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A VIEW OF ENVIRONMENTAL MANAGEMENT OF NATIONAL NAVAL VESSELS BASED ON THE BRAZILIAN NAVY REGULATIONS

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SUMMARY

Naval vessels, similarly to merchant ships, are sources of various types of pollution. In turn, the protection of the environment and the sustainable use of our national resources are considered strategic. Therefore, this study aims to present an overview of the environmental management of surface ships of the brazilian navy (bn) in the face of environmental regulations in the force. The exploratory research was based on a qualitative approach of deductive reasoning through critical analysis of national and international legislation that regulates environmental protection. In addition, documents from the defense area, particularly from bn, academic references published on the subject and documents of good environmental practices employed by the navies of the United States and the United Kingdom. In the documents analyzed, it was observed that the Armed Forces also have part of the responsibility in Environmental Protection, having been identified regulations for the Prevention of pollution generated by warships, prepared by the Defense sector itself and by these foreign navies. From the study of this material, measures to be considered by BN for the prevention of pollution generated by the Force's ships were found. It can also be inferred that adherence to environmental standards was relevant.
Keywords: Environmental Management; warship; Navy Brazil; Naval Means.

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INTRODUÇÃO

The evolution of shipbuilding combined with the type of energy source used as the driving force of the vessels is a factor responsible for negatively impacting marine ecosystems. Initially, environmental damage was attributed to forest deforestation due to the use of wood in shipbuilding and, later, to the exploitation of coal mines (REBOREDO, 2012) and the emission of polluting gases from their burns for use as driving forces of vessels.

Consequently, the use of diesel and diesel-electric engines by ships, with the use of fuel oil derived from petroleum, has become the target of new concerns of states and the international community. These concerns are related to the possible environmental impacts, as a result of oil spills and diesel burns with the release of toxic gases into the atmosphere.

In addition to the pollutants mentioned above, vessels are still responsible for the generation of organic waste and waste resulting from maintenance and dismantling processes (BILGILI, 2020). In addition, they may be responsible for generating underwater noise pollution that mainly affects whales and other cetaceans, as well as, by disposing of garbage at sea, by the emission of greenhouse gases (GHG). Pollution can also be from ballast water[3], which may be responsible for the bioinvasion of exotic species in ecosystems, thus causing ecological imbalance in the region of the exchange of this ballast water (IMO, 2021).

On its decommissioning[4] and subsequent dismantling[5], the ship may also be liable for damage to the environment and human health. Even today, the dismantling and recycling of ships from industrialized countries almost always occurs in developing countries, often with weaker environmental and labor laws. This can lead to environmental pollution as well as incidents and damage to the worker involved in the dismantling process and ship recycling. (EPA, 2000; EU, 2016)

Nevertheless, inactive ships are challenges for waste management due to the number of harmful substances of which they are composed. Currently, many ships that are in the process of decommissioning have materials that have already been banned from shipbuilding. In this case,

3 Ballast water – "It is water with its suspended particles taken on board a vessel in its ballast tanks, for the control of trim, band, draft, stability or vessel tensions" (MB, 2022, pag. VII).

4 Decommissioning-Set of actions, legal procedures and techniques aimed atensure the deactivation of the ship in a safe and reliable way, including environmental; (Levy,?)

5 Dismantle-dismantle machines. (MICHAELIS online, 2022) (www.michaelis.UOL.com.br).

the handling and final disposal of waste are considered activities with a high polluting degree. At present, these ships in the process of dismantling were built at this time, at the time when such polluting agents were still allowed. This is the case of some naval means that are still operating, for example, in the Brazilian Navy (BN). Both Squadron ships, district ships and auxiliary ships were incorporated, on average, more than 20 years ago (MARINHA do BRASIL, 2021).

Similarly to merchant ships, warships[6] they can be sources of various types of pollution whether by GHG emission, by oil spills, by garbage disposal, by ballast water and by improper disposal of harmful substances in the marine environment. In addition, underwater acoustic communication and military sonars are considered to cause negative impacts on marine biota (PRIMO, 2018).

On the other hand, warships can cause pollution due to their special features of operation and maintenance also. Technological waste inherent to military operations and the use of armaments and ammunition should also be considered (BILGILI, 2020). For example, warships have typical electronic equipment for military activity, with large polluting potential if improperly disposed of, also present in the surface ships of the Brazilian Squadron.

Faced with the environmental problems presented, international legislation for the protection of the marine environment evolved throughout the second half of the twentieth century. Thus, to prevent and mitigate pollution generated by ships, environmental regulations have been developed, such as the London Convention (UN, 1972) and the MARPOL 73/78 (IMO, 1973) and the *International Convention for the Safety of Life at Sea* (SOLAS) which in its Chapter V establishes minimum equipment in vessels with a view to good practice and safety in navigation (IMO, 1974; IMO, 2002). With the advance of concern regarding the protection of the marine environment, and its use in a rational and democratic way, the need to standardize the use of the sea was verified. In this regard, the United Nations Convention on the law of the Sea[7] (UNCLOS) held in Montego Bay, Jamaica, in 1982, in force from November 16, 1994,

6 Warship-any ship belonging to the Armed Forces of a state, bearing the outward signs of Warships of its nationality, under the command of an officer duly designated by the state whose name appears on the corresponding list of officers or their equivalent and whose crew is subject to the rules of military discipline. (Brazil, 1995, article 29).

