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## Status of marine environmental 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 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 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.

**Keywords:** maritime, pollution, environment, strategy

### 1. Introduction

According to the marine environmental status report of the Department of Marine Resources Protection and Environmental Protection, pollution of coastal water, especially, estuaries and harbors, plastic waste in the sea is a special issue. mind because there are no effective measures to handle. Investigation by the Oceanography Institute also showed that one of the basic causes of environmental pollution (OMT) is the phenomenon of widespread aquaculture without planning. In the provinces from Quang Ninh to Quang Binh, over 37,000 ha have been exploited for aquaculture (accounting for 30-35% of brackish water). Recently, most of the facilities have been adopted on an industrial scale, leading to the destruction of habitats, spawning grounds, breeding grounds, and epidemics ... Moreover, the status of EP is still due to the unreasonable exploitation and use of coastal sandy areas by localities, the lack of fresh water, erosion and sedimentation of the coast with increasingly serious levels. Tourism activities have a significant impact on the ecological environment and natural landscape of the sea. Typically, Cat Ba National Park with 5,400ha of water surface, is considered the first marine reserve in Vietnam with many large marine ecological resource reserves. But from a pretty and pure island, Cat Ba has been turned into an "impure" island since it was put into tourism and aquaculture. Tourist areas, fish cages, fishing grounds ... are all planned to "stick" to the sea. According to statistics, thousands of tons of garbage are dumped directly into the sea every day. Recently, coastal industrial parks are also a major threat to the coastal environment when a series of thermal power plants, oil and gas processing, steel and paper factories are growing all over the coastal strip from North to South. . Meanwhile, the control and management of waste sources from industrial parks, this factory has not caught up with the reality.



**Fig.1:** Marine pollution in Vietnam

Implications have occurred that 80% of the mangrove forest area has disappeared within the last 50 years but the recovery is negligible; the area of coral reefs in the North Sea decreases from 1/4 to 1/2. 85% of the remaining coral reefs are of poor quality or alarming. Many coastal areas with large seagrasses such as Tam Giang and Phu Quoc have been significantly reduced. Environmental incidents, red tides, coastal erosion ... have occurred continuously, causing great impacts on the environment, human health and coastal ecosystems. Pollution by organic substances in coastal sea water has been occurring and is quite common in coastal provinces of Vietnam. 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.

## 2. Causes and impacts

### 2.1. Causes

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. Current situation: Vietnam Sea is in alarming pollution due to air and human impact. 90% of the water of ponds, lakes and rivers flows into the sea without being processed. Most of the wastes from the continent flow by rivers, streams, waste from human activities at sea: Such as mining, sea transportation ... are threatening the ecology of the region. Sea. Statistics show that Vietnam's coastline is longer than 3,260 kilometers, passing through

28 provinces and cities along the length of the country. The total number of pools and coves is 44, over 2200 coastal islands, 1120 coral reefs, more than 250 thousand hectares of mangroves. Some coastal areas are being chiseled, the amount of suspended sediment greatly affects the photosynthetic capacity of some marine organisms and degrades the source of natural seafood. The seawater of some areas exhibits acidification because the pH in the sea surface changes relatively high. The coastal sea water is shown to be contaminated by organic matter, zinc (Zn), and some plant protection drugs. Biodiversity of northern coastal animal fauna and floating plants in the Central region declined markedly. Red tide phenomenon has appeared in the South Central Coast waters, especially in Khanh Hoa, Ninh Thuan and Binh Thuan, killing all kinds of fish and shrimp cultured in these areas, the situation of fishermen using fishing tools Destructive fishing is quite common such as electrical impulses, explosives, high-voltage lights exceeding the permitted capacity ... depleting coastal marine resources.

Causes of marine pollution in Vietnam: According to the 1982 Law of the Sea Convention, there are 5 sources that can pollute the marine environment:

- Activities at sea.
- Exploiting and exploring resources on continental shelf and ocean floor.
- The discharge of toxic substances into the sea.
- Transporting goods at sea.
- Air pollution

\* Pollution factors:

#### 1. Natural elements

About the air: Air pollution has a strong impact on marine pollution, high levels of CO<sub>2</sub> in the air will increase the amount of CO<sub>2</sub> dissolved in seawater, many toxic substances and heavy metal dust are carried by the air. Sea. The rise in the temperature of the earth's atmosphere due to the greenhouse effect will lead to sea level rise and changes in the marine ecological environment. In addition, the crust of the earth's crust that leaks oil fields in the ocean floor has also contributed to marine pollution. Due to marine microorganisms, marine microalgae are increasing in number, along with red tide phenomenon, reducing the beneficial marine life. Geological activities such as volcanoes, storms, etc. killed a large number of marine life, their corpses were not treated, causing pollution in coastal waters.

