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Consequence and solution of reducing marine pollution from ship operation

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Abstract

Vietnam has a coastline stretching over 3,260km, and more than 3,000 islands large and small. These are favorable conditions for our country to develop marine economic sectors such as oil and gas, tourism, fisheries, etc. But the reality shows that those needs and interests have been depleting gradually. Marine resources and making the marine environment increasingly polluted seriously. The statistics show that every year, about 70% of waste discharged into the sea comes from the mainland when factories, factories, residential areas, hospitals, pesticides.... but a large amount of this waste has not been treated, through a drainage system that discharges directly into rivers, hundreds of rivers flow into the sea or discharge directly into the sea, carrying large quantities of sediments, plastics, chemicals, metal, oil sludge, even radioactive substances. Another reason is that the sanitation in coastal tourist areas has not been paid much attention, the waste has not been collected and treated thoroughly, and the people's sense of keeping environmental sanitation is poor, leading to the situation that throw rubbish, leftovers indiscriminately on the sea turning the beach into a huge dump.

Keywords: marine environment, shipping, maritime

1. Introduction

The reality of marine environmental pollution is a "red" issue, and the sudden death of natural seafood and aquaculture on an unprecedented scale occurred in the Central provinces in April concluded by domestic and foreign scientists due to toxicology and toxic algae. Therefore, if we do not soon implement feasible measures to reduce and prevent pollution, it will seriously affect the sustainable development strategy of our sea and islands. According to the Ministry of Natural Resources and Environment, the main cause of marine pollution is the widespread development of industry and tourism; irrational aquaculture; population growth and poverty; simple lifestyle and low intellectual level; institutions and policies are still inadequate. Environmental experts say that vessels are a major source of pollution to the environment. Especially in port cities and coastal areas because of their use of poor quality asphalt fuels, which have high levels of emissions such as nitrogen oxides (NO), sulfur dioxide (SO₂). In addition, these wastes also produce acid rain and tiny particles of soot in the air. Ship operations (including fishing vessels and cargo ships) are one of the artificial sources that contribute significantly to air pollution. According to US government statistics, ships are responsible for two-thirds of SO₂ emissions in the transport sector in 2002, with a lack of controls that could make up 98 percent of the total in 2020. Therefore, the US government has set new emission standards for large ships. Accordingly, from 2015, new ships will have to reduce 96% SO₂ compared to today. Similarly, ships built after 2016 will have to cut 80% of their NO emissions. The European Union's report on the impact of ship emissions on the health of the European Union shows that toxic emissions from ships are killing about 39,000 people each year in Europe, of which England suffered the heaviest damage because of the long sea route and also busiest trade, the bustling passage. The study also showed that the average life expectancy of residents in the West Coast of England will be reduced from 20 to 30 months from 2020. Meanwhile, shipping companies will face the potential to meet lower SO₂ emissions and cleaner fuel costs, which have raised shipping rates. The EU accepted IMO's proposal to reduce the sulfur content of marine fuels, with the

sulfur limits for all vessels cutting to 0.5% by 2020 (currently 3.5%). The limits for all ships in the Baltic and North Sea (known as the control area emissions), will be cut to 0.1% from 0.5% starting from 2015. Marine operators can also use alternative treatment technologies to clean the emissions of ships to minimize pollution. Currently, Vietnam has over 1,700 transport vessels, with the number of fishing vessels of about 130,000, corresponding to the amount of gasoline fuel consumed about 4 million tons per year. It can be said that this is the source of pollution to the sea, coastal areas and many places, seriously affecting the marine ecosystem, destroying marine resources, endangering human health.

