²² United Nations Environment Programme, Decision 13/18/11 of the Governing Council of UNEP, of 24 May 1985.

²³ See <https://sustainabledevelopment.un.org/partnership/?p=7432>, Global Programme of Action for the Protection of the Marine Environment from Land-based Activities is designed to be a source of conceptual and practical guidance to be drawn upon by national and/or regional authorities for devising and implementing sustained action to prevent, reduce, control, and/or eliminate marine degradation from land-based activities.

²⁴ See *MOX Plant (Ireland v. the United Kingdom)*, Provisional Measures, Order of 3 December 2001, ITLOS Reports 2001, p. 95.

²⁵ 'Fukushima Daiichi Nuclear Power Plant treated water about 1 km offshore to investigate for discharge work', , Last" title="https://www3.nhk.or.jp/news/html/20210824/k10013220531000.html?utm_int=nsearch_contents_search-items_002 , Last">https://www3.nhk.or.jp/news/html/20210824/k10013220531000.html?utm_int=nsearch_contents_search-items_002 , Last Visited: 2021/10/30.

²⁶ Pierre-Marie Dupuy: Reviewing the Difficulties of Codification: On Ago's Classification of Obligations of Means and Obligations of Result in Relation to State Responsibility.

²⁷ See *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter*, opened for signature 29 December 1972, 1046 U.N.T.S. 120 (entered into force 30 August 1975).

²⁸ *1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter* (1972), opened for signature 7 November 1996, <https://www.wcdn.imo.org/localresources/en/OurWork/Environment/Documents/PROTOCOLAmended2006.pdf> (entered into force 24 March 2006).

limited impacts on the environment.’ Submarine pipelines are specified in UNCLOS as ‘pipelines and outfall structures’, the construction of submarine pipelines to transport nuclear-contaminated water to the ocean amounts to pollution from land-based sources, and the nuclear-contaminated water to be discharged by Japan is a prohibited act of dumping. In this regard, Japan may have an obligation to attain a precise result, in which to not discharging nuclear-contaminated water to the ocean. If Japan insists on using pipelines for the nuclear-contaminated water discharge, it will violate both the obligations of conduct and the obligation of result it has under international law.

Similarly, Japan’s domestic laws contain provisions on marine environmental protection. As early as the late 1950s, Japan began to control marine land-based pollutants²⁹ through the Water Quality Conservation Law of Public Waters (Jiang and Wu, 2021). Articles 2 and 3 of that law stipulate that everyone shall strive to protect the quality of coastal and other waters used for public purposes. Subsequently, the Law relating to the Prevention of Marine Pollution and Maritime Disaster was passed for controlling the discharge of waste into the ocean.³⁰ As a framework provision for environmental protection in Japan,³¹ Article 16 of the Basic Environmental Law³² requires the government to formulate environmental quality standards for water pollution, ‘for the protection of human health and the living environment.’³³ Furthermore, Articles 2 and 18 of the Basic Act on the Oceans,³⁴ known as Japan’s ocean constitution, also clarify the protection of the marine environment (Someno, 2020). Article 2 states that ‘the positive development and use of the oceans shall be executed, aiming at allowing sustainable development.’ Article 18 states that ‘the State shall take necessary measures to conserve the marine environment including securing the biodiversity in the oceans with conservation and improvement of the habitat and reduction of the pollution load caused by water flow into the oceans.’ Moreover, the fifth Basic Environment Plan of Japan passed in 2018³⁵ points out that in order to promote the protection and sustainable utilisation of the marine environment, the prevention of marine pollution and the comprehensive management of coastal areas are necessary. Based on the above, If Japan insist to discharge nuclear-contaminated water to the ocean, it will not only have the risk to violate the relevant international law obligations, but also has the risk to violate the relevant provisions of its own domestic laws.

5. Proposed solutions

Under the framework of international law, it is very difficult to accuse Japan of transboundary harm because there is no global convention that regulates liability for transboundary pollution damage, only some general legal principles (Sharon, 1984a,b). At the same time, because the negative effects of nuclear pollution will not be revealed until many years in the future, it is difficult to meet the requirement of

