

INTERNATIONAL JOURNAL OF LAW
MANAGEMENT & HUMANITIES

[ISSN 2581-5369]

Volume 5 | Issue 5

2022

© 2022 *International Journal of Law Management & Humanities*

Follow this and additional works at: <https://www.ijlmh.com/>

Under the aegis of VidhiAagaz – Inking Your Brain (<https://www.vidhiaagaz.com/>)

This article is brought to you for “free” and “open access” by the International Journal of Law Management & Humanities at VidhiAagaz. It has been accepted for inclusion in the International Journal of Law Management & Humanities after due review.

In case of **any suggestions or complaints**, kindly contact Gyan@vidhiaagaz.com.

To submit your Manuscript for Publication in the **International Journal of Law Management & Humanities**, kindly email your Manuscript to submission@ijlmh.com.

Ship's Ballast Water and its Impact on Marine Environment

MS. MEHAK BATRA¹ AND DR. M. IMRAN²

ABSTRACT

Vessel sourced marine pollution is either caused operationally or accidentally. Ship's ballast water is an example of operational vessel sourced pollution. Ballast water is used to ensure safe operations of the ship throughout a voyage. It also helps in providing stability and balance to unladen ships. Transfer of marine organisms through ships' ballast water is one of the most crucial issues. Marine organisms that are transported via ships' ballast water to the destination port have a harmful effect on coastal and marine ecology of that port state. Marine organisms grow in their new area, competing with the native species, and may cause the deterioration or extinction of one or more indigenous species, severely disrupting the marine ecosystem. These transferred organisms through ballast water are referred as invasive species. An example of this invasive species is Zebra Mussel.

Ballast water pollution is an imminent danger to a healthy marine environment, it may severely harm the marine ecosystem, species, and human wellbeing. Apart from the human health and environmental degradation, it economically affects the population of the coastal states as their welfare is largely dependent on a sound marine environment. In this way it appears that the protection and preservation of the marine environment is of vital importance to the entire international community. Hence, this article aims to find out the grey areas in the present International legal framework to govern and regulate ballast water pollution.

Keywords: *Ballast Water, Coastal/Port State, Invasive species, Marine Environment, Vessel Sourced Pollution.*

I. INTRODUCTION

“If it were not for the sea, the earth would just be one more small, dead planet, another desert island adrift in the limitless” - GESAMP

Oceans play an essential role in our lives around the world. They help in achieving biological and climatic balance on the planet. In addition to that, our daily lives are so intricately connected

¹ Author is a Ph.D. Scholar & Assistant Professor at Shobhit Institute of Engineering & Technology (Deemed-to-be University), Meerut, India.

² Author is a Professor & Associate Director, SLCS, Shobhit Institute of Engineering & Technology (Deemed-to-be University), Meerut, India.

with oceans, either in the form of food that we eat, or the products derived from the oceans that we use. On the other hand, after the construction of ships, seas not only remained a source of food or products for humans, but it also became a mode of transportation and communication. Globalization led to the growth of shipping industry and economy worldwide. Today, approximately 90 percent of the trade is transported by shipping industry. At the same time, problems related to protection and preservation of marine environment from vessel sourced pollution also increased. Marine pollution caused by ships irreparably damages sea life, which in turn affects human health as well. The current scenario of the marine environment is not on the bright side.

With the launch of steel-hulled vessels in the shipping industry. In case the ship is not carrying any cargo, water is pumped into the unladen ships which in turn is used as ballast to stabilize ships and to ensure its safe operating conditions during their voyage to the next destination port³. This whole process helps in decreasing the stress on the hull by providing transverse stability, manoeuvrability, improving propulsion, and compensating for weight fluctuations in various load levels of cargo and due to water and fuel consumption.

Although ship's ballast water is of vital importance for efficient and safe operations of the modern ships. But at the same time, it poses serious health, ecological and economic problems due to the carriage of various marine species via ship's ballast water. It mainly includes different varieties of microbes, bacteria's, eggs, small invertebrates, cysts etc. These transferred species can survive to create a hostile population of reproductive species in the marine environment of the host port state, becoming invasive species that are out-competing and multiplying⁴. It is estimated that around 10,000 billion tons of ballast water is transferred globally every year and around 7,000 pathogens and living species are carried to the other ports every day⁵.

