



PRINT ISSN 1119-8362
Electronic ISSN 2659-1499

Full-text Available Online at
<https://www.ajol.info/index.php/jasem>
<https://www.bioline.org.br/ja>

J. Appl. Sci. Environ. Manage.
Vol. 30 (1) 26-31 January 2026

Plastic and Microplastic Waste Governance in Vietnam: Analysis of Legal Gaps and Extended Producer Responsibility Mechanism in the Context of International Integration

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ABSTRACT: Plastic and microplastic pollution is becoming a global environmental crisis, seriously threatening ecosystems and human health. Therefore, the objective of this paper is to investigate the legal gaps and Extended Producer Responsibility (EPR) mechanism in the context of international integration of plastic and microplastic waste governance in Vietnam. In this study, a legal life-cycle approach combined with comparative legal and policy analysis is applied to examine key regulatory instruments, including the Law on Environmental Protection 2020, Decree No. 08/2022/ND-CP, and the latest national technical regulations of 2025. The research results indicate that Vietnam has made a strategic shift from a passive waste management model to the strong application of the Extended Producer Responsibility (EPR) mechanism and a roadmap to eliminate single-use plastics. However, the study reveals a significant legal gap regarding the control of microplastics, as there are no specific quantitative technical regulations for this type of pollution in water quality and wastewater documents. The article proposes establishing a separate legal corridor for controlling primary and secondary microplastics, while simultaneously perfecting recycling infrastructure to realize the plastic circular economy.

DOI : <https://dx.doi.org/10.4314/jasem.v30i1.4>

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Cite this Article as: MY, N. T. D; GIAO, N. T. (2026). Plastic and Microplastic Waste Governance in Vietnam: Analysis of Legal Gaps and Extended Producer Responsibility Mechanism in the Context of International Integration. *J. Appl. Sci. Environ. Manage.* 30 (1) 26-31

Dates: Received: 30 October, 2025; Revised: 27 November 2025; Accepted: 23 December 2025; Published: 31 January 2026

Keywords: Plastic waste; Microplastics; Extended Producer Responsibility; Law on Environmental Protection 2020; Circular economy

In the Anthropocene era, plastic has become a symbolic material of industrial development but also a driver of ecological disaster on a global scale (Porta, 2021). According to the United Nations Environment Programme (UNEP, 2023), the world produces about 400 million tons of plastic annually, of which less than 10% is effectively recycled. Vietnam, with its characteristics as a coastal nation with a rapidly developing economy, is ranked by international studies such as Jambeck *et al.* (2015)

among the countries with a large amount of plastic waste leaking into the ocean. "White pollution" not only causes urban aesthetic loss and drainage system blockage leading to flooding but also creates risks of microplastic pollution in the aquatic food chain, directly affecting food security and public health (World Bank, 2021). Facing international pressure and internal demand, the legal framework on waste management in Vietnam has undergone strong transformations in the 2020-2025 period (Ministry of

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Natural Resources and Environment, 2021). The Law on Environmental Protection 2020 is considered a pioneering legislative document in Southeast Asia for legislating the Extended Producer Responsibility (EPR) mechanism, mandating manufacturers and importers to be responsible for recycling packaging and plastic products after consumption. Furthermore, guiding documents such as Decree No. 08/2022/ND-CP and Decree No. 45/2022/ND-CP have established specific sanctions for failure to separate waste at the source and illegal discharge. Notably, 2025 marks the emergence of new National Technical Regulations (QCVN) on wastewater and ambient environmental quality, creating technical barriers that indirectly control plastic pollution. However, previous studies by Dauvergne (2018) often focused on ocean plastic waste management or technical recycling models without deeply analyzing the synchronization of the legal system in controlling microplastics, an "invisible" but dangerous form of pollution. The current research gap lies in assessing whether current legal instruments like EPR, environmental protection tax, or discharge standards are sufficient to prevent the dispersion of microplastics into the soil and water environment. This article aims to comprehensively analyze Vietnam's legal regulations on plastic management using a life-cycle approach, from design, production, and consumption to disposal and recycling. By dissecting the latest regulations up to 2025, the study will identify institutional obstacles and propose breakthrough policy solutions aimed at a global treaty to end plastic pollution. Consequently, the objective of this paper is to investigate the legal gaps and Extended Producer Responsibility (EPR) mechanism in the context of international integration of plastic and microplastic waste governance in Vietnam.