The quality of Vietnamese ships is not high, many vehicles are too old, obsolete, low fuel burning efficiency and no exhaust gas treatment system ... so they emit more toxic gases such as: SO_2 , CO_2 , CO , NO_2 , C_xH_y ... The quality of Vietnamese ships is not high ... so they emit more toxic gases. The Prime Minister has approved the Implementation Plan of Implementation of Appendices III, IV, V and VI of the MARPOL Convention - International Convention for the Prevention of Pollution from ships. There are currently 70% to 80% of marine waste originating from inland when factories, factories, industrial parks and residential areas discharge untreated solid waste into rivers in coastal plains or direct discharge to the sea. For example, in the process of aquaculture also generates a significant amount of solid waste directly into the sea, the main source of waste is fertilizers and artificial feeds used in aquaculture. On average, one hectare of shrimp farming releases about 5 tons of solid waste and tens of thousands of cubic meters of wastewater in a crop. With a total area of shrimp farming more than 600 thousand hectares, each year will release nearly 3 million tons of solid waste into the environment. Specifically, in the provinces from Quang Ninh to Quang Binh, over 37,000 hectares have been exploited and put into aquaculture (accounting for 30-35% of brackish water). Most of the facilities went into farming on an industrial scale, resulting in the destruction of habitats, spawning grounds, breeding grounds, and epidemic diseases ... Through research and investigation of the Institute of Oceanography In Vietnam, the pollution of the sea and island environment is also caused by the improper exploitation and use of the coastal sandy areas by the localities, resulting in the lack of fresh water, erosion and sedimentation of the coast with increasing levels. Serious. The exploitation of seafood by mines and the use of toxic chemicals quickly deplete aquatic resources, causing serious consequences for marine ecoregions. Tourism activities have a significant impact on the ecological environment and natural landscape of the sea. Typically Cat Ba National Park with 5,400 hectares of water surface, from a fresh island, today the environment here has been metamorphic since being put into exploitation of tourism and aquaculture, because every day Thousands of tons of waste are dumped directly into the sea. Another cause of marine pollution is the oil spill. The large economic growth rate has greatly increased the consumption of gasoline. Economic benefits lead to excessive oil exploitation. As a result, a huge amount of oil is leaked into the marine environment due to the operation of ships and due to incidents of damage or shipwrecking of oil tankers, incidents at exploratory drilling holes and oil exploitation rigs. It is noteworthy that serious oil spills in

recent years have tended to increase, causing serious damage to the marine environment, especially in aquaculture. In addition, the waters of our country have hundreds of oil and gas exploration and exploitation wells, in addition to discharging water and oil in large volumes, each year, this activity also generates 5,600 tons of petroleum waste, in 20% to 30% are hazardous solid wastes, which do not have any storage areas and treatment facilities. That is not to mention the oil pollution caused by oil exploitation and transportation on the sea is constantly increasing.

2. Effects of marine pollution

Every year, over 100 rivers in our country discharge 880 km³ of water and 270-300 million tons of silt, leading to many substances that can pollute the sea such as organic matter, nutrients, heavy metals and many substances. toxic waste from concentrated residential areas, industrial and urban areas, coastal aquaculture areas and agricultural production areas. In 2010, the amount of waste has increased greatly in coastal areas, of which oil is about 35,160 tons / day, total nitrogen is 26-52 tons / day and total ammonium 15-30 tons / day. The environmental status report indicates that the quality of marine and coastal environments continues to decline. Seawater in some areas appears to be acidified due to a change in pH in surface seawater. Coastal seawater appears to be polluted by organic matter, zinc, some plant protection drugs. Red tide phenomenon occurs in the South Central Coast, especially in Khanh Hoa, Ninh Thuan, and Binh Thuan, killing the shrimp and fish cultured in this region. The changing quality of the marine environment results in the destruction of the natural habitats of the species, causing great losses in coastal diversity. About 85 species of seafood with different levels of endangers and over 70 species have been included in the Vietnam Red Book. Every day tons of untreated wastes pour into the sea, people living along the coast also take the coast as a dumping ground. The lack of awareness of the people contributes to the polluted marine environment. In addition, factories and factories that discharge waste water along with toxic chemicals to the sea not only pollute the sea, but also harm human health and all living things. Pollution of the marine environment also occurs in some seaports due to inadequate access of vessels to and from the canal, dumping of waste, etc. Some seaports also have excess mercury levels, such as Vung Tau port. Up to 3.1 times. Many people also catch fish using landmines which cause a lot of harmful chemicals. Between 70% and 80% of domestic waste comes from inland waterways when factories, factories, industrial parks and residential areas discharged wastewater, untreated solid waste into inland rivers. Coastal plains or discharge directly to the sea. For example, aquaculture also produces a significant amount of solid waste directly to the sea. The main sources of waste are fertilizers and artificial feeds used in aquaculture. On average, one hectare of shrimp ponds will emit about 5 tons of solid waste and tens of thousands of m³ of waste water in one crop. With a total shrimp farming area of more than 600,000 hectares, it will emit nearly 3 million tons of solid waste each year. Specifically, in the provinces from Quang Ninh to Quang Binh, over 37,000 hectares have been exploited and used for aquaculture (accounting for 30-35% of the area of salt water). Most of the establishments have come into

aquaculture on an industrial scale, resulting in the habitat of living creatures, spawning grounds, breeding grounds, and

diseases. The marine pollution due to waste of people life is shown in Fig.1.