Most importantly, the irreversible damage caused by these invasive species to the marine environment at large through ship's ballast water has been considered as one of the four main threats by the Global Environment Facility to the Oceans. International Maritime Organization (IMO) and governments of various countries has put ship's ballast water on major priority and a topic of high premium. Therefore, this article will highlight the adverse impacts of these species on the marine environment and what are the rules and regulations are at present in

³ Dr. Green Potters, Marine Pollution 1 bookboon.com, 205 (2013)

⁴ H Elcicek and others, Effect of Ballast water on marine and coastal ecology ICOEST (3 September 2022, 13:40 pm), https://www.researchgate.net/publication/301821711_Effect_of_Ballast_Water_on_Marine_and_Coastal_Ecology

⁵ Umo Iduk and Nitonye Samson, Effects and Solutions of Marine Pollution from Ships in Nigerian Waterways 6(9) IJSER, 81-90 (2015)

regulating and governing the marine pollution with respect to ballast water. Lastly, this article will focus on the grey areas present in the present convention to deal with the problem of ship's ballast water.

II. INVASIVE ALIEN SPECIES AND ITS IMPACT ON MARINE ENVIRONMENT

Invasive alien species had significantly impacted the aquatic ecosystem leading to vital restructuring by changing predation impact, habitat and competing with local or native species. Invasive alien species have been considered as an important factor in changing the ecosystem and are known for multiplying resulting in extinction of native species and deterioration of coastal and marine ecology. For instance, in the early 1980's the most important threat in the Black Sea is **American comb jelly** which was carried via ballast water from North Sea. Later in 1989 these species multiplied into 1 billion tonnes of Invasive Alien Species and affected huge quantities of zooplankton, larvae, and fish eggs⁶. These species made a total loss of approx. 240 million dollars in the fish market industry by 1992⁷. In other words, with the increase in the number of IAS in Black Sea i.e. American comb jelly, the population of fish and zooplankton decreased.

Another instance is found in the Great Lake wherein European zebra mussels were introduced in the late 1980's. These **zebra mussels** have caused serious damages as they attached themselves to the pipes and restricts the water flow and impacts the quality of drinking water by effecting the smell and taste. They can even attach themselves to the hull of ships and reduces the performance by giving resistance and causes severe engine damage. The potential losses made to the fish industry due to the introduction of non-native zebra mussel within the Great Lakes region for further 10 years is around US\$ 5 billion⁸.

Further in Peru in 1991 drinking water got infected due to microbe vibrio Cholera which was carried via ballast water and around 1 million people got infected and approx. 10000 people died with cholera⁹. These are just few instances wherein the introduction of Invasive Alien species into the native water have caused significant impacts on mariculture, fisheries, ecosystem, biodiversity, infrastructure, industrial development, and human health.

In terms of impact caused to environment, it includes a huge loss of native biodiversity of that region due to competing with their own local species, overgrowth and smothering, reduction in

⁶ Barbara Werschkun, Emerging risks from ballast water treatment: The run-up to the International Ballast Water Management Convention 10 *Chemosphere*, 257-265 (2014).

⁷ *Id.*

⁸ Yuan Jingguo, 'The Pollution of Ships' Ballast Water to the Marine Environment and Countermeasures' 4 *Atlantis Press*, 167-170 (2016)

⁹ *Id.*

the availability of habitat for native species, disease, parasites, and hybridisation resulting in genetic dilution. Take for instance, *Mytilus Galloprovincialis* which were spread over by carriage of ballast water and by fouling the hulls of the ship. Now this species is well founded in moderate regions across the globe¹⁰. It has also taken over and displaced various native species of South Africa and seems to overtake on the US west coast and hybridize with its nearby relatives.