7 Convention promulgated by Brazil through Decree No. 1,530 of March 12, 1995 (Brazil, 1995).

established itself as a means of meeting the requirements of freedom of navigation, the protection of the marine environment and, especially, the world political and economic aspirations of the exploitation of living and non-living natural resources of the oceans (UN, 1982). Subsequently, the International Convention for the Control and maneuvering of ship's Ballast wasters and sediments (IMO, 2004).

Additionally, measures and actions were developed to reduce GHG emissions and to standardize the sulfur limit in fuel oil used by vessels (IMO, 2015). In 2015, the United Nations General Assembly adopted the Sustainable Development Goals.[8] (ODS), an action plan also known as Agenda 2030, which contemplate 17 objectives with targets to be achieved by 2030. Its Sustainable Development Goal 14 (life on water) directly impacts BN, by preaching the "conservation and sustainable use of oceans, seas and marine resources for Sustainable Development" (UN, 2015).

It is also worth mentioning the Hong Kong Convention[9] (CHK), which, although not yet in force, sets standards for the dismantling and recycling of ships in an environmentally sustainable manner. The convention establishes guidelines for the preparation of an inventory of harmful substances on ships, enabling prior knowledge of the polluting potential of vessels (IMO, 2009).

As a support for the 2030 Agenda, it was established within the framework of the UN, the decade of the ocean[10] started in 2021, whose goal is to protect marine life, focus of SDG 14 (UN, 2017). In turn, the final declaration of the 2022 Oceans Conference presents the commitments made by member countries to: "prevent, reduce and control all types of marine pollution, from land-based sources and from the sea, including untreated waste, solid waste disposal, chemical substances and emissions from the maritime sector, including pollution from ships and underwater

8 SDGs - targets stipulated in response to the increasing increase in environmental degradation, the threat of climate change and social and economic inequality for implementation from 2016 to 2030 (UN, 2015).

9 Hong Kong Convention-I developed with IMO Member States, the Basel Convention, in collaboration with the International Labor Organization, having as a guideline the environmentally friendly regulation of ship dismantling and recycling, not yet in force. Sustainable disposal and recycling is a global, inclusive paper action, for employment generation and Environmental Protection.

10 Ocean decade - Ocean Science decade for Sustainable Development (2021-2030): proposal of the United Nations organizations to make the world population aware of the importance of the oceans. (UN, 2015).

noise" (UN, 2022, P. 01), consolidating actions for the protection of the marine environment.

METHODOLOGY

The main objective of this work was to present an overview of the environmental management of surface ships of the Brazilian Navy (BN) in the face of environmental regulations in force. In addition, verify that these include the determined in national and international environmental regulations and are sufficient to prevent pollution caused by ships of the Brazilian Naval Force. To achieve this goal, a methodology based on exploratory research was adopted, based on the qualitative approach of deductive reasoning, deepening information that corroborated the understanding of the phenomenon under analysis.

The approaches to the solution of the problem, that is, if the Environmental Technical Standards of BN (NORTAM) meet this demand, were based on a critical analysis of Brazilian and international environmental legislation, in the treaties that regulate the protection of the marine environment, as in the high-level Documents of the National Defense of the Brazilian state and the Navy. In addition, in administrative and institutional documents of the Brazilian Navy, such as the NORTAM and the norms of the Maritime Authority (NORMAM), as well as in articles and research published in the last 10 years with themes related to the theme of the problem under analysis, in addition to documents of good environmental practices employed by the navies of the United States of America (USA) and the United Kingdom (UK). To corroborate the information contained in the institutional documents of the BN, a field work was carried out with the Directorate of Ports and Coasts of the Brazilian Navy.

The research was limited to BN surface warships, named in this work "naval means", and did not address their war operations, nor the pollution generated by the uses and discards their weapons and ammunition. The authors also seek to contribute with a reflection on sovereign immunity[11] assigned to warships regarding the environmental

11 Sovereign immunity " " the provisions of this Convention Relating to the protection and preservation of the marine environment shall not apply to warships, auxiliary vessels, other vessels or aircraft owned or operated by a state and used, at the time considered, solely in non-commercial governmental service. However, each state shall ensure, by appropriate

issue, collaborating for internalization on the subject in The Force.

Finally, the article is divided into eight sections. The first section deals with the contextualization of the theme. The second presents the methodology used in the research. The third section presents the detail of the topic in the high-level Documents of the National Defense and the BN. The fourth section examines the structure of BN's Environmental Management System for The Force's ships. The following section focuses on a contemporary discussion on the topic, with a literature review and international experience in the sector. In the sixth section, international experience in the field of Defense is presented. In the section that addresses the discussion about the norms under study, the results of the research are highlighted. Finally, in the final comments are listed reflections on the problem under analysis.

ENVIRONMENTAL ISSUES IN THE FIELD OF NATIONAL DEFENSE

Brazil has internalized the main international guidelines, adopting policies, plans and actions that help preserve the marine environment. BN, as a Maritime Authority, acts, using its physical structure, personnel and its means ships, in monitoring and combating environmental damage generated by ships. To this end, it elaborates the NORMAM and for Naval power, the North.

Since 2003, the guidelines of the commander of the Navy[12] (ORCOM) emphasize the importance of the Environmental Management System (EMS) in Military Organizations (MO) of the Brazilian Navy "whose activities are subject to causing pollution by oil and other harmful substances or dangerous in waters under national jurisdiction (MB, 2003; MB, 2004; MB, 2007; MB, 2008; MB, 2009; MB, 2010).