substantive damage. However, South Korea has indicated that it intends to bring charges against Japan. After Japan announced its plan to discharge nuclear-contaminated water into the ocean, South Korea immediately declared that it would apply to ITLOS for temporary measures or file a lawsuit to request ITLOS to suspend Japan’s actions (Gao and Qian, 2021a,b). ITLOS and the ICJ set a high threshold for the level of nuclear pollution required for affected States to obtain interim measures. The ICJ requires five conditions to be satisfied for interim measures: (1) preliminary jurisdiction of the court; (2) ‘plausibility’ of the rights to be protected through interim measures; (3) sufficient correlation between the rights to be protected through interim measures and claims; (4) risk of irreparable damage; and (5) urgency (He and Gao, 2014).’ In the *Pulp Mills on the River Uruguay Case*, the ICJ rejected Argentina’s application for interim measures on the grounds that Argentina failed to submit specific proof of the irreparable transboundary environmental harm that would be caused.³⁶ In the *MOX Plant Case*, ITLOS held that Ireland failed to provide evidence that the operation of the MOX Plant would cause irreparable damage to Ireland’s rights or serious harm to the marine environment.³⁷ ITLOS also did not believe that the urgency of the situation required the adoption of the interim measures requested by Ireland in the short period before the composition of the Annex VII arbitral tribunal.³⁸ If South Korea files a lawsuit against Japan in ITLOS, there is a great possibility that ITLOS will adopt the same high threshold as it did in the *MOX Plant Case*. Therefore, South Korea will not be in a dominant position in the lawsuit. Subsequently, South Korea fell silent after announcing in April that it would sue Japan, which also reflects the difficulties faced by States in instituting legal proceedings.

As noted above, access to the ICJ by way of litigation is difficult, stakeholders may wish to consider requesting advisory opinions from international tribunals such as the ICJ as well as ITLOS. The issue of marine environmental pollution involved in nuclear-contaminated water is less politically sensitive, and the dispute arising from the entire marine environmental pollution is not a bilateral dispute and qualifies for the advisory jurisdiction of an international tribunal. The purpose of the advisory function is to provide legal advice to the applicant, which is advisory in nature, not specific to the dispute, not binding, and is not limited by the principle of State consent (Luo and Yu, 2019). If China, South Korea, Russia, and other stakeholders wish to further prove Japan’s responsibility under international law for the discharge of nuclear-contaminated water and the international law responsibility for the pollution of the marine environment caused by nuclear-contaminated water, and to stop Japan’s conduct, they may cooperate closely, exchange information and jointly request an advisory opinion from the ICJ or ITLOS. The morally binding nature of the advisory opinion could greatly increase the realistic possibility of stopping the discharge of Japan’s nuclear-contaminated water into the oceans. At the same time, due to the expansion of the advisory jurisdiction of international judicial bodies, some advisory opinions have already had a direct impact on international judicial decisions, such as the ICJ advisory opinion on the Chagos Archipelago, which has directly impacted on the determination of ITLOS on the issue of sovereignty over the Chagos Archipelago in the maritime delimitation arbitration between Mauritius and Maldives. Advisory opinions have greatly contributed to the improvement of international legislation, and stopping the discharge of nuclear-contaminated water from Japan through advisory opinions can effectively prevent the recurrence of similar acts in the future, thus safeguarding the common interests of all mankind (Chang and Duan, 2022).

²⁹ Law Concerning the Conservation of Water Quality in Public Water Areas, Law No. 181 (Showa 33/12/25), , Last" title="https://www.shugiin.go.jp/internet/itdb_housei.nsf/html/houritsu/03119581225181.htm , Last">https://www.shugiin.go.jp/internet/itdb_housei.nsf/html/houritsu/03119581225181.htm , Visited: 2021/10/30.

³⁰ Ibid.

³¹ Ibid.

³² The Basic Environment Law, Law No.91 of 1993, Effective on November 13, 1993, <https://www.env.go.jp/en/laws/policy/basic/index.html> , Last Visited: 2021/10/30.

³³ The Basic Environment Law, Chapter 2, Section 3, Article 16 <https://www.env.go.jp/en/laws/policy/basic/ch2-1.html#section3> , Last Visited: 2021/10/30.

³⁴ The Basic Law of the Sea, Law No. 33 of Heisei 19 , <https://elaws.e-gov.go.jp/document?lawid=419AC1000000033> , Last Visited: 2021/10/30.

³⁵ See The Basic Environment Plan, Cabinet decision on April 17, 2018, https://www.env.go.jp/en/policy/plan/5th_basic/plan.pdf , Last Visited: 2021/10/30.

³⁶ Ibid.

³⁷ *MOX Plant (Ireland v. the United Kingdom)*, Provisional Measures, Order of 3 December 2001, ITLOS Reports 2001, p. 95.

³⁸ *MOX Plant (Ireland v. the United Kingdom)*, Provisional Measures, Order of 3 December 2001, ITLOS Reports 2001, p. 95.

