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State Management of the Urban Environment in the Pursuit of Sustainable Economic Development: A Case Study of Phu Dien Ward, Hanoi, Vietnam

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Abstract
Rapid urbanisation has made environmental quality a condition for, rather than a by-product of, sustainable economic development in Vietnam's large cities. Since 1 July 2025, wards in Hanoi have become the lowest level of a two-tier local government system and carry direct responsibility for many tasks of urban environmental management. This paper analyses state management of the urban environment in Phu Dien ward, a fast-urbanising ward in the west of Hanoi formed by merging Phu Dien with most of Phuc Dien and parts of Mai Dich and Co Nhue 1. Using a qualitative case design with document analysis and descriptive statistics, and a pressure-state-response framework, the study examines the city context and the ward's management practices for waste, air, water and green space. Hanoi's annual mean PM2.5 concentration rose for the third consecutive year to 45.4 µg/m³ in 2024, nearly double the national limit of 25 µg/m³; domestic solid waste increased from about 6,400 tonnes per day in 2014 to about 7,500 tonnes per day in 2025 and is forecast to approach 10,000 tonnes per day by 2030; and the Nhue river, which flows through the ward, remains seriously polluted. At ward level, management relies on contracted waste collection, inspection with ward police and community campaigns, but incidents such as unauthorised waste and broken-glass storage sites show gaps in monitoring and enforcement. The paper proposes six groups of solutions that link environmental management with the ward's economic development, including clearer ward mandates, performance-based waste contracts, construction dust control, protection of the Nhue corridor and Mai Dich retention lake, digital monitoring and co-management with residents and businesses.

Keywords: Urban Environment, State Management, Sustainable Development, Ward Level, Waste Management, Air Quality, Hanoi

1. Introduction

The link between economic growth and environmental quality is now central to urban policy. Since the Brundtland Commission defined sustainable development as development that meets present needs without compromising the ability of future generations to meet their own (WCED, 1987) [29], the concept has been operationalised through the Sustainable Development Goals, including Goal 11 on sustainable cities and communities (Hák *et al*., 2016) [7]. In fast-growing cities of developing countries, the environmental costs of growth, such as air pollution, uncollected waste and polluted rivers, can undermine health, productivity and investment, and thereby the growth itself.

Hanoi illustrates this challenge. According to IQAir, the city's annual mean PM2.5 concentration rose for the third consecutive year to 45.4 µg/m³ in 2024, more than nine times the World Health Organization guideline (IQAir, 2025) [9]. The city generates around 7,500 tonnes of domestic solid waste per day, and only about 30% of its domestic wastewater is treated before being discharged into rivers and lakes (Nhan Dan, 2025a) [15]. At the same time, Hanoi continues to urbanise, particularly in its western districts, where new residential areas, universities and service businesses expand quickly.

Institutional change adds a further dimension. From 1 July 2025, Vietnam abolished the district tier and introduced a two-tier local government model. In Hanoi, 126 commune-level units, including 51 wards (Standing Committee of the National Assembly, 2025) [23], now carry direct responsibility for many functions previously performed by districts, including parts of environmental management. Wards are closest to residents and polluters, but they have limited staff, equipment and legal tools.

Phu Dien ward, located in the former Bac Tu Liem district, is a suitable case for examining these issues. It is a fast-urbanising area along major transport routes, the Nhue river runs through it, and it hosts public green spaces such as the Mai Dich

retention lake park. It has also experienced visible environmental incidents since the merger (Dai Doan Ket, 2025; Tri thuc & Cuoc song, 2026) [4, 25]. The paper addresses three questions: What is the current situation of state management of the urban environment in Phu Dien ward? What are its achievements and limitations in the context of sustainable economic development? Which solutions can strengthen ward-level environmental management?