In 2011, the need to search for alternative energy sources was detected by The Force, with guidance for biodiesel research for use by the operating sector (MB, 2011). From 2016, the existing ORCOM were transformed into guidelines for naval planning, becoming part of the Navy Strategic Plan (PEM) (MB, 2016).

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measures that do not impede the operations or operational capability of such vessels or aircraft owned or used by it, that such vessels or aircraft operate, to the extent practicable and reasonable, in a manner consistent with this convention." (UN, 1982, article 236).

12 Guidelines of the commander of the Navy - " constitute a reference document for the high-level planning of the Navy and express the main priorities and themes that are receiving special follow-up by the commander of the Navy (CM)" (BN, 2016, p.2).

In the documents of the scope of the Defense, the concern with the environment and sustainability are also highlighted. For example, the Green Book of National Defense guides the Environmental Management of the Armed Forces, which should be based on the premise that "it is necessary to inhabit, without harming the environment and consume assertively" from three perspectives: "optimal use of energy, handling of waste and substances and construction and maintenance of military installations in a sustainable way" (BRASIL, 2017, P.26).

In turn, the National Defense White Book (LBDN) (BRASIL, 2020) highlight that environmental crises can interfere with peace and national security. This document presents the need for international cooperation on environmental and sustainability issues, such as within the framework of the Zone of Peace and Cooperation of the South Atlantic (ZOPACAS). The book also emphasizes the Brazilian Antarctic Program (PROANTAR) and to the environmental monitoring, mainly linked to the Amazon protection system. It is understood that the environmental theme is a priority because it emphasizes the protection of the environment, the mitigation of harmful environmental impacts and the sustainable use of National Natural Resources, concepts also present in the National Defense Policy (PND) and the National Defense Strategy (END) that in its item 2.3.11 presents concern with the environmental, social, economic and political consequences of climate change. In addition, it is exposed in the publication The concern with the Prevention of water pollution, addressed by the of the Blue Amazon Management System[13] (SISGAAZ)[14] (BRASIL, 2020).

The Strategic Plan of the Navy (PEM 2040) (MB, 2021) mirrors the High - Level Documents of the country, and on the environmental theme, emphasizing the protection and security of Brazilian Jurisdictional Waters (AJB), through national standards and international treaties internalized in the country. It is based on the premise of the White Book of National Defense, that the environmental theme has progressive importance for Brazil. It also presents the growing importance of environmental issues

13 Blue Amazon - Maritime space under national jurisdiction " " where Brazil holds sovereign rights for the economic use of natural resources, whether existing in the liquid mass or in the Marine subsoil" (MB, 2021, p. 18).

14 SISGAAZ – It has as its mission "to continuously monitor and protect maritime areas of interest and inland waters, their living and Non-Living Resources, their ports, vessels and infrastructures, in the face of threats, emergencies, environmental disasters, hostilities or illegalities, in order to contribute to the security and defense of the Blue Amazon and to national development". https://www.marinha.mil.br.

for Ocean politics, "with an increasing risk of foreign interference with the support of an international public opinion committed to the environment" (P.28). In addition, it is reinforced in its Chapter 2 (p.31), that "in ocean politics, the environmental issue is discussed on a global scale and is guided in various international forums". (BRASIL, 2020).

In this sense, the importance of the theme in the international scenario can be verified, for example, in the biregional agreement of Mercosur with the European Union (EU) (Brazil. 2019), not yet signed. Among other deliberations, the agreement proposes eliminating or reducing customs tariffs, enabling Brazil to expand its exports through effective environmental restrictions (FES, 2020).

However, regarding the environmental issue, warships are exceptions to the main conventions such as UNCLOS, MARPOL and CHK due to the sovereign immunity granted to state ships. It should be noted that, because they are representatives of Naval power, warships are configured as important pieces to align with the environmental aspect of National Defense Policy and National Defense and Naval strategies. Thus, it becomes relevant to evaluate the degree of adherence of the ships of the National Naval Force to the regulations that combat pollution generated by ships.

BRAZILIAN NAVY SHIP ENVIRONMENTAL MANAGEMENT SYSTEM

According to the content of complementary law 97, Article 17, item IV, of 1999, the commander of the Brazilian Navy was granted the legal attribution of Brazilian Maritime Authority, and by law 9.537 of 1997, article 3, the duty to:

> "prevention of environmental pollution by vessels, platforms and their support facilities, safeguarding human life and-safety in case of water pollution, having competence to formulate and conduct national maritime policies" (BRASIL, 1999).

Effectively, Environmental Management in BN was formalized in 2002 when the Directorate of Ports and Coasts (DPC), through Ordinance

No. 218, was designated as the agency responsible for the Environmental Management System (EMS) of BN. Therefore, the DPC is responsible for some tasks, being:" [...] accountable for matters relating to conduct and activities harmful to the environment and the Prevention of pollution caused by vessels, platforms and their support facilities.[15] [..] "(MARINHA, 2019). Therefore, from 2003, based on the technical standard NBR ISO 14001 (ABNT, 2015), BN began the implementation of the EMS in its military shore organizations, with the implementation and supervision carried out by the DPC.

