



Strengthening management of the coastal soil and water environment

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Coastal zone is the transition area between the mainland or island and the sea, including coastal sea and coastal land area. This place is under great environmental pressure due to socio-economic activities from the continent, activities at sea as well as natural movements. The coastal zone is a sensitive area, containing “hot spots” of marine environmental pollution, including soil and water pollution. Recently, soil and water resources in the coastal zone have tended to increase in pollution, while management of the marine environment is facing problems. Therefore, solutions to strengthen the management of the marine environment, including the soil and water environment in coastal zones.

Current status of soil and water environment in coastal zone

Vietnam’s coastal zone has a coastline of over 3,260km (excluding island shores) spanning many regions having different geographical and geological characteristics with hundreds of estuaries, lagoons, bays, islands and archipelagos... creating a system of complex, diverse habitat types and the presence of diverse ecosystems: Tidal flats, mangrove forests, estuaries, lagoons, coves, coral reefs, deltas, sandbanks, tidal mudflats, upwellings, brackish water aquaculture lagoons, coastal wetlands... This place also converges 6/8 world heritage sites, 7/11 world biosphere reserves, 8 national parks, 15 marine protected areas, 44 bays and 125 beaches that can be exploited for tourism development.

Vietnam’s coastal zone has 28/63 provinces and centrally governed cities, where up to 50% of the country’s population is concentrated, with vibrant socio-economic activities taking place because of its advantage in natural resources and human resources. Vietnam’s coastal zone has over 300 industrial production locations including marine economic zones, industrial parks, industrial clusters, and coastal export processing zones, along with scattered industrial establishments and many coastal craft villages. Vietnam’s coastal provinces are also provinces with large agricultural production output. These industrial, handicraft, farming, animal husbandry and aquaculture activities have released huge amounts of waste into the coastal soil and water environment. The geographical location, natural conditions, and specific characteristics of Vietnam’s seas and islands have created great pressure on the marine environment, especially the problem of cross-border marine pollution and marine environment of unknown origin as well as the existing impacts of climate change and sea level rise. These factors also put considerable pressure on the coastal soil and water environment of Vietnam.

Solid waste in the coastal zone: In recent years, solid waste in the coastal zone of Vietnam has increased from socio-economic activities such as industry, agriculture, infrastructure construction, tourism, daily life, healthcare... According to the Ministry of Natural Resources and Environment (MONRE), coastal territories have a higher level of solid waste generation than territories far from the sea: The Southeast (32%), Red River Delta (22%), North Central and Central Coast (18%), Mekong Delta (15%), Northern Midlands and Mountains (7%), Central Highlands (5%).

In 2014, the volume of urban domestic solid waste (including coastal cities) generated was about 32,000 tons/day. By 2019, the volume of urban domestic solid waste generated reached 35,624 tons/day. The country’s industrial solid waste in 2011 was 22,400 tons/day, while coastal territories accounted for 20,670 tons/day (Southeast: 7,570 tons/day; Red River Delta: 7,250 tons/day; North Central and Central Coast: 3,680 tons/day; Mekong Delta: 2,170 tons/day). Statistics in some localities in 2014, except for Ha Noi City, show that some coastal provinces generated a higher volume of solid waste from medical activities than inland provinces (Nghe An: 3,904 tons/year; Ninh Binh: 3,548 tons/year; Thanh Hoa: 3,128 tons/year; Lang Son: 1,706 tons/year; Kon Tum: 3.22 tons/year; An Giang: 236 tons/year).

Besides, in rural areas (including coastal rural areas), solid waste generated is increasing, from 18,200 tons/day in 2011 to 28,394 tons/day in 2019. The development of craft villages (including coastal craft villages), especially metal recycling and copper casting craft villages, also puts great pressure on the environment by emitting large volumes of solid waste.

Coastal continental surface water environment: With a dense river system in 10 river basins distributed and spread across the country having a total area of over 1,167 million km², the total average annual surface water volume of Viet Nam is about 830 billion m³. Due to flow characteristics,



the seasonal distribution of water is uneven. Wastewater from industrial and handicraft establishments, agricultural activities, and domestic and other activities, following the river system to the coastal area, pollutes the continental surface water environment in the coastal zone when pollutants in water have concentrations that exceed allowable standards, ranging from 1.5 to 3 times.

Coastal seawater environment: According to the assessment of the MONRE, Viet Nam's coastal seawater quality is still quite good with most values of parameters typical for seawater quality within allowable limits of QCVN 10-MT:2015/BTNMT. However, the coastal seawater environment at some times in the rainy season due to the increase in the value of organic compounds, nitrogen-containing compounds (NH_4^+), TSS from land to sea, and the drift of pollutants from offshore to the coastal strip, so the marine environmental risk quotient (RQ) in some sea areas is high (Tra Co, Quang Ninh Province) and very high (Dinh An, Tra Vinh Province); NH_4^+ , TSS, Fe, Coliform, and P- PO_4^{3-} content values exceed QCVN 10-MT:2015/BTNMT in some Northern coastal areas; some parameters such as NH_4^+ , Coliform, DO, TSS and Fe have contents exceeding the allowable limit of QCVN 10-MT:2015/BTNMT in some Central coastal areas; main pollution parameters include NH_4^+ , Coliform, TSS and Fe in some Southern coastal areas.

