

## Some solutions for reducing the marine pollution in Vietnam

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**Abstract:** Vietnam has 28/63 coastal provinces and cities with a large population, the total population of the coastal strip is about 43.51 million people, of which the urban population accounts for 34%; population density is about 1.9 times higher than the national average density; The average population growth rate is about 0.91%. This increase puts significant pressure on the environment, natural resources and marine ecology. Besides, the promotion of marine and island economic sectors with a range of activities such as oil and gas exploitation, maritime, aquaculture, marine tourism development, construction of coastal ports and distribution systems developing economic zones, industrial zones, coastal urban areas ... also makes the sea environment worse. The marine environment is severely polluted by industrial, agricultural and aqua cultural waste, household waste. However, the impact of oil pollution on shipping, shipbuilding and seaports is questionable to “hurt” the managers and it needs to warn to be conscious, responsible for minimizing pollution from this source. According to the implementation plan of Annex III, IV, V and VI of the MARPOL, the Government will review and improve the system of legal normative documents for the prevention of environmental pollution caused by ships and the management of waste arising from ships in maritime shipping.

**KEYWORDS:** marine environment, shipping, maritime, remedies

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### I. INTRODUCTION

Currently, environmental pollution is a hot topic on newspapers and has received a lot of attention from the people. In particular, especially the problem of water pollution in Vietnam has become more and more serious. Through the media, we can easily see the images, as well as articles that reflect the current state of the environment. Although departments and unions tried to call for environmental protection, water resources protection,... but it seems that it is not enough to improve the pollution situation becoming more serious. The planning of urban areas is not associated with waste treatment, waste water treatment, ... still exists, so in big cities, industrial parks, urban areas, ... Environmental pollution is at an alarming level. According to estimates, among 183 industrial parks in the country, over 60% of industrial parks do not have centralized wastewater treatment systems. In urban areas, only about 60% - 70% of solid waste is collected, infrastructure for drainage and wastewater and waste treatment cannot meet the requirements of environmental protection. Most of the waste water contaminated with grease, cleaning chemicals, dyed chemicals ... has not been treated directly into natural rivers and lakes. An example has been concerned by public opinion, the case of Thi Vai river is polluted by chemicals discharged from Vedan MSG factory for 14 consecutive years. 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 (SO<sub>2</sub>). 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 SO<sub>2</sub> 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% SO<sub>2</sub> 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 most heavy 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 SO<sub>2</sub> 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<sub>2</sub>, CO<sub>2</sub>, CO, NO<sub>2</sub>, C<sub>x</sub>H<sub>y</sub> ... 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. 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, 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.

## II. CAUSES AND IMPACTS

As we all know, pollution is occurring everywhere, such as air pollution, soil pollution and not outside of that is the pollution of the marine environment. Recently, the media as well as other mass media have reported a lot about the phenomenon of mass death fish in the central coastal area makes the lives of people here are difficult and even more difficult

This raises many concerns about whether to live in this land. There is no article about the official cause of the problem, but what we can easily see is that the marine environment is increasingly polluted. The sea is rich and diverse in terms of resources, filled with potential for diversified economic development. Not only that, the sea is also an easy place to develop tourism and develop aquaculture.

While beautiful sea is, it is useful but the sea is also gradually polluted by many agents, which is mainly the agent itself.

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 plastic

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. The marine pollution due to oil spill is shown in Fig.2.



Fig.2. The marine pollution due to oil spill

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 km<sup>3</sup> 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. The final reason is probably due to lax management and has not really tightened control over garbage treatment of businesses, enterprises and tourism. Among the sources of waste discharged into the sea, it is possible to "first call" waste sources from coastal residential activities. Coastal residential activities generate many kinds of waste into the environment and discharge into the sea through rivers and canals. The amount of this waste increases the most in coastal cities, where the socio-economic development activities are concentrated and attracting laborers from the coastal provinces.

The ability to pollute from maritime activities is very large, especially pollution due to emissions and waste water from transport vehicles. Wastewater usually comes from ships and marine vehicles, ship building and repair factories, seaports, yards and warehouses. In particular, marine industrial wastewater often contains high levels of mineral oils, cleaning chemicals and heavy metals seriously threatening the quality of seawater in areas receiving wastewater. At Hai Phong - Quang Ninh port cluster, in recent years there are about 400 outbound vessels, the amount of ballast water from seagoing ships is estimated to be estimated at 430,000 - 710,000m<sup>3</sup>. Particularly in 2008, the amount of waste water and oil from 394 ships to Hai Phong port was 4,578 tons, of which 2,561 tons of sludge.

According to research results, oil spill has seriously affected ecosystems. When oil pollution incidents occur, ecosystems have been severely affected, especially mangrove ecosystems, seagrass, sandy tidal zones, lagoons and coral reefs. Oil pollution has reduced the resilience, flexibility and resilience of ecosystems from the impact of disasters. When flowing on the water surface, the oil forms scum and changes its properties. The oil content in the water increases, the oil film reduces the ability of oxygen exchange between air and water, Oil spill contains toxins that damage the ecosystem, can cause ecosystem degradation. Oil contains many different ingredients, making the environment polluted.