2. Literature review and analytical framework

2.1 Urban environmental governance and sustainable development

Environmental governance refers to the set of regulatory processes, mechanisms and organisations through which political actors influence environmental actions and outcomes (Lemos and Agrawal, 2006) [11]. In cities, environmental governance is multilevel: national laws set standards, city governments plan and invest, and local administrations implement, monitor and engage communities (Bulkeley and Betsill, 2005) [2]. The triple bottom line idea (Elkington, 1997) [5] and the SDG framework emphasise that economic, social and environmental objectives must be pursued together, not traded off.

Collective-action research shows that local communities can manage shared resources effectively when rules fit local conditions, monitoring is credible and users participate in decisions (Ostrom, 1990) [21]. For urban environments, this suggests that state management at ward level should combine regulation and public services with community co-management.

2.2 Waste and air quality management in developing-country cities

Solid waste management is one of the most visible municipal services. Comparative studies identify collection coverage, controlled disposal, recycling and inclusive governance as key dimensions of performance (Wilson *et al*., 2012) [31]. Guerrero *et al*. (2013) [6] found that cities in developing countries face challenges in financing, institutional capacity, public participation and illegal dumping. The World Bank projects that global municipal waste will rise substantially by 2050 if current trends continue (Kaza *et al*., 2018) [10].

Air pollution management requires controlling multiple sources, including traffic, construction dust, industry, open burning and regional transport of pollutants. The WHO (2021) [30] Global Air Quality Guidelines lowered the recommended annual PM2.5 level to 5 µg/m³, while Vietnam's national technical regulation QCVN 05:2023/BTNMT sets an annual limit of 25 µg/m³.

2.3 Legal framework in Vietnam

The Law on Environmental Protection No. 72/2020/QH14 establishes the responsibilities of local authorities in managing waste, wastewater and air quality, and makes the sorting of domestic solid waste at source mandatory for households and individuals from 1 January 2025. The Law on the Capital No. 39/2024/QH15 gives Hanoi special powers, including the establishment of low-emission zones; on this basis the Hanoi People's Council adopted Resolution No. 57/2025/NQ-HĐND on criteria, conditions and a roadmap for low-emission zones (Hanoi People's Council, 2025) [8]. The National Action Plan on air pollution remediation and air quality management for 2026-2030 sets a target for Hanoi of reducing annual mean PM2.5 by about 20% compared with 2024, to below 40 µg/m³ by 2030 (Prime Minister of Vietnam, 2025) [22].

2.4 Analytical framework

The study uses the pressure-state-response (PSR) framework (OECD, 1993) [20], which links human pressures on the environment, the resulting state of environmental quality and the responses of public authorities and society. At ward level, responses are analysed through five management functions: planning and assignment of responsibilities; provision and contracting of environmental services; inspection and enforcement; community mobilisation; and monitoring and information.

3. Research Methodology

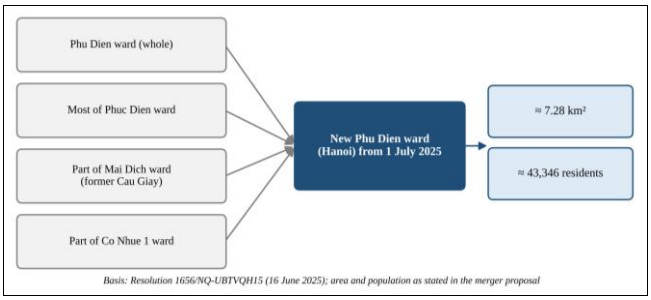
Phu Dien ward is treated as a single qualitative case (Yin, 2018) [32]. Evidence was assembled through document analysis (Bowen, 2009) [1], drawing on four types of sources: (i) international and national environmental data, including IQAir reports, national environmental status reports and statistics of the Ministry of Agriculture and Environment; (ii) legal documents of the central government and Hanoi; (iii) reports and press releases of Hanoi city on waste, air quality and the Nhue river; and (iv) published information about Phu Dien ward in 2025-2026.

Quantitative data were analysed with descriptive statistics and compared with national standards and city targets. Qualitative information was organised according to the PSR framework and the five management functions. Ward-level environmental statistics are not routinely published in Vietnam, so city-level data are used to describe the environmental state, and ward-level information is used mainly to describe management responses.