MATERIALS AND METHODS

The article uses the "Legal Life Cycle Assessment" (LLCA) framework combined with evidence-based policy analysis. The LLCA framework allows for the assessment of legal interventions at each stage of the plastic material life cycle: (1) Upstream: control of scrap imports, eco-design, material tax; (2) Midstream: control of consumption, waste separation

at source; and (3) Downstream: collection, recycling, treatment, and control of microplastic pollution.

Input data for the study includes the system of Vietnamese legal normative documents effective up to 2025, focusing on the Law on Environmental Protection 2020, Law on Environmental Protection Tax 2010, Law on Fisheries 2017, Decree No. 08/2022/ND-CP, Decree No. 45/2022/ND-CP, and Circulars issuing QCVNs in 2025 by the Ministry of Agriculture and Environment or formerly known as Ministry of Natural Resources and Environment. The Comparative method is used to benchmark Vietnam's regulations against the European Union's Single-Use Plastics (SUP) Directive and OECD recommendations on microplastic management. The study also employs Regulatory Impact Assessment (RIA) to evaluate the economic and environmental effectiveness of the EPR mechanism and current tax/fee instruments.

RESULTS AND DISCUSSION

Supply Control and Eco-design: The initial stage of the plastic life cycle involves production and importation. The Law on Environmental Protection 2020 and Decree No. 08/2022/ND-CP have established a roadmap to eliminate single-use plastics and non-biodegradable plastic packaging. Specifically, the regulation banning the production and importation of non-biodegradable plastic bags smaller than 50cm x 50cm and thinner than 50 µm from 2026 is a strong measure to eliminate the supply of non-essential plastic products. Additionally, the Law on Environmental Protection Tax has applied a high tax rate on non-biodegradable plastic bags, creating an economic barrier to the consumption of this product. Discussing this issue, OECD studies (2022) indicate that bans and taxes are only truly effective when viable alternatives exist. In Vietnam, although policies encouraging the production of bioplastics and environmentally friendly materials were mentioned in the Law on Investment 2020 (incentivized investment sectors), technical standards and eco-labels for these products still lack consistency, leading to "greenwashing" in the market. Table 1 summarizes regulations controlling plastic supply.

Table 1: Regulations controlling plastic supply and products

Policy Instrument	Regulation Document	Control Content	Effectiveness Assessment
Ban Roadmap	Decree No. 08/2022/ND-CP	Ban single-use plastics in tourist areas, supermarkets; Ban production of difficult-to-decompose plastic bags after 2030.	Clear roadmap but challenges in monitoring the black market.
Environmental Protection Tax	Law on Environmental Protection Tax 2010 (Art. 8)	Tax of 50,000 VND/kg on plastic bags.	Effectiveness reduced due to tax refund mechanism for pre-packaged goods.
Import Control	LEP 2020 (Art. 71)	Only allows import of plastic scrap as production material with strict technical regulations.	Effectively prevents Vietnam from becoming a technology landfill.

Keys: LEP 2020 = Law on Environmental Protection 2020; ND-CP = Government Decree; Art. = Article; VND = Vietnamese dong

EPR Mechanism for Financial Momentum for the Recycling Value Chain: The brightest spot in the legal framework for plastic waste management in Vietnam is the legislation and implementation of the Extended Producer Responsibility (EPR) mechanism under Articles 54 and 55 of the Law on Environmental Protection 2020 and Chapter VI of Decree No. 08/2022/ND-CP. This mechanism compels manufacturers and importers of plastic packaging to choose: either organize recycling themselves according to a mandatory rate or contribute money to the Vietnam Environmental Protection Fund to support recycling activities. This is a shift from a state budget-reliant management model to one sharing financial responsibility with the

private sector, creating sustainable resources for collection and recycling. Compared to EPR models in South Korea or Taiwan, Vietnam’s regulations are highly flexible but face challenges from the informal sector, the force of waste pickers and recycling craft villages that holds the majority of plastic material flows. Circular No. 20/2023/TT-BTNMT on the management of hazardous waste and controlled substances also supports this mechanism by standardizing collection processes, but there is no clear mechanism to integrate the informal force into the formal EPR system, leading to risks of waste leakage from recycling villages causing serious environmental pollution (World Bank, 2022).

