

ECOLOGICAL AWARENESS AS A DETERMINANT OF EFFECTIVE WASTE MANAGEMENT IN CITIES

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Purpose: This paper addresses the persistent gap between ambitious waste management targets and insufficient practical progress in Poland and other EU Member States. The study explores how ecological awareness influences the effectiveness of municipal waste management, focusing on its treatment in key strategic documents such as KPGO 2028, CEAP, and selected EU directives.

Design/methodology/approach: The research uses qualitative document analysis of national and EU policy texts. Key elements analyzed include references to ecological awareness, education, communication, financing, monitoring, and implementation mechanisms. Content was analyzed according to key categories to identify goals, recommended actions, measurable indicators, and institutional responsibilities, enabling a comparative assessment of policy declarations and practical implementation.

Findings: Ecological awareness is recognized as important in both Polish and EU documents, but practical application is limited. Gaps include the absence of measurable indicators, unstable funding for educational programs, and weak coordination between central and local authorities. Monitoring data show Poland's recycling rates (41% in 2022) lag behind the EU average (49%), illustrating the implementation gap.

Research limitations/implications: The study relies on secondary data and does not include primary empirical research such as surveys or interviews. Methodological changes in reporting waste indicators limit comparability over time. Future research could include behavioral studies or surveys to assess awareness campaigns' effectiveness.

Practical implications: Policymakers should operationalize ecological awareness through measurable indicators, ensure stable financing for education campaigns, and integrate awareness initiatives with infrastructure improvements. These measures can enhance municipal waste management effectiveness.

Social implications: Raising ecological awareness promotes pro-environmental behavior, supports sustainable urban development, and fosters collective responsibility, contributing to improved quality of life and environmental protection.

Originality/value: The paper offers a comparative analysis of national and EU policy documents, highlighting the gap between declarations and implementation. It provides practical recommendations for policymakers, municipal managers, and stakeholders aiming to improve waste management outcomes.

Keywords: ecological awareness; waste management; sustainable development; EU policy; municipal waste.

Category of the paper: research paper.

1. Introduction

Municipal waste management remains a major challenge in contemporary urban policy, directly contributing to environmental degradation and affecting the quality of life in cities. The growing volume of municipal waste highlights the need for efficient strategies focused not only on technical and regulatory solutions but also on strengthening public ecological awareness.

Building ecological awareness plays a key role in fostering environmental responsibility and encouraging everyday pro-environmental behaviors. Limited environmental consciousness among citizens is often cited as one of the key barriers to achieving sustainable, zero-waste urban environments. Therefore, effective environmental policy instruments should not rely solely on regulation and enforcement but must incorporate educational and motivational measures to support behavioral change.

Ecological awareness thus emerges as a crucial determinant of effective municipal waste management, influencing both individual behaviors and the success of systemic transformations. Understanding what shapes ecological awareness in urban contexts is essential for designing policies that genuinely support the transition toward more sustainable and circular cities.

The main aim of this study is to investigate how ecological awareness is integrated into municipal waste management strategies in Poland and the European Union. The paper seeks to identify whether strategic policy frameworks, include measurable indicators, financing mechanisms, and evaluation tools that effectively operationalize ecological awareness.

The following research hypotheses are proposed:

H1: Ecological awareness is insufficiently operationalized in Polish and EU waste management policies.

H2: The lack of measurable indicators and stable financing reduces the practical effectiveness of awareness-raising initiatives.

This study is original in its comparative approach—linking the National Waste Management Plan 2028 (KPGO 2028) with the Circular Economy Action Plan (CEAP) and relevant EU directives. By focusing on the intersection between awareness, education, and implementation, the paper contributes to bridging the gap between declarative policy goals and operational practice.

2. Theoretical Background

Consciousness, understood as the capacity to integrate cognitive, emotional, and reflective processes, has been the subject of inquiry in numerous scientific disciplines (Nęcka et al., 2006). In an environmental context, environmental awareness is most commonly defined as a set of knowledge, beliefs, attitudes, and dispositions held by individuals and societies toward the natural environment (Zuzek, 2017). In the literature, two complementary approaches to its analysis are typically distinguished: the cognitive–informational perspective, focused on knowledge and factual awareness, and the socio-psychological perspective, emphasizing values, emotions, and social norms shaping the human–nature relationship (Papuziński, 2006; Górka et al., 1998; Penc, 2003).

From these approaches, a three-dimensional model of environmental awareness can be derived, encompassing: (1) the cognitive component (knowledge and beliefs), (2) the affective component (values and emotional engagement), and (3) the behavioral readiness component (willingness and capacity to act). Research on household recycling and waste-related behaviors often draws on related constructs such as the KAP model (Knowledge–Attitude–Practice) and behavioral theories like the Theory of Planned Behavior (Ajzen, 1991), which highlight that knowledge alone does not automatically lead to pro-environmental actions (Barr, 2007; Knussen et al., 2004; Tonglet et al., 2004).