Pollution in Vietnam's coastal zone affects the soil and water environment. Domestic solid waste is dumped directly on the ground such as in spontaneous landfills, organic components decompose in anaerobic conditions and under the action of microorganisms will create organic acids that acidify (sour) the soil. In addition, the accumulation of heavy metals and hazardous substances in the soil due to seepage from leachate into the soil also contributes to soil environmental pollution. Domestic solid waste discharged into water sources causes substances to float to the surface of the water, causing loss of landscape, blocking the transmission of light, and affecting the photosynthesis process of plants in the water. Domestic solid waste suspended in water, especially plastics, will get tangled in boat propellers, blocking traffic, and affecting aquatic species. Waste settles to the bottom, an increased volume of sediment must be dredged every year and the anaerobic digestion process produces toxic gases that poison aquatic species.

Waste from socio-economic activities affects the soil environment by affecting the physical and chemical properties of the soil. Physical impacts such as erosion, soil compaction, and destruction of soil structure due to construction and production activities. Solid, liquid, and gaseous wastes can accumulate in soil for long periods, causing chemical effects and potential risks to the soil environment.

Industrial waste includes toxic chemicals and heavy metals that are highly accumulative in soils rich in clay minerals and humus. Gas emissions pose many potential risks to the quality of the soil environment because they have the ability to agglomerate or form acid rain that falls to the ground, polluting the soil. Wastes that pollute the soil at high levels are from detergents, dyes, paints, the battery manufacturing industry, leather tanning, and the chemical manufacturing industry. Many types of organic matter coming from sewer water, city ditches, and industrial wastewater used as a source of irrigation water in agricultural production are also agents of soil pollution.

Wastewater from coastal production areas and residential areas is untreated and discharged directly into the environment through canals and seeps into the soil, causing soil pollution and changing the content of chemicals in the soil. Leachate from composting tanks and landfills has extremely high organic pollutant loads as well as heavy metals that are not treated according to regulations and will seep into the ground, polluting the soil and groundwater in the coastal zone.

It is the factors that cause increased environmental pollution in the coastal zone along with climate change that has caused the soil environment to face soil degradation (salination, humification, drought, erosion, desertification) in Quang Ninh, Da Nang, Ba Ria - Vung Tau, Ho Chi Minh City, Tien Giang, Bac Lieu, Ca Mau...; or soil pollution in Nghe An, Ha Tinh, Da Nang, Binh Dinh; marine environmental RQ by coastal seawater in some areas has high levels (Tra Co, Quang Ninh) and very high levels (Dinh An, Tra Vinh).

Issues raised in the management of soil and water environment in coastal zone

Recently, the State of Viet Nam has paid attention and focused on marine environmental management (including coastal soil and water environment) through promulgating and organizing the implementation of a system of policies and legislations, programs, plans and evaluation of the results of activities to control marine and coastal environmental pollution...

Although certain results have been achieved, marine environmental management (including coastal soil and water environment) in Viet Nam is also facing limited management problems:

Firstly, legislation on marine environmental management still leaves blank the issue of determining damage and liability for compensation due to marine environmental incidents; there are no specific regulations and



instructions on the management, collection, reduction, and treatment of ocean plastic waste in the context of increasingly serious ocean plastic waste pollution in our country today.

Legislation also does not have specific, unified, and synchronous regulations for sea reclamation activities, so it is very difficult to meet the requirements for protecting the coastal soil and water environment; lack of sanctions to handle violations by organizations and individuals when violating regulations on integrated management of natural resources and environmental protection of sea and islands.

Many documents on economic and technical norms related to the marine environment were issued a long time ago and are outdated, but are slowly amended and supplemented, so they are no longer suitable for practical requirements for marine environmental management.

Secondly, the organization of the state management agencies for the marine environment still has overlapping tasks among agencies, especially a unified mechanism for coordinating marine environmental management activities has not really been established.

Thirdly, the team of civil servants performing the task of state management of the marine environment is limited at both the Central and local levels, especially civil servants in organizations performing the function of state-integrated management of the seas and islands.

Fourthly, material resources for marine environmental management still have many problems and have not been invested commensurate with marine environmental management requirements.

Fifthly, the role of residential communities, organizations, individuals, and other stakeholders participating in marine environmental management has not been promoted.

Sixthly, activities of checking, controlling, inspecting and handling violations of the marine environment are irregular, incomplete and slow to detect violations. Supervision activities of the Provincial People's Council and local National Assembly Delegation on the environment (including the marine environment) in the areas have not yet been paid attention to, and sometimes they are formal, and effectiveness is still not high.