BN also promotes actions and management in the prevention of negative environmental impacts, especially regarding water pollution by oil, lubricant and fuels, working together with the National Petroleum Agency (ANP) and the Brazilian Institute of the Environment (IBAMA). It also acts preventively, making continuous use of containment barriers around its ships when they are docked, avoiding environmental impacts as much as possible, thus respecting MARPOL 73/78 (IMO, 1973).

Due to the complexity and interdisciplinary characteristics of the tasks assigned to the Maritime Authority by complementary law 97 (BRASIL, 1999), in addition to the tasks already assigned to the DPC, the Interministerial Commission for Sea Resources (CIRM) was established by Decree No. 3,939, of September 26, 2001, reinstituted by Decree No. 9,858 (BRASIL, 2019). Therefore, CIRM aims to guide and coordinate decision-making regarding sectoral plans and programs, such as the National Coastal Management Plan (PNGC) (BRASI, 1988), the National Plan for Sea Resources (PNRM) (BRASIL, 2005), the Pro-Antarctica Program (PROANTAR) (BRASIL, 2022), the Continental Shelf Survey Plan (LEPLAC) (MB, 2020) and the National Antarctic policy[16] (POLANTAR) (MB, 2021).

As the representative of the BN Commander in the environmental issue, the DPC has as one of its tasks to draw up the standards of the Maritime Authority. As example, one can cite NORMAM-01 which addresses the transport of dangerous cargo and surveys; NORMAM-05 establishes the approval of material and the deliberate sinking of a damaged vessel in compliance with the London Convention (UN, 1972). In

15 https://www.marinha.mil.br/dpc/node/3519.

16 Updated by Resolution No. 3 of May 18, 2021 after the National Commission for Antarctic affairs (CONANTAR).

turn, NORMAM-07 regulates naval inspection activities and NORMAM - 10 normalizes the search, exploration, removal and demolition of sunken, submerged, stranded and Lost things and goods. In addition, NORMAM-20 can be cited that regulates the release of oil and other harmful or dangerous substances into water under national jurisdiction, the management of ballast water and the control of antifouling systems harmful to the environment (MB, 2022).

In addition to the NORMAM, DPC prepares the Environmental Technical Standards in accordance with current national legislation. As an example, we can cite NORTAM-05, which establishes the ship Emergency Plan for oil pollution, and NORTAM-06, which deals with the separation of recyclable waste discarded by land MOS (MB, 2017). In turn, NORTAM-09 regulates the preparation of Environmental Technical reports and NORTAM-02 is dedicated to the EMS of brazilian shore organizations (MB, 2021).

During the field research at DPC, it was found that BN ships do not normally undergo inspections by the Port Authorities and their respective police stations and agencies, in relation to the requirements determined by environmental regulations. In addition, there are no national environmental regulations explicitly dedicated to BN naval assets. It was also verified that the environmental management of the ships of the Brazilian Naval Force is linked to the mooring of Brazilian shore organizations at the time of mooring in Naval complexes and Bases, for example, and at the time of collection and transportation for final destination of solid waste generated by the ships of The Force. In addition to the legal aspect, the SGA acts "to strengthen BN's image of environmental responsibility before society" (MB, 2021).

Without a management system dedicated to naval assets, NORTAM-06 in its item 2.9 guides "ships that segregate their recyclable on-board waste, in order to deliver them properly separated in Naval complexes or port facilities, and these Naval complexes must be structured to incorporate them into their own waste" (MB, 2017, p.2-3).

Even considering the sovereign immunity of State ships,

BN recognizes the polluting potential of its vessels, stating that:

> when docked, they generate solid waste, sanitary sewage and oily effluents that need to be submitted to the processes of handling, packaging, collection,

> pretreatment (when appropriate) and appropriate final disposal, to be conducted by BN Naval Bases or Stations, which also result in the generation of waste and effluents, sometimes classified as toxic or dangerous and may contain oily substances, contaminated water, paint sludge, heavy metals, etc., need to be characterized (MB, 2021, P. 1-1 1-2).

For Solid Waste Management and health services, NORTAM-02 guides to " observe the procedures provided for in CONAMA resolution N° 358/2005 (MMA, 2005) and ANVISA resolution RDC 222/2018 (MS, 2018)", especially in the segregation of these residues (MB, 2021, P.2-4).

Even recognizing the polluting potential of its vessels in NORTAM-02, BN has not established a specific Environmental Management System for its naval assets.

CONTEMPORARY DISCUSSION ABOUT THE GENERATION OF POLLUTION BY WARSHIPS

The understanding of the environmental problems linked to the generation of pollution by warships is closely subordinated to the interpretation of the sovereign immunity attributed to state ships. The sovereign immunity in relation to the environmental theme present in the main conventions and treaties that deal with marine pollution such as UNCLOS (UN,1982) and MARPOL (IMO,1973), still refers to debates.

At the time of the elaboration of the UNCLOS guidelines (UN,1982), there was a fear that coastal states could generate situations to seek advantages during the innocent passage of warships through their maritime spaces. This, in particular in relation to nuclear ships, which could require the sharing of data on their equipment and designs, to prove compliance with legislation (OXMAN, 1984).

The most accepted understanding currently is that state ships maintain sovereign immunity with the obligation, as far as possible, to comply with the provisions of the conventions and treaties that deal with environmental issues. Thus, they would maintain sovereign immunity from coastal states, abiding only by the environmental standards of the ship's flag States. For some authors, immunity would be restricted only to the innocent passage of ships through the

spaces of the Exclusive Economic Zone (EEZ) of coastal states and, mainly, to visitation and inspection, and not in relation to compliance with environmental guidelines for the Prevention of pollution generated by vessels (OXMAN, 1984; QUINN, 1994; ZANELLA, 2016; SILVA, 2019).