Fig.1: the marine pollution due to waste of people life

The second cause of pollution is due to the adverse effects of social development. The society is developing more and more and at the same time, the demand of the people has been improved, and the tourism industry has grown tremendously. However, tourism is increasingly developed, it means that the marine resources are over-exploited leading to the exhaustion of marine resources and also waste a small amount of waste into the sea. And another small cause is the oil spill. Economic growth speeds up the consumption of oil. The economic benefits associated with over-exploitation of oil, which causes large amounts of oil to leak into the oceans, pollute the sea, and fish die from not having enough oxygen to survive, causing great damage. For the marine environment and aquaculture areas. Vietnam has hundreds of wells for exploration and exploitation of oil and gas. In addition to waste water and oil in large quantities, this activity generates 5,600 tons of oil and gas waste each year, of which 20% Up to 30% of hazardous solid waste has no dump and place of disposal. That is not to mention the oil pollution caused by the exploitation and transportation of oil and gas on the sea constantly increasing. Every year, over 100 rivers in our country emit 880 km³ of water and 270-300 million tons of silt, pulling substances that can pollute the sea like organic substances, nutrients, heavy metals and many substances. Hazardous from concentrated residential areas, industrial and urban areas, coastal aquaculture and agricultural production areas. In 2010, the amount of waste has increased dramatically in coastal waters, of which oil is about 35,160 tons / day, total nitrogen is 26-52 tons / day and total ammonium is 15-30 tons / day.

Pollution of the marine environment leads to very serious consequences. It directly damages human health and gradually loses its marine resources such as seafood, marine tourism, etc. A 2008 study found that Vietnam lost about \$ 69 in industry revenue annually Travel because of poor sanitation. The polluted marine environment also reduces the attraction to tourists. In order to contribute to the protection of the environment in general and the marine environment in particular, everyone needs to raise their

awareness and responsibility for environmental protection such as not littering the sea or organizing many field trips and Beach cleaners. State management agencies also need to strengthen management to reduce the amount of harmful waste in the marine environment to keep the natural landscape from being robbed under the death hand and allowing people to live on. The sea is less hard about the rice paddies.

3. Existence of pollutant emissions from ships and proposed remedies

In recent years, the development of marine economy has contributed significantly to the overall development of the country. However, over the past 10 years, the contribution of coastal and marine economy to national GDP has decreased from 48% in 2005 (Vietnam Sea Strategy to 2020) to 40.73% in 2010 and 32. , 55% in 2015 (Report provides data of the General Statistics Office for summarizing 10 years of implementation of Vietnam Sea Strategy). In 2017, this contribution was estimated at 30.19%, of which GRDP of 144 districts and coastal towns accounted for 24.68%; GDP of the marine economy accounts for 5.51%.

Along with the great contributions to the development and overall economic growth of the country, the Vietnam Sea has been facing a series of environmental problems. According to the research results of the Institute of Strategy, Natural Resources and Environment Policy, in recent years, the main threats facing the marine environment have been very popular and at such a high level of alarm. Are: (i) Pollution originating from the continent and from the sea, (ii) Destroying natural habitats, (iii) Excessive fishing and fishing, (iv) Impacts of climate change. Specifically:

- Increasing sources of marine pollution: The increase of waste sources from the continent, especially along the river flows to the sea, leads to the deterioration of quality in many places. Many coastal estuaries have been polluted by industrial and urban wastewater. The discharge of untreated or unregulated wastes is becoming more and more