4. Results

4.1 Overview of Phu Dien ward

Phu Dien ward was established under Resolution No. 1656/NQ-UBTVQH15 of 16 June 2025 by merging the whole of the former Phu Dien ward, most of Phuc Dien ward and parts of Mai Dich ward (former Cau Giay district) and Co Nhue 1 ward. According to the merger proposal, the new ward covers about 7.28 km² and has about 43,346 residents (Fig 1). The headquarters of the ward Party Committee and People's Committee is located in residential group No. 18.



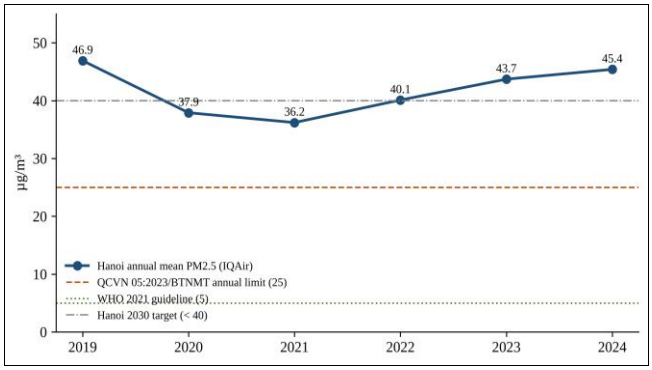
Source: Compiled by the authors from Resolution 1656/NQ-UBTVQH15 and the merger proposal

Fig 1: Formation of Phu Dien ward

The ward lies in the western development corridor of Hanoi. It contains dense older residential areas, new urban areas, educational and training institutions, building-material trading sites and small businesses. Major roads, including the section of National Highway 32 from Nam Thang Long to Cau Dien, which is being widened, carry heavy traffic. The Nhue river, which begins at the Lien Mac sluice in the north-west of the city, passes through the area.

4.2 Environmental pressures and state: the city context

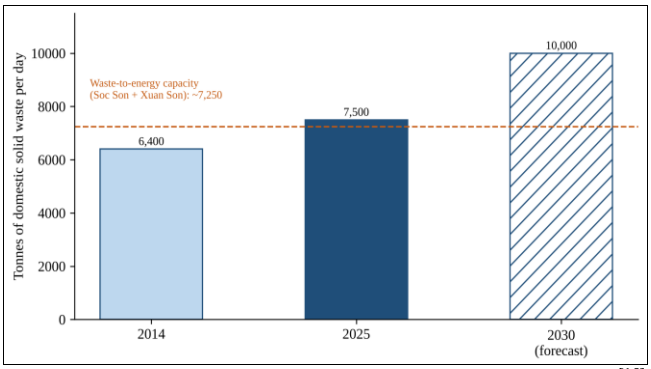
Air quality. Fig 2 shows Hanoi's annual mean PM2.5 concentration from 2019 to 2024. After a decline in 2020-2021, partly linked to reduced activity during the COVID-19 pandemic, PM2.5 rose each year to 45.4 µg/m³ in 2024, nearly double the national limit (IQAir, 2025) [9]. Automatic monitoring stations in Hanoi recorded annual PM2.5 values ranging from 26 to 52 µg/m³ during 2020-2024, between 1.0 and 2.1 times the national limit, and in 2024 one central station recorded 33.04% of days exceeding the standard (Tạp chí Môi trường, 2025) [24]. Locations near main roads tend to record the highest levels, which is relevant for wards such as Phu Dien that lie along major traffic routes.