At the same time, it also impacts the ecosystem by reducing the quality of water and changing the nutrient cycles. In Southeast Asia and Africa, there seems to be number of problems caused due to change in ecosystem function by IAS. Entire Lakes and rivers waterways were clogged with dense mats of these plants. These plants lower the level of Oxygen and causes problems for fishes to live in the waterways, hugely impacting the shipping and fishing industry. The water Hyacinth absorbs the important nutrients from the water and reduces the growth the native plants. When hyacinth dies it gets settle down in the bottom, releasing all its nutrients and water becomes eutrophic, affecting the drinking water and human health.

As far as human health is concerned. It includes overgrowth of aquifers, reduced recreational opportunities and beaches smothering, along with diseases and parasites. The immense increase in the occurrence of lethal algal blooms and spread of dangerous phytoplankton are key concerns for human health and wellbeing. For instance, Paralytic shellfish poisoning due to *Gymnodinium catenatum*, dinoflagellate, resulted in deaths of around 30 people along with around 500 being hospitalized¹¹. On the other hand, mutated *Vibrio Cholera* travelled widely in ship's ballast water. In Peru in 1991, this lethal species of cholera from Asia created epidemic and affected thousands of people at large.

In addition, economic impacts are also there as an outcome from intrusion to biological resources that backs mariculture and fishing, damage to fisheries and tourism, disrupt infrastructure and charges of treatment such as clean up etc¹². For example, European green crabs, transported by wooden ships to United States. Ship worms made holes in the hulls. The above incident was partially liable for the destruction of the soft-shelled calm fisheries and lessening of catches by 85 percent affecting many people between 1938 and 1959¹³.

Moreover, there are certain cultural impacts that may arise from Invasive alien species (IAS) due to the decrease in the number of native species which are generally used for dilapidation of

¹⁰ Supra Note 4.

¹¹ Ballast Water Impacts, (4 September 2022 10:25 am) <https://hansbuch.dk/marine/news/ballast-water-impacts>

¹² Alan Khee Jin Tan, *Vessel-Source Marine Pollution* 1 Cambridge University Press, United State of America 167 (2005)

¹³ Supra Note 7

culturally significant habitats or subsistence harvesting. Almost in every case where IAS impacts the resources that are harvested locally. It also leaves some cultural impacts such as forced abandonment of traditional values and livelihoods.

III. BALLAST WATER MANAGEMENT CONVENTION

In 1998 at IMO, problem of HAOP was raised first, Australia and Canada were also facing problems with respect to alien species carried by ballast water. Thus, IMO together with MSC, MEPC and IMO sub-committees have been dealing with the issues, first by focusing on guidelines then on formation of new Conventions.

For example, in 1991, MEPC implemented “*Guidelines for Preventing the Introduction of Unwanted Organisms and Pathogens from Ships’ Ballast Water and Sediment Discharges*”. Further, based on the above-mentioned guidelines, IMO assembly in 1993 incorporated “*Guidelines for Preventing the Introduction of Unwanted Organisms and Pathogens from Ships’ Ballast Water and Sediment Discharges*”. The Resolution invited MSC and MEPC to develop International legally binding framework by keeping the guidelines under review. Moreover, the precautionary principle approach set out in Rio Declaration was also mentioned in the “Guidelines on incorporation of the precautionary approach in the context of specific IMO activities” in 1995 by MEPC. Moreover in 1997, the IMO in its 20th Assembly incorporated “*Guidelines for the control and management of ships’ ballast water to minimize the transfer of harmful aquatic organisms and pathogens*”. After these Guidelines, Ballast Water Management Convention came into picture in 2004. But before that all the problems and issues related to invasive alien species transferred to the native marine environment was dealt by the Conventions on Biological Diversity (CBD) and United Nation Convention on the Law of the Sea. Moreover, these issues were subject of various debated at international level in the United Nations Conferences on the topic of Sustainable Development.