Moreover, from a long-term perspective, it is necessary to draft a global convention on liability for transboundary harm. At this stage, the restriction of international environmental laws mostly depends on international soft law instruments rather than legally binding hard law treaties (Peng and Ma, 2020). Accordingly, the formulation of a global convention on liability for transboundary harm may be a good solution to overcome the crisis. The convention should contain provisions on the conditions for liability, the methods of damage assessment, the dispute settlement mechanism, and the organisational framework to promote the implementation of State obligations. Under the guidance of the convention, the above-mentioned organisational framework can be established based on the current mechanism of the United Nations Environment Programme (Ann, 1982). On May 10, 2018, the United Nations General Assembly adopted a resolution to formulate the framework of the 'Global Pact for the Environment.' If the 'Global Pact for the Environment' can be successfully adopted, it will become the first comprehensive global convention for environmental protection, which roundly stipulates basic principles and measures for environmental protection. Article 5 of the 'Preliminary Draft of the Global Pact for the Environment' requires that 'the Parties have the duty to ensure that activities under their jurisdiction or control do not cause damage to the environments of other Parties or in areas beyond the limits of their national jurisdiction.'³⁹ However, due to the fragmentation and dominance of soft law within international environmental law itself, the decline of globalisation, the power games played by States in political discourse, and economic dominance in the negotiation process (Wong, 2021), the negotiation of the convention was temporarily terminated. In addition, the existing international organisations committed to preventing nuclear pollution, such as the International Atomic Energy Agency (IAEA) and the International Maritime Organisation (IMO), should recognise the importance of cooperation, strengthen contacts, and jointly create a worldwide mechanism for pollution prevention and control. As one of the organisations that initiated the codification of *IAEA Safety Standards*, the IMO should consider cooperating with the IAEA and other organisations for establishing an international expert group to conduct a risk assessment and supervise the discharge of nuclear-contaminated water into the ocean, build transparent mechanisms for supervision and information sharing, and handle Japan's nuclear-contaminated water in a manner acceptable to the international community, upholding the purposes of UNCLOS, the London Convention, and the 1996 Protocol to the London Convention.

To successfully achieve these goals, the key lies in common awareness among States of the fact that environmental problems affect more than a single State and that due to their transboundary nature, it is impossible to solve complex environmental pollution problems by relying on the power of one State alone. This is why UNCLOS provides a special section (Section 2, Part 12) to regulate 'global and regional cooperation.' Article 199 of UNCLOS stipulates that 'States in the area affected, in accordance with their capabilities, and the competent international organisations shall cooperate, to the extent possible, in eliminating the effects of pollution and preventing or minimising the damage. To this end, States shall jointly develop and promote contingency plans for responding to pollution incidents in the marine environment.' Article 200 of UNCLOS provides that, 'States shall cooperate, directly or through competent international organisations, for the purpose of promoting studies, undertaking programmes of scientific research, and encouraging the exchange of information and data acquired about pollution of the marine environment. They shall endeavour to participate actively in regional and global programmes to acquire knowledge for the assessment of the nature and extent of pollution, exposure to it, and its pathways, risks, and remedies.' The above two articles fully demonstrate the importance of international cooperation in dealing with environmental problems, especially urgent environmental

pollution incidents.

Japan's unilateral and unauthorised announcement that it will discharge nuclear-contaminated water into the ocean has been strongly condemned by all States precisely because Japan did not fully realise that this act can no longer be attributed to its exercise of sovereignty, and in fact, the discharge of radioactively contaminated water will endanger the rights and interests of other neighbouring States in their normal use of the ocean. Therefore, the correct approach to be followed by Japan is to actively report the nuclear leakage to vulnerable States and relevant international organisations in a timely, accurate, and complete manner. Before making a major decision to discharge pollutants into the ocean, Japan should consult with relevant States and organisations to seek understanding and international cooperation for a better solution, which will not only help Japan to recover from the nuclear crisis as soon as possible but also, more importantly, will protect the global marine environment from infringement.

6. Conclusions

Japan's unilateral declaration that it will discharge nuclear-contaminated water into the ocean is somehow questionable. Japan shoulders responsibility for immediate notification of interested parties, implementation of preventive measures in accordance with the precautionary principle, prevention of transboundary harm, and measures to protect the marine environment from radioactive pollutants from various sources. If Japan insists on proceeding before exhausting all safe ways of disposal, and without fully disclosing relevant information or fully negotiating with neighbouring States, it will have to assume national responsibility. One of the remedies available to injured States is to raise the accusation of liability for transboundary harm against Japan under the framework of international law, but more importantly, this incident can lead all States to realise that relevant conventions and organisations should be strengthened to promote the implementation of international environmental law as soon as possible. The best way to achieve this goal is for all States to view environmental issues from an overall perspective and to strengthen cooperation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

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³⁹ Article 5 of the Preliminary Draft of the World Environmental Pact.

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