It is worth mentioning that the legal and theoretical frameworks in relation to marine pollution caused by merchant ships are numerous and widely studied and analyzed. However, they are not the focus of this article. Because they are considered exceptions in the regulatory frameworks, warships and the pollution generated by them are topics little studied and debated, which results in few academic works on the issue.

To quantify the environmental theme linked to naval resources in the Academy, a survey of documents prepared by academic institutions in the National Defense sector was carried out.

Thus, research was carried out in the BIM network, with the year of publication selected from 2010 to 2021, with the Escola de Guerra Naval (EGN) and the Escola Superior de Guerra (ESG) as information units, with dissertation, monograph and thesis as types of selected works, in combination with the keywords: marine pollution, sustainability, environment, warship, naval means and Brazilian Navy to identify works with a predominantly environmental theme. The works developed by ESG are relevant for comparative purposes with those developed by EGN.

The works of the higher course (C-SUP), the General Staff Course for senior officers (C-EMOS) and the C-EMP of EGN were considered. In relation to ESG, the work of the course of high Studies in politics and strategy (CAEPE) and the course of high Study In Defense (CAED), both for training in National Security and Defense, were considered.

In total, 38 studies were identified, 55% of which were prepared by EGN and 45% by ESG.

In this context, a survey was also conducted from July 2020 to May 2021 on the portal google scholar and in the portal of the Coordination for the Improvement of Higher Level Personnel (CAPES) with the combination of the words marine pollution, warship, sustainability, Defense and marine environment, in Portuguese and English languages and also these words in combinations with words dedicated to specific analyzes, such as: sovereign immunity, noise pollution. Research was limited to surface naval vessels and did not address pollution from military conflicts.

As a result of this research, studies and research were identified whose focus is warships, which are mainly aimed at reducing the use of fossil fuels. These

are research, probably, in response to IMO actions to reduce GHG emissions and to reduce the percentage of sulfur in fossil fuels (BEADS, 2012; SOMMHOT, 2012; CARROLL, 2015; FARRIER, 2020). Including,

there is research carried out to verify: the use of electric propulsion to replace conventional diesel systems (LEITE, 2020), the use of solar energy (COTOCEA, 2007), the use of residual thermal energy from onboard diesel engines (ESTEVES, 2018), the use of more sustainable fuels (BEADS, 2012) and the use of hybrid propulsion systems (FOLORUNSHO, 2020), as well as the addition of additives to marine oil (F-76) (CARROL, 2015). In the quest for fossil fuel independence, the U.S. Navy, for example, has a special interest in energy storage technologies such as lithium batteries. These, because they are considered to have high loading power, are ideal candidates for various military applications (SOMNHOT, 2012).

The dismantling of warships at the end of their life cycles[17], is another issue with which the Academy shows concern. On their disposal, the ship may be liable for damage to the environment and human health due to the amount of harmful substances of which they are composed. The dismantling and recycling of ships from industrialized countries almost always occurs in developing countries, often with weaker environmental and labor laws, which lead to environmental pollution, incidents and damage to workers ' health inserted in the process of dismantling and recycling the ship. The research identified on the topic presents the need, adequacy and feasibility of sustainable deforestation, ratifying the Imo position on sustainable deforestation presented in the CHK (DEVAULT, 2015; KODUNGALLUR, 2012).

In relation to the Brazilian Naval Force, it is guided by Article 236 of the UNCLOS (UN, 1982), which establishes the sovereign immunity of State ships. However, their naval vessels follow some environmental regulations, as previously verified in this article, being identified research that deals with the adherence of naval vessels to environmental guidelines determined, almost in its entirety, by IMO and internalized by BN through the NORMAM.

According to Barbosa (2010), in his research it was found that 70% of BN ships had water and oil separation systems. However, it was verified that no ship had a garbage record book, as preached by MARPOL 73/78. The Emergency Plan of ships for oil pollution was included in all media, complying with what

17 Life cycle - "Successive and chained stages of a product system, from the acquisition of raw materials or generation of material resources to the final disposal" (ABNT, 2001, pag. 3) in this context, agenda 2030 and the ocean decade present themselves as challenges for the Brazilian Navy, but they can also symbolize opportunities, driving BN to align itself with sustainable criteria in the future.

was determined by NORTAM-05. It was noted that 24% of military ships using ballast water did not meet the NORMAM-20, and only 12% of ships had shredders, compactors or incinerators for garbage treatment on board. Already 100% separated garbage for disposal at the port and another 41% had a garbage management plan. Also, 77% of BN media had already replaced the chemical compound *halons*[18] used in CO2 fire extinguishers or were in the replacement phase, as recommended by the Montreal Protocol[19] in addition, 50% of the media had eliminated chlorofluorocarbon (CFC) gases responsible for reducing the ozone layer used in refrigeration. Neimeyer (2020), in his study, verified the operating conditions of the water and oil separator equipment (SAO) and the onboard Wastewater Treatment Unit (UTAS), and it was found that of the ships visited, 92% of the SAO and 73% of the UTAS were inoperative, or operating with restriction. Regarding the environmental management of BN ships, according to Neimeyer's research (2020), it is evidenced that BN does not have control or management over specification, preparation of documents and surveys aimed at attesting to the environmental performance of BN vessels.