Article 196(1) of the Convention on Law of the Sea talks about Invasive species. It states that “*States shall take all measures necessary to prevent, reduce and control pollution of the marine environment resulting from the use of technologies under their jurisdiction or control, or the intentional or accidental introduction of species, alien or new, to a particular part of the marine environment, which may cause significant and harmful changes thereto*”¹⁴. The said clause can be interpreted with the background of the principle of preservation and protection of the marine environment as mentioned in Article 192 of Convention on Law of the Sea.

¹⁴ Article 196, United Nations Convention on Law of the Sea (UNCLOS)

The preamble of the Ballast Water Management Convention considers the CBD objective's, specially the introduction and transfer of HAOP by ballast water in ships which in turn impedes the sustainable use and conservation of biological diversity, along with the decision IV/5 of the 1998 Conference of the Parties to the CBD regarding the sustainable use and conservation of coastal and marine biological diversity, and decision VI/23 of the 2002 Conference of the Parties to the CBD which deals with alien species that endangers species, habitats, and ecosystems, containing guiding principles with respect to invasive species.

Article 8(h) of CBD includes the basic code for the management of invasive species, which demands that each contracting State should as far as it is possible “*prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species*”¹⁵. Also, it is worth citing that the United Nations Conference on Environment and Development (UNCED) of 1992 intreated the IMO to contemplate the incorporation of the appropriate regulations on discharge of ballast water. The World Summit Sustainable Development of 1992 as well, in paragraph 34(b) of its Plan of realization calls for action to speed up the development of methods to deal with invasive alien species in ships ballast water at all levels. At the same time, it is worth noticing that there is no definition as such of invasive alien species that is contained under BWM Convention, instead it uses its own notion of harmful aquatic organisms and pathogens. In accordance with European Strategy on Invasive Alien Species and CBD Guiding Principles, the invasive alien species implies an alien species whose introduction and/or spread endangers biological diversity¹⁶.

However, the extent of the notion of IAS and HAOP has not been stipulated in the legal rules in a unified way. BWM Convention defines HAOP as “*aquatic organisms and pathogens that, if introduced into the sea, including estuaries, or into freshwater courses, may create hazards to the environment, human health, property, or resources, impair biological diversity or interfere with other legitimate uses of such areas*”¹⁷. Thus, the said Convention is based on precautionary principle and environmental management instruments feature for a holistic and ecosystem approach.

Recognizing the significance of suitable ballast water management regarding environment, the IMO in 2004 embraced the Ballast Water Management Convention, though it came only into

¹⁵ Article 8(H), Convention on Biological Diversity (CBD)

¹⁶ Tamelander J., Riddering L., Haag F., Matheickal J., Guidelines for Development of National Ballast Water Management Strategies. GEF-UNDP-IMO GloBallast, London, UK and IUCN, Gland, Switzerland. GloBallast Monographs No. 18 (2010)

¹⁷ Article 1(8), Ballast Water Management Convention (BWM).

force in 2017. Currently the Convention have been ratified by 80 countries, being 81% of gross shipping tonnage worldwide.

The Ballast Water Management Convention considers both specific obligations with respect to port states, flag states and shipping industry and general obligations with respect to all parties.

With regards general obligations, all the concerned parties must undertake all essential measures to minimize, prevent, and ultimately eradicate the transfer of such destructive organisms by ships ballast water and sediments. All state parties are expected to form national BWM rules and regulations. Besides, the significance of collaboration among state parties is accentuated and regulated in various articles.

For example, Article 2 states that “*parties shall cooperate with other countries for effective implementation, compliance, and enforcement of the BWM Convention and to cooperate to address threats and risks to marine ecosystems and biodiversity effectively in ballast water related issues*”¹⁸. Collaboration is also necessary in detecting the violations and enforcement of the Ballast Water Management Convention and in transfer of the technology regarding ballast water management. Along with general collaboration, the BWM Convention also states association among state parties’ adjoining seas as they share common interest to prevent and protect the marine environment in that area. Specifically, the BWM Convention authorises that such state parties “*shall endeavour, taking into account characteristic regional features, to enhance regional cooperation, including through the conclusion of regional agreements consistent with this Convention*”¹⁹.