Source: IQAir World Air Quality Reports; QCVN 05:2023/BTNMT; WHO, 2021 [30]

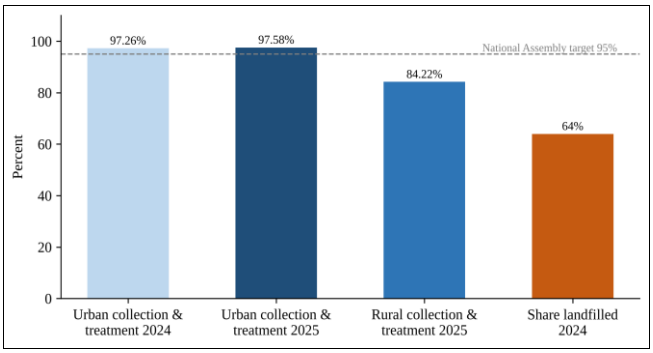
Fig 2: Annual mean PM2.5 concentration in Hanoi, 2019-2024, compared with standards and the 2030 target

Solid waste. Hanoi's domestic solid waste rose from about 6,400 tonnes per day in 2014 to about 7,500 tonnes per day in 2025, an increase of about 17% in ten years (Nhan Dan, 2025a) [15], and is forecast to approach 10,000 tonnes per day by 2030 (Nhan Dan, 2025b; Fig 3) [16]. The city has moved away from landfilling by commissioning two waste-to-energy plants with a combined capacity of about 7,250 tonnes per day, and aims to treat all domestic waste by incineration with energy recovery and end direct landfilling by the end of 2027 (Nong nghiep va Moi truong, n.d.-a, n.d.-b) [18, 19]. Nationally, the collection and treatment rate of urban domestic waste reached 97.58% in 2025, above the 95% target set by the National Assembly, while the rural rate was 84.22% (VietnamPlus, 2026a; Fig 4) [26].



Source: Compiled by the authors from Nhan Dan, 2025a [15], 2025b [16], and Nong nghiep va Moi truong, n.d.-a [18]

Fig 3: Domestic solid waste generation in Hanoi and waste-to-energy capacity



Source: Department of Environment, Ministry of Agriculture and Environment, as reported by Dai bieu Nhan dan, 2025 [3], and VietnamPlus, 2026a [26]

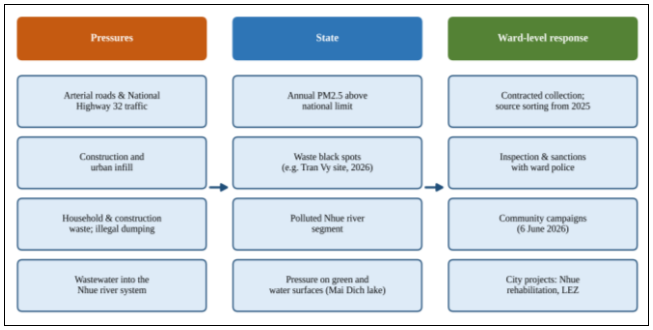
Fig 4: National indicators of domestic solid waste collection and treatment, 2024-2025

Construction waste and illegal dumping. Hanoi generates about 3,000-3,400 tonnes of construction solid waste per day, with peaks of around 10,000 tonnes when major projects are under way, while operating treatment capacity is far lower (VietnamPlus, 2026b) [27]; illegal dumping remains a recurring problem. In Phu Dien, the press reported in May 2026 an unauthorised site near the Judicial Academy at No. 9 Tran Vy street where household waste and construction debris were collected (Tri thuc & Cuoc song, 2026) [25]. The ward's Economic, Infrastructure and Urban Affairs Division stated that the waste belonged to the company contracted by the ward People's Committee to collect waste, which had arranged the site itself; the ward police assessed the activity as showing signs of violations of environmental protection, construction waste management and land management rules. Another report described two sites on about 2,000 m² of agricultural land in the ward used for storing broken glass for several years, which the new ward administration inspected and ordered to be relocated (Dai Doan Ket, 2025) [4].

Water. The Nhue river is a branch of the Red River that drains much of Hanoi's urban area and supplies water for agriculture downstream. It has been seriously polluted for many years by untreated domestic wastewater. In July 2026 the Hanoi People's Council approved the investment policy for a comprehensive Nhue river rehabilitation project with a preliminary total investment of VND 75,115 billion, requiring about 855 ha of land across 19 communes and wards along the river, to be implemented during 2026-2029 (VietnamPlus, 2026c) [28].