According to this study by Neimeyer (2020), it was found, not by chance, due to its representativeness, that the NE "Brasil" was the only vessels analyzed in the research that kept the SAO and UTA operating properly, demonstrating the need and obligation of Brazilian naval means to comply with environmental regulations, especially when abroad to avoid disturbances near foreign ports.

With regard to the quantitative registration of the generation of electronic waste resulting from the maintenance of ships ' equipment carried out by the BN Systems Maintenance Center, only one survey was identified and it was recorded that, from 2008 to 2011, about 3 tons of waste with great polluting potential were generated. among these, lithium battery, integrated circuits, nickel-cadmium battery and solder tailings, lead batteries and lamps (MONDEGO, 2012).

Through the result obtained in his research, Mondego (2012) verified that "the potential of the company[20] impact on the environment, and consequently, the need for the implementation of an electronic waste management system to avoid the generation of environmental liabilities" environmental liabilities generated by BN's naval vessels.

18 Halons - A chemical substance with the ability to extinguish fire and used in fire extinguishers that contributes to the destruction of the ozone layer of terrestrial estrastofera (EPA, 2001).

19 Montreal Protocol - International agreement to reduce the emission of they destroy the ozone layer. (UN, 1987).

20 Company - Navy System Maintenance Center.

This author also presented the need to align the BN with the National Solid Waste Policy (PNRS) (Brazil, 2010) and the RoHS directive[21] *(Restriction of harmful Substances)* (EU, 2011) of the European Community, which restricts the amount of toxic substances in Electrical and electronic equipment, including dual-use, used in the civil and military scope.

Souza (2015), in turn, in his study analyzed the feasibility of adopting the RoHS environmental directive by BN's Specialized Directorate. It found that the equipment using RoHS technology operates satisfactorily, having verified the technical/ operational reliability of the analyzed directive. Therefore, observing the conclusions of the works of Mondego (2012) and De Souza (2015), it is verified the relevance of the BN in adopting the ROHS directive for the reduction of the polluting potential of WEEE generated by the Naval Force and, mainly because this directive is adequate and feasible for use by the Naval means of the BN.

INTERNATIONAL EXPERIENCE OF THE DEFENSE SECTOR FOR THE PREVENTION OF POLLUTION GENERATED BY WARSHIPS

In the search for data from the defense sector in the Prevention of pollution generated by warships, we opted, in this work, for the analysis of sustainable actions of countries of the North Atlantic Treaty Organization (NATO). This is due to the quality of the material identified and, in particular, of the United States and United Kingdom navies, due to the traditional cooperation of the memos with the Brazilian Navy.

It is worth mentioning that the acquisitions of naval vessels by the Brazilian navy were strongly related to the acquisitions made with the United States of America. The proximity to the United States can be verified even when observing the creation of the EGN of the MB, which had as a collaborator an officer of the United States Navy who taught at the American War College. (Almeida, 2014, p. 17).

However, due to the end of the Brazil-US military agreement of 1952[22], by which the acquisitions of warships suffered technological restrictions and only used materials were made available, the removal of American influence began, giving rise to the strategic autonomy of the BN (VIDIGAL, 2002).

21 RoHS - Restriction of the Use of Certain harsh Substances in Electric Electronic equipment – European directive restricting the amount of the substances lead, mercury, cadmium, hexavalent chromium, biphenyl polybromate (PBB) and Polyphenyl ether diphenyl (PBDE) in electronic equipment

22 Decree N°33.044 / 1953. Promulgates the military assistance agreement between the United States of America and the United States of America. Rio de Janeiro. 1953.

In Freitas (2014, p.110) the technical/ operational restrictions imposed by the USA to Brazil are ratified. It states that between 1946 and 1970, the refit of the new squadron was made with submarines and destroyers of the 2nd World War ceded by the US Navy". In addition, the ships offered favored anti-submarine warfare in response to the geopolitical conception of the Cold War, with the Soviet Union (USSR) being the likely enemy that had at the time, the largest submarine force in the world.

However, from 1960, the BN began the search for its own strategies and nationalization of naval resources, reducing the logistical submission from abroad (VIDIGAL, 2002). In this way, it sought to make possible a technical/operational/ strategic independence from American influence. Thus, the "Niterói" class frigates were acquired from the United Kingdom and the "Tupi" class submarines, of German technology. Contracts for obtaining these naval vessels provided for access to design and construction data, as well as documentation (data classified as technology transfer), ensuring larger technological and operational independence of BN's naval vessels. In a new stage of BN's strategic defense reform, the class frigates were acquired from the United Kingdom *"Dodsworth"*, received between 1990 and 2001, incorporated by BN as Class frigates *"Grenhalgh"*(FREITAS, 2014)

Other acquisitions have recently been made with NATO countries: the multipurpose ship "Atlântico" from the United Kingdom, the "Riachuelo" Class Submarines, a French project in the receiving phase, and the "Tamandaré" class frigates, under construction, based on a German project in partnership with the Brazilian companies Embraer and Atech, with delivery scheduled for 2028 (BN, 2021).