The Convention on Ballast Water Management also puts various responsibilities on flag states. These responsibilities consist of ships surveying to validate that the BWMP (ballast water management plan) and other related process, equipment etc. are in full compliant with the said Convention before granting a certificate ensuring compliance²⁰. After successful completion of the initial survey, the convention also requires a legal certificate which is valid for all the ships to which it pertains, and flag states are also hold accountable to permit such certificates, to those who are associated or registered under their flag state. Moreover, the flag states are obligated to conduct intermediate, annual and renewal surveys to warrant full compliance. Further,

¹⁸ Article 2, Ballast Water Management Convention (BWM).

¹⁹ Maria Cecilia Trindade de Castro, Implementation of the Ballast Water Management Convention, 2004 – Background Information on the Subject and Enforcement Proceduresun.org (5 September 2022, 11: 20 am), https://www.un.org/depts/los/nippon/unff_programme_home/fellows_pages/fellows_papers/castro_1213_brazil.pdf

²⁰ Ballast Water Management, (4 September 2022 14:20 pm) <https://www.imo.org/en/OurWork/Environment/Pages/BallastWaterManagement.aspx>

authorizing the ships' BWM and BWMP systems used in confirmation with the BWM Convention are obligations of the flag states to make sure that the ships which are registered under a flag state are effectively and properly managing ship ballast water.

Lastly, the Convention under its Article 8 mentions about sanctions of contraventions must be instituted under the legal provisions of the flag state of the ship involved, irrespective of the location of the contravention. Thus, having law at national level which prescribes the rules and regulations of the BWM Convention and sanctions in case of contravention is also one of the obligations of the flag states. Though there is no precise definition of "*port states*" in the Convention, when it implies to the activities in the port states themselves, they are themselves responsible for the said action.

Take for example, Article 9, it governs the examination of ships by asserting that a ship can be subject to examination by officials of a state in any port to regulate whether the ship follows the Convention by validating existence of an onboard certificate, inspecting the record book of ballast water and if considered essential, to sample the ballast water. This authority is provided to the port states, instead of flag states. Similarly, Article 5 says that "*each country shall ensure that, in its ports where cleaning or repair of ballast tanks occurs, facilities for the reception and safe disposal of sediments are provided which puts an obligation on port states*"²¹.

With respect to the introduction of Invasive Alien Species, the shipping industry also entails certain obligations as far as the BWM Convention is concerned, a few of which would suffer significant costs. As described above briefly, any vessel to which the Convention pertains are needed to apply and be issued a valid certificate and plan and maintain onboard a Ballast Water Management Plan limited to each vessel, both of which are to be agreed by the flag state. Furthermore, each vessel is to maintain a record book of ballast water in any kind of format (like on paper, electronic, integrated into separate book etc.) where in all the details related to intake, discharge or treatment are recorded (like salinity, temperature, or location) and kept readily available for any time inspection. With respect to sediment management for vessels, the Convention obligates all vessels, according to their BWMP to detach and discard of sediments from ballast water tanks.

In addition, vessels are obligated to run one of two Ballast water management options, i.e., to either participate in exchange of ballast water, which is to be done at least 200 nautical miles far from any coastal state (which is called as the D1 standard) or engage in installing and utilizing a BWTS (ballast water treatment system) which restricts the flow of number of viable

²¹ Article 5, Ballast Water Management Convention (BWM).

species or organisms in the water discharged below a particular level (which is called as the D2 standard)²². Lastly, to achieve all the obligations, all the vessels require to train its crew members to execute the Ballast Water Management Plan and certify that all the related activities are efficiently and properly done.

The D1 and D2 standards are regarded as important for the regulation and governance of the ships ballast water. As far as the standards of shipping industry is concerned, the Convention modulates that once the treaty entered into force, the D1 standard must be effective. As regards the D2 standard, it must be effective on a defined timeline which ultimately requires all vessels to have a Ballast Water Treatment System on board to achieve the D2 standards, which is now been decided as 2024²³. This makes the D1 standard as a temporary option to manage and regulate the ballast water, while the D2 standard will be more long lasting and permanent.