Green and water surfaces. The Mai Dich retention lake park is an important public space used daily by many residents. It provides recreation, cooling and stormwater storage, but is exposed to littering and intensive use.

Fig 5 summarises the pressure-state-response relationships identified for the ward.



Source: Developed by the authors

Fig 5: Pressure-state-response analysis of the urban environment in Phu Dien ward

4.3 State management responses at ward level

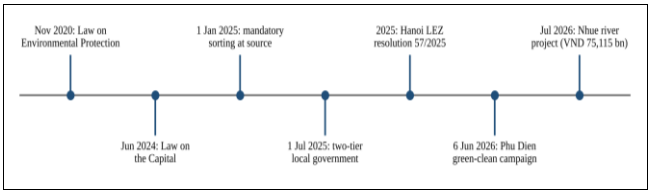
Table 1 assesses the ward's responses across the five management functions.

Table 1: Assessment of state management of the urban environment in Phu Dien ward

Management function	Current practice	Main limitations
Planning and assignment	Environmental tasks assigned to the Economic, Infrastructure and Urban Affairs Division under the new two-tier structure	No published ward environmental plan with targets
Environmental services	Waste collection contracted to a private company by the ward People's Committee; source sorting mandatory since 2025	Weak control of the contractor's transfer sites, as shown by the Tran Vy case
Inspection and enforcement	Joint checks with ward police; requests to relocate unauthorised storage sites	Long-standing violations detected late; unclear timelines for remediation
Community mobilisation	Campaign "All people join hands to protect the environment, for the capital, for a green, clean and beautiful Phu Dien" (6 June 2026); clean-up of Mai Dich lake park by 19 residential groups	Campaign-based; continuity and measurement of results unclear
Monitoring and information	Relies on city monitoring network and resident complaints via city channels	No ward-level air or noise monitoring; no public ward environmental data

The community campaign launched on 6 June 2026, on the occasion of World Environment Day and the Month of Action for the Environment, mobilised officials, Party members, mass organisations and residents (Nhan Dan, 2026) [17]. Residents of 19 Mai Dich residential groups cleaned the Mai Dich retention lake park, and participants marched through the ward to promote clean air and green transport. The chair of the ward Fatherland Front Committee stressed that environmental protection is the responsibility of every resident, not only of specialised agencies. This reflects a shift from purely administrative management towards co-management.

Fig 6 places these local actions within the policy timeline.



Source: Compiled by the authors

Fig 6: Policy milestones relevant to urban environmental management in Phu Dien ward, 2020-2026

5. Discussion

The results highlight a mismatch between the scale of environmental pressures and the tools available at ward level. Air pollution and river pollution in Phu Dien are largely driven by city-wide and regional factors such as traffic, construction across the western corridor, regional transport of pollutants and the wastewater of the whole Nhue basin. The ward cannot solve them alone. Waste management and local nuisances, by contrast, are within the ward's direct influence, and here the main weaknesses are in supervision and enforcement.

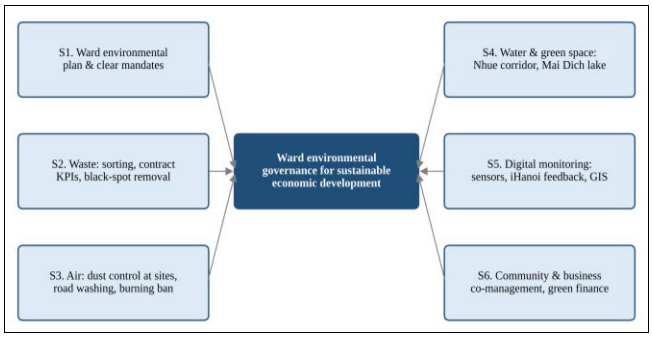
The Tran Vy case is instructive. Outsourcing waste collection to a private contractor, a common practice in Hanoi, can improve efficiency, but it transfers operational control without automatically transferring accountability. Wilson *et al.* (2012) [31] and Guerrero *et al.* (2013) [6] both emphasise that contracts need clear performance indicators, monitoring and sanctions. Without them, a contractor's temporary transfer site can become an illegal dump, harming the very residents the service is meant to protect.