#### 2. Human factors

a. Waste from the mainland: Contamination sources from the continent to rivers bring to the sea such as oil and products from oil, waste water, agricultural fertilizer, pesticides, industrial waste ... About 70% pollution of the sea and oceans originated from the mainland, derived from the discharges of cities, towns and towns, from industries, construction, chemicals ... most significantly and the most dangerous are wastes from factories through sewers, discharging to the ocean and oceans a large amount of sediments, chemicals, metals, plastics, oil sludge and even substances radiation.

b. Ramping tourism, irrational aquaculture: Many coastal areas in our country develop tourism without planning, which greatly affect the ecological environment and natural landscape of the sea. Fish cage farming area, fishing area ... all planning "stick" to the sea. Recently, establishments that have cultivated on an industrial scale have led to

destruction of habitats, spawning grounds, breeding grounds, epidemics that have spread ... unreasonable exploitation and use Coastal sandy areas lead to a lack of fresh water, erosion and sedimentation with increasing levels. Exploiting by mines, using toxic chemicals quickly deplete aquatic resources and cause serious consequences for marine ecological areas.

c. Marine activities are an important cause of marine pollution of oil spills. Most of the oil spills are caused by collisions of oil tankers, in addition, the operation of commercial vessels through international maritime routes cutting through the East Sea also discharges into the Vietnamese sea a large amount of oil leakage, waste oil and domestic waste.

d. Exploiting on the continental shelf. The most significant influence of oil and gas exploitation on the sea the sea area of our country has about 340 oil and gas exploration and exploitation wells, in addition to discharging large quantities of oil and water, on average each year of this activity. Arising about 5600 tons of oil and gas waste, of which 23-30% is hazardous solid waste that has not been treated yet

## 2.2. Impacts

In general, pollution of seawater is understood as the introduction of seawater (either directly or indirectly) of residues, entities or energy, including sound sources. The bar is emitted by the people in the sea, causing bad effects on living resources and marine ecosystems. Consequently, biodiversity sources are reduced, the risk to human health, causing obstacles to marine-related activities (mainly fishing, tourism and Relaxation. Sea...) or the metamorphosis of the water source. The first difficulty is the marine biodiversity and declining aquatic resources. Important marine ecosystems are degraded and lose their habitats and their area is narrowed. The populations tend to move further offshore due to changes in coastal circulation structure related to climate change, changes in river and sea interactions in coastal estuaries, due to the loss of up to 60% of habitats. Important natural residence.

Mangroves take about 15.000 ha / year, about 80% of ecological forests in Vietnam's waters are in risk, of which 50% is high. There are about 100 species of seafood at different endangered levels and over 100 species have been included in the Vietnam Red Book.

Seafood resources are in danger of declining in reserves, output and catch size. The extensive shrimp farming productivity in the mangrove forest has decreased from about 200kg / ha / crop and so far only 80kg / ha / crop. Besides, 1 ha of mangrove forest used to be able to exploit 800kg of aquatic products, but now only one-twentieth is compared to before. Marine resources in near-shore waters show signs of being over-exploited due to the rapid increase in the number of small fishing boats, the exploitation efficiency is declining sharply. Meanwhile, offshore marine stocks have not been fully evaluated. In recent years, activities of embellishment and expansion of shallow beaches into artificial islands in the Spratly cluster of China have seriously damaged the environment not only for the Spratly waters but also for the rest of the East Sea.

Up to now, the sea, islands and coastal areas of our country have mainly been managed by the open-type and private-sector approach and mainly managed by branches through laws. At present, we still lack basic maritime laws to

effectively implement integrated state management and unification of sea and islands. This leads to the overlap of management between the 15 ministries on the sea, the lack of uniform management policies, and in the existing laws there are not many overlapping and low performance. The participation of local communities in the management process is very passive, does not clarify the issue of ownership and use of coastal land and sea surface for coastal residents. The work of checking, controlling, granting and revoking licenses for the use and exploitation of marine resources has been slow to be implemented in order to implement the policy of "economicization" in the field of marine resources. Marine environmental pollution is also an alarming issue. We need to ensure the quality of the marine environment for sustainable socio-economic development by strengthening, controlling the marine environment, effectively managing and treating wastes and pollutants before dumping. To the sea from coastal river basins and from marine economic activities. 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. 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.

### Conclusion

Preventing and being ready to respond to marine environmental incidents, preventing degradation and recovering lost and degraded ecosystems. Implementing the planning of marine protected area system by 2020 approved by the Prime Minister in 2010 and continuing to discover rich, beautiful and national and international seas to submit to competent authorities as well International organizations recognize it. In addition, we also need to proactively prevent and implement adaptation measures, mitigate the impacts of climate change and sea level rise on coastal areas, seas and islands. Encourage the active participation of local communities and improve the resilience of coastal residents on the islands to the impacts of climate change and ocean change. Finally, what we need to do now is to build a strong marine economic group in a number of areas such as oil and gas, marine minerals, maritime, shipbuilding, sane mining and processing as a force. the core and pioneering amount in marine economic development, in reaching and step by step integrating the ocean economy. 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. 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.

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