IV. CONCLUSION

To deal with the problems of ballast water BWM Convention was adopted to eliminate, minimize, and prevent the hazard of introduction of invasive alien species via ships ballast water. Apart from the prevention of the spread of the invasive alien species from one state to another port state, tourism, aquaculture, and fishing sectors will also flourish and donate to the economic growth of the port state.

At International Level, keeping in mind the protection of marine environment, International Convention for the Prevention of Pollution from Ships (MARPOL) was introduced to deal with the major problems of how to regulate and prevent vessel sourced marine pollution caused by carriage of ballast water. Dealing with Ship's ballast water is a multifaceted issue demanding effectiveness, reliability, economy, and safety. So far during a voyage, exchanging ballast water at high seas is one of the most practical and effective method to tackle the harmful effects caused to port state through ship's ballast water. But there are risks involved that concerns the security as to the safe operations of the ships at large. There are other methods also in theory to deal with the same problem but there are implementation problems with those. Therefore, the need of the hour is to have an economical and effective prevention method to curb the pollution with respect to ship's ballast water. At the same time, there are some ship's that are equipped with a system to handle the ballast water, but they are not economically feasible. Hence, it is only used at the time of the Port State Control inspection. Thus, it is imperative for every vessel to form

²² Tamelander J., Riddering L., Haag F., Matheickal J., Guidelines for Development of National Ballast Water Management Strategies. GEF-UNDP-IMO GloBallast, London, UK and IUCN, Gland, Switzerland. GloBallast Monographs No. 18 (2010)

²³ *Supra Note 17*

and create a supervising equipment to ensure that the ship's ballast water treatment system is in use at all the times. At last, much more efforts are needed to protect our marine environment and biodiversity from the harmful effects of ship's ballast water.

V. REFERENCES

- Alan Khee Jin Tan, Vessel-Source Marine Pollution 1 Cambridge University Press, United State of America 167 (2005)
- Ballast Water Impacts, (4 September 2022 10:25 am) <https://hansbuch.dk/marine/news/ballast-water-impacts>
- Ballast Water Management, (4 September 2022 14:20 pm) <https://www.imo.org/en/OurWork/Environment/Pages/BallastWaterManagement.aspx>
- Barbara Werschkun, Emerging risks from ballast water treatment: The run-up to the International Ballast Water Management Convention 10 *chemosphere*, 257-265 (2014).
- Bourhim, Aomar, The United Nations approach to reduce threats to living marine resources from fishing and ship-based pollution (1999). World Maritime University Dissertations. 370. http://commons.wmu.se/all_dissertations/370
- Dorota Pyć, Ballast water management for sustainable development – some remarks on Polish law SHS Web of Conferences 1, 2-3 (2018)
- Dr. Green Potters, Marine Pollution 1 bookboon.com, 205 (2013)
- H Elcicek and others, Effect of Ballast water on marine and coastal ecology ICOEST (3 September 2022, 13:40 pm), https://www.researchgate.net/publication/301821711_Effect_of_Ballast_Water_on_Marine_and_Coastal_Ecology
- Maria Cecilia Trindade de Castro, Implementation of the Ballast Water Management Convention, 2004 – Background Information on the Subject and Enforcement Procedures www.un.org (4 September 2022, 11: 20 am), https://www.un.org/depts/los/nippon/unff_programme_home/fellows_pages/fellows_papers/castro_1213_brazil.pdf
- Tamelander J., Riddering L., Haag F., Matheickal J., Guidelines for Development of National Ballast Water Management Strategies. GEF-UNDP-IMO GloBallast, London, UK and IUCN, Gland, Switzerland. GloBallast Monographs No. 18 (2010)
- Umo Iduk and Nitonye Samson, Effects and Solutions of Marine Pollution from Ships in Nigerian Waterways 6(9) *IJSER*, 81-90 (2015)
- Yuan Jingguo, 'The Pollution of Ships' Ballast Water to the Marine Environment and Countermeasures' 4 *Atlantis Press*, 167-170 (2016)