The community campaign of June 2026 is consistent with Ostrom's (1990) [21] argument that local participation strengthens environmental outcomes. Campaigns, however, are episodic. Sustained co-management requires regular routines, such as residential-group monitoring of collection points, simple reporting tools and public feedback on how complaints were resolved.

Finally, environmental management in Phu Dien is closely tied to sustainable economic development. The ward's economic base, including education, services, trade and new residential areas, depends on liveability. Persistent dust, odour from waste or a polluted river reduce property values, deter investment and impose health costs. The Nhue river project and Hanoi's low-emission zone policy create opportunities to turn environmental improvement into an economic asset, for example by developing green riverside spaces and services along the rehabilitated corridor, provided the ward prepares to manage these spaces once they are built.

6. Solutions

Six groups of solutions are proposed (Fig 7).



Source: Proposed by the authors

Fig 7: Proposed solutions for state management of the urban environment in Phu Dien ward

S1. Ward environmental plan and clear mandates. The ward should adopt an annual environmental protection plan with measurable targets linked to the city's plans, assigning responsibilities to the Economic, Infrastructure and Urban Affairs Division, ward police, residential groups and contractors. Targets should cover waste sorting rates, removal of black spots, construction-site compliance and green-space maintenance.

S2. Waste management. Waste collection contracts should include performance indicators such as collection frequency, approved transfer locations, sorting compliance and response time to complaints, with penalties and public reporting. All black spots, including construction-waste and glass storage sites, should be mapped, removed within fixed deadlines and protected against recurrence. Support for source sorting should include clear guidance, appropriate bins and collection schedules matched to sorted fractions.

S3. Air quality at local level. The ward can reduce local contributions to PM2.5 by enforcing dust control at construction sites (covering materials, washing vehicle wheels, enclosing sites), coordinating road washing on busy routes, and strictly prohibiting open burning of waste. It should also disseminate air quality warnings to schools and residents during high-pollution episodes.

S4. Water and green space. The ward should cooperate with the city in implementing the Nhue river project, especially in land clearance, communication with affected households and control of illegal discharges into drains. The Mai Dich retention lake park should have a maintenance regime with clear responsibilities and resident participation.

S5. Digital monitoring and information. Low-cost air quality sensors at schools and along main roads, a ward map of environmental hotspots, and systematic use of city feedback applications such as iHanoi would improve detection and response. The ward should publish basic environmental information, including black spots handled and complaints resolved, to build trust.

S6. Community and business co-management. Residential groups, mass organisations, schools and businesses should be engaged through regular routines rather than one-off campaigns, for example monthly clean-up days, recognition of "green residential groups" and agreements with businesses on waste and dust control. Green economic activities, such as recycling services and green transport, can be encouraged as part of the ward's development.

7. Conclusion

This paper examined state management of the urban environment in Phu Dien ward, Hanoi, in the context of sustainable economic development and the new two-tier local government model. The ward faces strong environmental pressures from traffic, construction, waste and a polluted river, within a city whose PM2.5 levels and waste volumes continue to rise. Ward-level management has achieved some progress through contracted waste collection, inspection with ward police and community campaigns, but gaps remain in planning, contractor supervision, enforcement and local monitoring.

Strengthening environmental management at ward level requires clearer mandates, performance-based service contracts, local dust control, active participation in city projects, digital monitoring and sustained co-management with residents and businesses. These measures are not only environmental: they protect the liveability on which the ward's economic future depends.

The study is limited by the scarcity of published ward-level environmental data and by its reliance on secondary sources. Future research could combine ward-level monitoring data with surveys of residents and businesses to measure environmental quality, satisfaction with services and willingness to participate in co-management.

8. Acknowledgements

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