Table 2: Structure of EPR mechanism for plastic packaging			
EPR Factor	Regulation in Decree No. 08/2022/ND-CP		Market Impact
Subject	Commercial packaging (rigid, PET, flexible); Single-use plastic products.		Creates an output market for the plastic recycling industry.
Form	Self-recycling; Hired recycler; Contribution to Fund.		Promotes the formation of environmentally standard recycling plants.
Recycling Rate	Mandatory rate increases gradually according to roadmap (e.g., 22% for paper/plastic packaging).		Creates pressure for technological innovation and recyclable product design.

Keys: EPR = Extended Producer Responsibility; ND-CP = Government Decree; PET = Polyethylene Terephthalate

Separation at Source and Collection Infrastructure: The Law on Environmental Protection 2020 (Article 75) mandates the separation of municipal solid waste at source no later than December 31, 2024. Decree No. 45/2022/ND-CP prescribes fines for households and individuals who do not separate waste.

Table 3: Assessment of separation and collection regulations			
Content	Legal Basis	Status	Challenges
Separation	LEP 2020; Decree 45/2022.	Law is enforceable but infrastructure is not ready.	
Collection	LEP 2020 (Art. 77).	Lack of specialized vehicles; Collection process not standardized nationwide.	
Service Price	LEP 2020 (Art. 79).	Volume-based pricing mechanism (Pay-as-you-throw) not widely implemented.	

Keys: LEP 2020 = Law on Environmental Protection 2020; Art. = Article

This regulation aims to create clean raw material sources for plastic recycling and reduce landfill waste. However, analysis of technical infrastructure

shows serious lack of synchronization. The Law on Urban and Rural Planning 2024 and the Land Law 2024 have regulated land funds for waste treatment infrastructure, but investment in separate collection vehicles and standard transfer stations in major cities remains delayed. Reality shows that even if citizens separate plastic, if collection vehicles mix it all together, the separation effort becomes meaningless. Furthermore, Circular No. 05/2025/TT-BTNMT on urban domestic wastewater requires control of leachate from waste collection points, but there are no specific technical regulations on the design of separated waste collection points in residential areas to prevent the dispersion of microplastics into drainage systems.

Marine Plastic Litter Control: As a maritime nation, Vietnam is particularly concerned with marine plastic litter. The Law on Marine and Island Resources and Environment 2015 and the Law on Fisheries 2017 contain regulations on controlling marine environmental pollution. Specifically, Circular 16/2024/TT-BTNMT specifying technical regulations on waste management in offshore oil and gas activities is a step forward in controlling plastic waste sources from marine economic activities. The National Action Plan on marine plastic litter management by 2030 sets a goal to reduce marine plastic litter by 75%. However, analysis shows a lack

of linkage between land-based source management and marine pollution. The majority of marine plastic litter originates from land, drifting along rivers to the sea. The Law on Water Resources 2023 and river basin plans have not strongly integrated the goal of preventing plastic waste at river mouths. The lack of

trash barriers at river mouths and an inter-agency monitoring mechanism between the Ministry of Natural Resources and Environment (managing the sea) and the Ministry of Agriculture (managing irrigation, fisheries) is a major loophole.

Table 4: Policies for controlling marine plastic litter

Generation Source	Management Document	Control Measure
Fisheries Activity	Law on Fisheries 2017.	Collect damaged fishing gear; Ban plastic discharge from fishing vessels.
Offshore Oil and Gas	Circular 16/2024/TT-BTNMT.	No. Manage hazardous waste, plastics on drilling rigs.
Land-based Source	National Plan.	Action Beach cleanup campaigns; Estuary control (limited).