complicated in coastal provinces, causing great economic, life and livelihood losses of the population community. Coastal and unpredictable damage to ecosystems and marine life. According to estimates by scientists, 80% of waste discharged into the sea comes from activities on land. Vietnam has 112 estuaries, which is the source for rubbish drifting into the ocean. Many creatures mistakenly believe that garbage is food or stuck between fishing gear, leading to habitat destruction. The representative of the United Nations Environment Program announced that in 2018, Vietnam emits oceans every year from 0.28 to 0.73 million tons of plastic waste (accounting for 6% of the world's total), ranked 4th in the world. Pollution of marine waste not only affects the quality of the environment and ecosystems but also affects economic development and coastal communities; potential risks of food insecurity and security. At present, marine pollution sources in maritime, aquaculture, tourism, oil and gas, etc., are related to the diverse and complicated use of marine resources. These are the sources of oil pollution (from oil used for fuel, lubrication, hydraulic for ships, to oil shipped by ship); Liquid chemicals on board; Dangerous goods (explosives, radioactive substances, inflammables, toxins ...) carried by train; trash; wastewater; Antifouling paint used for hull; Toxic materials used for shipbuilding (asbestos, heavy metals, chemicals); Pollution caused by the movement of aquatic species through ballast water; Communicable diseases spread through the maritime route; Operation of old ships demolition, exploration and exploitation of oil and gas on the sea. Ship operations (including fishing vessels and cargo ships) are one of the artificial sources that contribute significantly to air pollution. The quality of Vietnamese ships is not high, many means are too old, obsolete, low fuel burning efficiency and no exhaust gas treatment system ... so they emit more toxic gases such as SO₂, CO₂, CO, NO₂, C_xH_y ... Currently, Vietnam has over 1,700 transport vessels, with the number of fishing vessels of nearly 130 thousand ships, corresponding to the amount of gasoline fuel consumed about 4 million tons per year. It can be said that this is the source of pollution to the sea, coastal areas and many places, seriously affecting the marine ecosystem, destroying marine resources, endangering human health. According to the European Union's report on the effects of ship emissions on the health of the European Union, toxic emissions from ships are killing about 39,000 people each year in Europe, with Britain Suffered the most heavy losses. Lead researcher Janusz Cofala of the Applied Systems Analysis Institute in Austria said that the acceleration of international trade and the number of ships that are mostly from China has increasingly. The field is more polluted. He was most affected because of the long sea route and also the busy market, the bustling traffic. The study also shows that the average life expectancy of West Coast residents will be reduced by 20-30 months from 2020.

The EU is currently planning to establish the first low-emissions areas, minimizing pollution from thousands of cargo ships moving through the seas each year. The EU requires governments to assist maritime companies to meet strict SO₂ standards. In support of EU solutions, the International Maritime Organization (IMO) agrees to limit the SO₂ content of the ship's fuel to ships passing through the emission control area (effective Meanwhile, shipping companies will face the potential to meet low SO₂

emissions and cleaner fuel costs, which have raised ocean freight rates. The EU accepted IMO's proposal to reduce the sulfur content of marine fuels, with the sulfur limits for all ships cutting to 0.5% by 2020 (currently at 3, 5%), and the limits for all ships in the Baltic and North Sea (called "controlled area emissions") will be cut to 0.1% from 0.5% by 2015. Instead of using low sulfur fuel. Ship operators can also use alternative treatment technologies to clean the emissions of ships to minimize pollution. In order to properly control the emissions of ships in maritime activities, Vietnam should have policies, legal documents, regulations, and state regulations for fishing vessels and transports. Reduce emissions - especially greenhouse gas emissions, ship science and technology, ship engines, waste gas collectors. For transport vessels, Vietnam should soon consider fully participating in Annex VI - "Regulations for the prevention of air pollution caused by ships" of MARPOL 73/78. This plan aims to fully and fully implement the provisions of Appendices III, IV, V and VI of the International Convention for the Prevention of Pollution from Ship (MARPOL) of which Vietnam is a member. To ensure the legitimate rights and interests of the coastal state, the port State, the flag State. According to this plan, from 2016 to 2020, the Government will review and improve the system of legal documents on environmental pollution prevention caused by the ship and management of waste arising from ships in operation. Marine navigation, offshore oil and gas exploration and exploitation, investigation and detection of violations and marine accidents in order to fully and comprehensively implement legal documents and regulations of Appendices III, IV, V and VI of the MARPOL Convention. Annually implement the provisions of Annexes III, IV, V and VI of the MARPOL Convention, including the inspection and control to fulfill the responsibility of the State for vessels flying the Vietnamese flag. , The responsibility of the coastal state and the responsibility of the port state. Besides, capacity building for the inspection and certification of vessels carrying the Vietnamese national flag, conducting marine casualties investigations, timely handling of violations, including Both the training of seaport State Inspectorate officers, the State Port State Inspection (PSC) and the inspectors shall conduct the assessment, inspection and control of the ship's systems and techniques. From 2016 to 2030, study mechanisms and policies for investment in the construction and upgrading of waste reception systems at seaports in accordance with MARPOL Annex III, IV, V and VI; to study and apply the equipment for inspection and control of waste arising from ships. Assessment of current environmental pollution caused by the seagoing vessel, the situation of waste management at Vietnamese seaports and the extent to which they meet the requirements of the MARPOL Convention; Study, develop and propose the establishment of environmental protection measures to prevent pollution caused by ships in Vietnamese waters to submit to the International Maritime Organization through; Propaganda, dissemination, training, training for organizations and individuals involved in the implementation of the provisions in Annex III, IV, V and VI of the MARPOL Convention. Strengthen cooperation with international organizations in the maritime field and other countries in the region to exchange information, provide technical assistance, train civil servants, civil servants, officers and boats. Membership and transfer of