According to incomplete statistics, from 1989 to now, the country has more than 100 oil spills due to maritime accidents, pouring into the sea from a few dozen to hundreds of tons of oil. Oil spills often occur from March to June. Typically, the Formosa One oil spill happened in 2001 in Ganh Rai bay, Ba Ria - Vung Tau province. Due to failing to comply with Vung Tau Port Authority's instructions, Formosa One ship crashed into Petrolimex-01, spilling about 900m<sup>3</sup>, equivalent to 750 tons of DO oil. Or the Hong Anh ship oil spill occurred in 2003, due to large waves sinking Hong Anh ship in Ganh Rai bay area, overflowing about 100 tons of FO oil, directly affecting the Can Gio protection forest area and other areas. aquaculture area. Total economic and environmental losses caused by incidents amounted to tens of billions of VND.

By the end of 2008, coastal provinces had more than 30 thousand aquaculture establishments including state-owned enterprises, joint-stock companies, 100% foreign-owned companies, limited companies and private enterprises. Many localities implement aquaculture in estuarine and estuarine areas, causing degradation or reducing the area of ecosystems such as mangrove forests, seagrass and tidal areas. In addition, the use of toxic chemicals in catching seafood also increases the risk of contamination.

Domestic waste and wastewater from tourism services, particularly from tourist activities, are the direct cause of pollution of surface water in areas near hotels, motels and tourist services. In addition, the exploitation of water for tourism needs beyond the ability to meet water resources also causes increased risk of water pollution.

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.

The mining industry causes many factors affecting the environment. Wastewater from coal mines can negatively affect the coastal environment such as sedimentation, loss of aquatic resources, and deterioration of water quality. The amount of solid waste in the coal mining process is about 150 million m<sup>3</sup> / year. For oil and gas exploitation, the risk of oil spill in exploitation, loading, transporting oil and polluting toxic substances is relatively high.

One of the important causes of marine pollution, it is due to pollution of rivers from the mainland. All rivers flow into the sea, followed by a source of land-borne pollution such as industrial, agricultural, chemical, garbage, waste, untreated waste. First of all, it is necessary to strictly enforce relevant laws such as the Law of the Vietnam Sea, the Law on Natural Resources, the Marine and Islands Environment and the sub-law documents, annual plans and investments for management and protect the sea and island environment; formulating mechanisms and policies to mobilize capital sources for activities of protecting the sea and islands environment. At the same time, Vietnam enlisted the cooperation of countries in the South China Sea region, promoted bilateral and multilateral cooperation to enhance the capacity of managing the marine and island environment; continue to maintain and develop relationships with countries and international organizations. To protect the marine environment, Vietnamese government has carried out some solution such as”

1. Promote dissemination and awareness raising for all levels, sectors, localities, economic sectors and the entire population on the sustainable management and use of marine resources; To attach importance to preventive and preventive work in combination with efficient treatment of pollution and improvement of the marine and coastal environment.
2. Strengthen the implementation of the Law on Environmental Protection, especially for acts of damaging the marine environment. To continue well performing the integrated management of the sea and islands so as to ensure multi sectoral, multi-purpose and multi-benefit development between the State, the private sector, the concerned parties and the local communities. Phoenix; Limit conflicts of interests between parties in the process of exploitation and use of marine resources and environment.
3. Pay close attention to strict control of the marine environment, especially the use of relevant legal instruments in controlling and assessing environmental standards and impacts; Monitoring - warning identify "environmental hot spots" or pollution, ... to take measures to handle in time.
4. The State shall soon develop and promulgate economic instruments in the management of the marine environment, in particular details of the extent of violations and penalties; To intensify consultations with concerned parties and create positive changes in the management and protection of the sea and islands of the fatherland.

### III. CONCLUSION

The marine environment continues to change in a bad way and continues to be "poisoned" related to socio-economic development. More and more untreated waste from the river and coastal basins flows into the sea. This is a great pressure on our environment, ecosystem and marine resources. The amount of solid waste from domestic waste generated by 28 coastal provinces of our country is about 14.03 million tons / year (about 38,500 tons / day) ... Statistics, over 100 oil spills caused by ship accidents occurred in the last 10 years, not including small oil spills causing local pollution. In addition, in the sea area, there are about 340 oil and gas exploration and exploitation wells, in addition to discharging oil and oil in large quantities, this activity also generates about 5,600 tons of solid waste, of which 20- 30% is hazardous solid waste without dumping and disposal area. Important marine ecosystems are degraded, lose their habitats and are narrowed in area. Mangroves lose about 15,000 ha / year, about 80% of coral reefs in Vietnam's waters are in risk, Of which 50% is high, this situation is similar to seagrass and other marine-coastal ecosystems. In the waters of our country, there are about 100 different species of endangered seafood and over 100 species have been included in the Vietnam Red Book. Seafood resources tend to decrease in volume, output and size of caught fish, seafood reserves decrease by 16%. The extensive shrimp production in the mangrove forest has been reduced from about 200 kg / ha / crop (in 1980) to now only 80 kg / ha / crop and 1 ha of previously mangrove forest can be exploited about 800 kg of seafood, but currently only 1/20 compared to the previous.

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