Regarding the environmental theme, during the research in lide, it was verified that NATO guides its States Parties in the search for more sustainable military activities, emphasizing training, standardization, environmentally friendly technologies, energy efficiency and alternative fuels. It also works on specific objectives such as, for example, the use of sustainable dual technologies (NATO, 2014) and waste management.[23]

In this way, the United Kingdom, considering NATO guidelines, sought to adapt to new technologies, aiming to minimize environmental impacts and reduce costs. It has also sought to reduce dependence on fossil fuels. Energy efficiency for the UK, particularly for *Royal Navy*, is a tactical issue, allowing to go further and stay longer at sea, thus with more firepower.

In addition, the United Kingdom has developed the *Joint Service*

23 AMEPP-02 (National Navy Regulations for the disposal of waste) and AMEPP-09 (Health care waste disposal procedures aboard NATO Navy vessels). (https://nso.nato.int).

Publication 418 (JSP 418) *Management of Environmental Protection in Defence*, which guides the UK Ministry of Defence in the management of Environmental Protection by the defence sector (MDUK,2014). This document JSP-418 normalizes the emission of greenhouse gases (*Leaflet* 6), substances that destroy the ozone layer, including halons, (*Leaflet* 7) and, also, anthropogenic noises in the marine environment (*Leaflet* 4.1) (MDUK, 2014). In order to minimize the environmental impact, the Waste Management proposed by the UK is based on prevention, to generate minimal environmental damage when these are disposed of (Leaflet 3) (MDUK, 2014).

In turn, the Naval environmental policy of the US Navy is based on the *document Environmental Readiness Program Manual* (OPNAV-M-5090.1) (DUSN, 2021), which addresses environmental requirements for Naval Shore Organizations and Naval ships. The document aims to provide large dissemination of environmental guidelines to the operational, technical and logistics sectors and to companies related to the naval and environmental sectors, in order to assist in the operational and environmental feasibility of new projects. In its Chapter 35 it establishes requirements for, among other pollutants: emission of greenhouse gases, by oil spills and toxic substances, management of harmful materials, solid and hospital waste, ballast water, underwater acoustic noise and, also, of environmental requirements to be observed during training and test routines at sea.

However, the factor considered most relevant in the United States Naval environmental policy is the delimitation of responsibilities in the Environmental Management of The Force. The OPNAV-M-5090.1 features in its item 35.4 the delimitation of responsibilities, defining the organizations and commands responsible for qualification, logistics and operational issues. The U.S. Navy also has the *Navy Environmental Sustainability Development to Integration Program* (NESDI), which identifies environmental needs and challenges and presents solutions for further integration into the Naval Fleet.

Discussion About The Standards In Study

This work was based on the study of Brazilian and international environmental regulations, treaties that regulate the protection of the marine environment, such as the United Nations Convention on the law of the Sea, MARPOL 73/78 and CHK. In addition, it was based on the High-Level Documents of the National Defense and the Strategic Plan of the Brazilian Navy. Also, in administrative and institutional documents of the Brazilian Navy, such as Environmental Technical Standards and Environmental Standards of the Maritime

Authority. In addition, it was supported by academic references published on the subject in the last 10 years and documents of good environmental practices employed by the navies of the United States and the United Kingdom.

During the preparation of this article, it was identified that the largest part of the studies focused on environmental issues, which focus on ships of war, had as its main objective the reduction of the use of fossil fuels and the search for renewable alternative energies.

It is noteworthy that the studies that analyzed the use of different types of alternative energies for propulsion and power generation for warships showed favorable results in relation to the reduction of fuel consumption. In addition, mainly, the emission of polluting gases, indicating the suitability of the adoption of alternative energy sources on board warships, being, however, its feasibility conditioned to the type of medium and related missions.

In the contemporary discussion, there was concern about the dismantling of warships at the end of their life cycles. The research identified on the topic presents the need, relevance and viability of sustainable dismantling, ratifying IMO's position on the topic. It should be noted, when the entry into force of the CHK[24] this should impel Brazil to sign and ratify the convention, resulting in the elaboration of new guidelines by the Maritime Authority and the Brazilian Naval Force, through the mandatory registration and control of toxic substances existing in the systems, equipment and hulls of ships. Thus, the inventory of toxic substances existing in the equipment and hull of naval vessels will make it possible to identify the polluting potential of The Force's ships at the end of their life cycles, at the time of their disarmament.

A recent example of the environmental problem in the dismantling of warships can be seen in the case, which has had repercussions in the Brazilian media, which is the situation of the former aircraft carrier (NAe) "São Paulo". In 2021, at the second public sale, the hull of the Nae "São Paulo" was sold to Turkey's SoK Denizalik shipyard for dismantling in the Port of Izmir (ALTINO, 2022). In this sense, BN complied with the basic requirements of CHK and the requirement of the ship's manufacturer, France, so that the dismantling and recycling of the medium were carried out in a sustainable way. For this purpose, a contract was signed between Naval Project Management Company (Emgepron) and Fluminense Federal University (UFF), whose object was the elaboration by

24 Entry into force scheduled for 24 months after ratification by 15 states, representing 40% of World merchant shipping by gross tonnage. The convention has been ratified by 17 states currently constituting 29.77% of the gross tonnage of the world merchant fleet (IMO, 2022). (https://www.imo.org/en/About/Conventities/Pages/The-Hong Kong- International-Convention-for-the-Safe-and-Environmentally-Sound-Recycling-of-Ships. aspx).

the University one study to establish procedures for safe recycling of the hull of the former. NAe "São Paulo" (EMGEPRON, 2019).