technology related to the implementation of the MARPOL Convention; Promote bilateral cooperation with the States Parties to the Convention in order to consult the experience and take advantage of their technical assistance and assistance. It can be said that this is a new step in the prevention of pollution caused by ships of Vietnam. The MARPOL Convention is one of the key conventions on marine environmental protection and Vietnam has acceded to the Convention since 1991. The Convention establishes regulations to prevent pollution caused by the carriage of goods by oil. Mine, dangerous goods, toxic, as well as water, garbage and emissions from the ship. As the relentless development of science and technology as well as the environmental issues that arise in the maritime industry's practices (oil spills, emerging pollution problems, etc...) The technical requirements of MARPOL 73/78 have been continuously amended and amended. Up to now, the MARPOL 73/78 has six appendices detailing the relevant contents. At the same time, the development of IMO Energy Efficiency Design Indicators (EEDI) sets is an indispensable indicator for the calculation of vessel design parameters. This index is a means for fleet owners to compare the efficiency of the same ship designs with the same size of many different shipyards. In addition, human resource training, awareness raising on marine gaseous emissions and climate change should be organized for marine, fishery and marine economy stakeholders. The technology of building marine ships according to the standards of marine navy needs to be renewed in order to reduce the emission of engines - ship engines, incinerators. The policies on taxation and collection of charges for ship gases should be promulgated; Cooperate and exchange experience with international maritime-environment organizations in the field of marine emissions; Researching, building and setting up a number of "emission control" or "special" sea-going areas in seaports near sea areas of special ecological value in Vietnam's sea areas. Accordingly, all large vessels with excess emissions exceeding the permitted standards will be restricted from landing or under special pilot regimes. This "Emission Control Zone" can be established in two coastal areas of Quang Ninh - Hai Phong and Vung Tau - Ho Chi Minh City. Ho Chi Minh. Environmental incidents due to oil spills, chemicals, coastal erosion ... are increasing. The most recent, typical is the pollution of marine environment due to the discharge from Vung Ang Industrial Zone, Ha Tinh of Formosa Group in 2016. According to the Government report, the economic losses and society is huge. Economically, the number of dead seafood washed ashore is estimated at 100 tons. In the long run, due to the coral reefs, phytoplankton also die, leading to the decline of regional biodiversity and aquatic resources. Impact on long-term livelihood of people in coastal areas: more than 17,600 fishing boats and nearly 41,000 people have been directly affected; More than 176,000 dependents were affected. The coastal fishing output has lost about 1,600 tons / month. Aquaculture activities: about 9 million postlarvae died, thousands of fish cages were also damaged. In addition, the incident also seriously affected marine tourism activities in these localities. Socially, the pollution of Formosa's marine environment has reduced the confidence of people in the Government and related agencies.

4. Conclusion

Petroleum activities, sea transport, with about 340 oil and gas exploration and production wells and 272 seaports are operating with a total capacity of over 550 million tons / year, for many years has contributed greatly to economy. In addition to the large amount of waste water and waste water, each year this activity generates about 5,600 tons of petroleum waste, more than 15,000 tons of floating oil and grease, of which 23 - 30% are untreated hazardous solid waste. In 2006-2007, there were about 21,600 - 51,800 tons of floating oil polluting the Vietnamese sea from the North to the South, of which only 20 coastal provinces and cities have recovered and handled 1,721 tons, the rest diffused, spreading, causing consequences to plants and marine organisms) ... In addition, oil spills are also one of the causes affecting the marine environment. According to statistics of the Ministry of Natural Resources and Environment in the period of 1992 - 2015, there were 54 serious oil spills in Vietnam waters (From 2010 to 2017, there were over 100 oil spills from large ships). small, many large volume leaks: Onnekas One cargo ship (Malaysian nationality) crashed in the coastal area of Thua Thien Hue province (December 23, 2012); AZ Beijing barge incident sunk in Kien Giang year 2012; incident of 10 freight trains in distress due to typhoon No. 12 in Quy Nhon waters in November 2017). Marine resources are over-exploited and unsustainable; destruction of coral reefs, seagrass beds, and mangroves is increasing in many places. According to estimates, seagrass all over our country's waters from Quang Ninh to Ha Tien has lost about 40-60%; Mangroves lose up to 70%; and about 11% of coral reefs have been completely destroyed, unable to recover by themselves. Pristine mangroves are almost gone. The serious decline of mangrove area has led to the decline of marine biodiversity, especially loss of spawning grounds and habitat for aquatic species.

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