Keys: TT-BTNMT = Circular of the Ministry of Natural Resources and Environment

Legal Void on Microplastics: Microplastics (plastic particles < 5mm) are a top concern of the international scientific community. Analysis of Vietnam's 2025 national technical regulation system reveals a worrying legal gap. Circular No. 01/2025/TT-BTNMT on ambient environmental quality (surface water, groundwater, soil) has not included microplastics in the list of mandatory pollution parameters. Similarly, Circulars 05/2025/TT-BTNMT and 06/2025/TT-BTNMT on wastewater have not stipulated discharge limits for microplastics from wastewater treatment plants or

textile and chemical industrial zones. While jurisdictions like the EU or the US have begun banning primary microplastics in cosmetics and toothpaste (Microbead-Free Waters Act), Vietnam has no similar ban in the Law on Chemicals or consumer product management regulations. Circular No 12/2024/TT-BYT on limits of contaminants in health supplements also does not mention microplastic limits, despite the significant risk of entry into the food chain. This is a policy delay that needs to be addressed soon to protect public health.

Table 5: Analysis of regulatory gaps on microplastics

Microplastic Type	Source	Current Regulation	Policy Proposal
Primary	Cosmetics, detergents, paint.	No ban/restriction regulations.	Issue ban on microbead use in consumer products.
Secondary	Breakdown from large waste, tires, fibers.	Indirect control via waste management.	Regulate microplastic filters at WWTP outlets.
Environmental	Surface water, sediment.	No QCVN on limits.	Add microplastics to national environmental monitoring parameters.

Keys: QCVN = National Technical Regulation of Vietnam; WWTP = Wastewater treatment plant

Co-processing and Chemical Recycling: To address low-value or mechanically hard-to-recycle plastics, based on hazardous waste threshold classification stipulated in Circular No. 44/2025/TT-BNNMT, Circular No. 46/2025/TT-BNNMT on waste co-processing in cement kilns has opened a promising path. Using plastic waste as alternative fuel (AFR) in cement kilns recovers energy and thoroughly treats waste without generating ash requiring landfilling. This solution is suitable for Vietnam's conditions,

where the cement industry is strongly developed. Simultaneously, Circular No 45/2025/TT-BNNMT on waste incinerators sets strict emission standards (especially Dioxin/Furan), forcing investors to apply advanced combustion technologies, limiting manual plastic burning that causes air pollution, these technical controls could be reinforced by emission-based environmental fee mechanisms targeting air emissions. However, stronger economic incentive mechanisms (such as green credit,

preferential waste-to-energy prices) are needed to promote chemical recycling technologies (pyrolysis) that convert plastic into fuel oil, rather than stopping at heat recovery incineration.

Conclusion: Vietnam's legal system on plastic waste management in the 2020-2025 period has made significant strides, shifting from a mindset of mere waste management to resource management and circular economy. Legislating the EPR mechanism and issuing technical regulations on co-processing and recycling have established a solid legal foundation for a formal plastic recycling market. However, enforcement remains constrained by fragmented collection infrastructure and the persistence of informal recycling, while Vietnam continues to lag behind global trends in microplastic control. The absence of technical regulations and bans on primary microplastics is a major risk gap. Accordingly, the article recommends adding microplastic control regulations to QCVNs on wastewater and water supply, developing a roadmap to ban microbeads in cosmetics and detergents, strengthening EPR monitoring and enforcement to ensure financial flows reach compliant recycling activities, and promoting international cooperation to facilitate technology transfer for treating microplastics and hard-to-recycle plastics.

DECLARATIONS

Ethical Approval: This study did not involve human participants or animal experimentation and therefore did not require formal ethical approval. All procedures involving data handling and analysis were conducted responsibly and in accordance with standard academic and institutional guidelines

Disclaimer (Artificial Intelligence): The authors declare that no generative Artificial Intelligence technologies were used in writing or editing this manuscript.

Declaration of Conflict of Interest: The authors declare that there is no conflict of interest regarding the publication of this paper.

Declaration of Data Availability Statement: Data are available upon request from the corresponding author.

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