Some solutions for the management of soil and water environment in the coastal zone

To strengthen the management of the marine environment in Viet Nam (including coastal soil and water environment) in the coming time, the following solutions are needed:

Firstly, organize a review to amend, supplement, and develop new legal regulations on marine environmental management: First of all, organize the development and promulgation of regulations on determining damage and liability to compensate for damage caused by marine environmental incidents; develop and promulgate regulations related to controlling and minimizing ocean plastic waste; develop and promulgate regulations on sea reclamation to

control negative impacts on the marine environment from sea reclamation activities. At the same time, supplement and promulgate new specific regulations on handling violations of the contents of integrated resource management and environmental protection of seas and islands. In addition, it is necessary to promote the development and promulgation of economic and technical norms for marine environmental management.

Secondly, develop and promulgate mechanisms and policies to encourage the community and relevant parties to participate in marine environmental management: Based on economic and educational tools, develop mechanisms and policies to encourage the promotion of community regulations on marine environmental management appropriate to the new context. Complete the mechanism to ensure community participation in the formulation of strategies, master plans and programs for integrated management of coastal resources; establish coastal protection corridors; conduct environmental impact assessment for projects on seas, islands and coastal zones.

Thirdly, organize the development and implementation of strategies and master plans for resource exploitation and environmental protection of seas and islands: Focus on completing the development, submission to competent authorities for approval and implementation of the National Marine Spatial Master Plan, the Master Plan on Sustainable Exploitation and Use of Coastal Resources for the period of 2021 - 2030, with a vision to 2050. Organize the immediate implementation of solutions to protect the marine environment and coastal zone in the process of implementing the Strategy for the Sustainable Exploitation and Use of Natural Resources and Protection of the Marine and Island Environment to 2030, with a vision to 2050.

Fourthly, improve the coordination mechanism between agencies in developing and implementing policies and legislations on integrated management of natural resources and environmental protection of seas and islands: Carry out a review to complete regulations on the assignment of responsibilities of each agency on the basis of the legislations on marine and island resources and environment. In particular, clearly identify the agency that performs the function of coordinating activities of integrated resource management and environmental protection



of seas and islands; clearly define the contents of coordination between relevant agencies in integrated resource management and environmental protection of seas and islands.

Fifthly, improve the quality of civil servants and public employees: Strengthen the organization of training courses on expertise and integrated marine management as well as marine environmental management to improve the capacity of civil servants to perform their duties; promote public service ethics and increase the responsibility of civil servants and public employees in performing marine environmental management tasks. At the same time, it is necessary to ensure enough civil servants to carry out marine environmental management tasks based on determining specific job positions, especially in coastal localities.

Sixthly, increase investment and effective use of facilities, equipment, and public finance for marine environmental management: Invest in improving the capacity to monitor, supervise, and forecast marine resources and environment; establish a comprehensive and synchronous information system and database on marine and island resources and environment. At the same time, promote proactiveness in finding, establishing, and promoting international cooperation on the marine environment; proactively seek foreign funding sources using new financial mechanisms such as ODA loans, concessional loans, public-private partnerships, foreign investment... Develop programs and projects with medium to large scope and scale having an impact on policy, which solves many multi-sectoral, cross-field, inter-regional, and cross-border issues. In addition, it is necessary to focus on scientific research and technology applications, promoting innovation in marine environmental management.

Seventhly, raise awareness about the marine environment: Diversify the contents, methods, and forms of legal propaganda and education, raise awareness about the sea, sustainable exploitation and use of resources, and marine and island environment protection. Deploy synchronously and effectively all forms of propaganda and education on maritime legislation, sustainable exploitation and use of resources, and marine and island environment protection.

Eighthly, improve the quality of investigation, inspection, and supervision of the implementation of policies and legislations on marine environmental management: Strengthen control of marine environmental pollution; improve the effectiveness of coordination in pollution control, prevention and response to marine environmental incidents, climate change and sea level rise. Promote the activities of elected agencies, socio-political organizations and socio-professional organizations in supervising and inspecting the implementation of policies and legislations on marine environmental management ■

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In the context that climate change is becoming a major challenge for every country in the world, with a threat to the lives of ten million people and the property of many countries worth many trillion USD. Many policies aimed at combating climate change and restoring nature are receiving attention and priority in all policies of countries. Green growth and sustainable development are the trends and directions of many economies around the world to effectively respond to the negative impacts of climate change, especially for developing countries like Vietnam. To successfully implement the national strategy on green growth towards sustainable development, therefore, it is necessary to mobilize resources from the entire society, in which the banking system plays a key role. The Fourth Industrial Revolution (Industry 4.0), with digital technology and digital transformation, will promote this role.

1. Industry 4.0 with digital transformation in the banking system

In the history of development, the global industry has gone through three industrial revolutions and today is in the process of Industry 4.0. In previous industrial revolutions, mechanical power, oil, and electricity were the materials for economic development driving force, then in the 4.0 era, data became a new resource. In the 4.0 era, IoT and Blockchain technologies are acting as data "drilling rigs", poured into the reservoir of Big Data, refined by AI based on the cloud computing platform, and have become useful information before transferring to automation