Continuing, it was found that the EMS of the naval vessels is fragmented, part inserted in the norms elaborated by the Maritime Authority and another part contained in the norms elaborated by the Naval Power, decentralized and without a clear definition of responsibilities. For example, the Environmental Management of The Force's ships is linked to the EMS of the Brazilian shore Organizations when they are moored in Naval complexes and Bases. On these occasions, solid waste generated by ships is collected for later final disposal.

Regarding BN ships, it was observed that there are national and international regulations not yet implemented that can be adopted by the Brazilian Naval Power, such as the National PNRS and the RoHS directive of the European Community. Analyzing the regulations of the BN elaborated specifically for its naval vessels against the current environmental guidelines and the good environmental practices of friendly Navies, regulatory gaps were observed in relation to underwater pollution generated by anthropogenic noise caused by active sonar in the marine environment, hospital waste and electronic waste.

It was noticed that in this context, whose sovereign immunity attributed to warships in relation to environmental issues still raises doubts, that the elaboration of regulations by the Brazilian Naval power is not yet pacified. However, despite the aforementioned sovereign immunity, through the environmental standards of the US Navy and the United Kingdom, it was possible to verify that the adoption of environmental criteria by warships is adequate and feasible. Both the U.S. and U.K. navies are making progress in developing regulations to prevent pollution from their ships. In addition, these criteria direct the operational, technical and logistical sectors in the function of preventing and mitigating environmental damage, with delimitation of responsibilities and defining the actions of the organizations and commands participating in these Naval Forces. These are responsible for guiding the sectors of qualification, logistics and operational issues, and can be used as references to fill the gaps identified in the BN environmental documentation for naval vessels.

It is worth mentioning that this work suffered limitations due to the scarcity of research that addresses pollution generated by warships, in particular, to the Naval vessels of the BN.

FINAL REMARKS

The article showed that the research theme is in line with what is

established in the environmental aspect of the high-level Documents of the National Defense and MB, which aims to protect the marine environment and the Blue Amazon.

In addition, the research can contribute to the Brazilian Navy internally promote awareness regarding the Prevention of pollution generated by its naval vessels, for its relevance as an integral part of Naval power and for being potential guides of good environmental practices.

It is worth noting that the environmental theme has been configured as a means of diplomacy, pressure (or oppression), demonstration of power, whether economic or political, and also acts as a means of soft power in business partnerships. Currently, economic and political decisions can be conditioned to state responses given to environmental problems, this being a variable to be considered in economic agreements and political decisions.

In this context, the 2030 agenda and the Ocean Decade present themselves as challenges for the Brazilian Navy, but they can also symbolize opportunities, driving BN to align itself with sustainable criteria.

Through the discussion presented, it is found that sovereign immunity can be interpreted in a favorable way to the protection of the marine environment. Warships can comply with environmental guidelines without declining their military duties and obligations. By the analysis carried out, it was observed the relevance and relevance of Naval Power in advancing in the protection of the marine environment, elaborating new environmental regulations in addition to the guidelines currently established in NORMAM and NORTAM.

Therefore, the ordering of the naval resources of the BN to environmental regulations involves a paradigm shift of the Brazilian Naval Force, allowing better adherence to High-Level Documents of the National Defense and the Brazilian Navy in the environmental bias. It is a learning and an improving process, as it demands time, resources and staff training. However, in the current study it is interesting to glimpse the concern of BN in the projects of the frigate class "Tamandaré", the Antarctic support ship and the instruction notices regarding compliance with environmental standards, in particular, to MARPOL. Finally, it is worth remembering that The Brazilian State, used for the safeguarding of national sovereignty and the defense of marine natural resources in Brazilian Legal Waters, acting in the prevention and mitigation of environmental damage.

UMA VISÃO DA GESTÃO AMBIENTAL DE MEIOS NAVAIS NACIONAIS A PARTIR DAS NORMAS DA MARINHA DO BRASIL

SUMMARY

Os meios navais, de forma similar aos navios mercantes, são fontes de vários tipos de poluição. Por sua vez, a proteção do meio ambiente e o uso sustentável de nossos recursos nacionais são considerados estratégicos. Sendo assim, este estudo visa apresentar um panorama da gestão ambiental de navios de superfície da Marinha do Brasil (MB) em face de normativas ambientais vigentes na Força. A pesquisa, de caráter exploratório, foi baseada numa abordagem qualitativa de raciocínio dedutivo mediante análise crítica de legislações nacionais e internacionais que normatizam a proteção ambiental. Soma-se ainda, documentos da área de Defesa, particularmente da MB, referências acadêmicas publicadas sobre o tema e documentos de boas práticas ambientaisempregadas pelas Marinhas dos Estados Unidos e do Reino Unido. Nos documentos analisados, observaram-se que as Forças Armadas também possuem parcela da responsabilidade na proteção ambiental, tendo sido identificadas normativas para a prevenção de poluição gerada por navios de guerra, elaboradas pelo próprio setor de Defesa e por estas Marinhas estrangeiras. A partir do estudo desse material, constataram-se medidas a serem consideradas pela MB para a prevenção da poluição gerada pelos navios da Força. Pode-se, ainda, inferir que a adesão àsnormas ambientais, mostrou-se pertinente.

Palavras-chave: Gestão Ambiental; Navio de Guerra; Marinha do Brasil; Meios Navais.

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