Empirical studies indicate that environmental awareness interacts with structural and instrumental factors. The availability of infrastructure, reliability of services, economic incentives, and clarity of communication all condition the extent to which awareness translates into waste sorting and reduction practices (Afroz et al., 2010; Gwarda, 2019; Mihai, 2012). Therefore, effective environmental policy should combine informational measures with enabling conditions—such as accessible collection systems, feedback mechanisms, and financial stimuli—to bridge the widely observed “knowledge–action gap” in urban contexts (Schultz, 2014; Szalewska, 2021).

Recent European and international policy documents also emphasize this conclusion, framing awareness as a policy variable that should be systematically monitored and incorporated into implementation systems. The European Commission’s Circular Economy Action Plan (CEAP) stresses the need to link standardized collection systems with community engagement initiatives, while the European Environment Agency highlights differences in social participation among member states and calls for improved monitoring of behavioral outcomes (EC, 2020; EEA, 2023, 2024). Likewise, the OECD’s Environmental Performance Reviews for Poland recommend that behavioral and awareness components be operationalized through measurable indicators and regularly assessed within national waste management strategies (OECD, 2022).

Integrating these theoretical and policy perspectives suggests a practical research agenda: environmental awareness should be treated not merely as an educational or normative goal but as an operational variable, measurable through surveys (KAP), behavioral indicators (e.g., sorting accuracy, participation rates), and process metrics (e.g., campaign reach, funding continuity). Such an integrated approach links environmental awareness directly to infrastructure and governance mechanisms, forming the conceptual foundation for the document analysis conducted in this study.

3. Research methodology

The aim of the study was to identify how selected key strategic documents concerning waste management in Poland address the concept of ecological awareness, what instruments they recommend for its development, and to assess whether and to what extent strategic declarations are supported by measurable targets, financing mechanisms, and monitoring of outcomes.

The analysis focused on the most relevant acts and reports concerning waste management:

1. National Waste Management Plan 2028 - KPGO 2028 (ISAP, 2023).
2. Circular Economy Action Plan - CEAP (EC, 2020).
3. EU waste guidelines and directives (regarding obligations for separate waste collection and recycling targets).

These documents were selected because they represent the main strategic levels of waste management governance — from national implementation to EU-level coordination.

A qualitative document analysis method was applied, including:

- systematic keyword searches within the documents for the terms: education, communication, awareness, campaign, monitoring, indicator, financing,
- coding of extracted fragments according to the following categories: presence of the topic of awareness, forms of recommended actions, existence of measurable goals related to awareness, indications concerning financing and institutional responsibility,
- comparative synthesis of results between national and EU-level documents.

The keywords were selected because they reflect the key conceptual dimensions of ecological awareness: cognitive (knowledge), affective (attitudes), and behavioural (actions).

The comparison between documents was guided by three criteria: the presence of measurable indicators of ecological awareness, the existence of financing and implementation mechanisms, the degree of integration between education, infrastructure, and monitoring.

Data were coded according to these categories, enabling a comparative synthesis of declarative and operational content.

The analysis was based exclusively on secondary sources (strategic texts and monitoring publications) and did not include primary empirical data (e.g., interviews with officials or resident surveys).

It should be noted that many indicators in national sources have undergone methodological changes in recent years (for example, the method of calculating recycling rates in Poland), which hinders direct year-to-year comparisons. Moreover, strategic documents often formulate only general goals; therefore, the analysis pays particular attention to elements of operationalization—that is, whether the documents specify concrete KPIs or implementation mechanisms.

4. Research results

The content analysis of the National Waste Management Plan 2028 (ISAP, 2023) and key European Union strategic documents, including the CEAP (EC, 2020) and EU waste directives, indicates that environmental awareness is recognized as a crucial component of effective waste management policy.

In KPGO 2028, educational and informational activities are identified as important instruments supporting the improvement of the quality of separate waste collection and the reduction of illegal dumping sites. Similarly, EU documents emphasize the need to support local initiatives, standardize communication, and improve the quality of waste streams, assuming that these efforts will be reinforced through increased public engagement (EC, 2020; EEA, 2023).

A comparison of how the concept of environmental awareness is addressed across the analyzed documents is presented in Table 1. As the comparison shows, all examined documents acknowledge the importance of environmental education and communication; however, none of them define precise indicators to measure the effectiveness of these activities.

Table 1.
Comparison of the approaches to the concept of environmental awareness in selected strategic documents

| Document | KPGO 2028 | Circular Economy Action Plan (CEAP) | Waste Directives / EU Guidelines |
|--|---|--|--|
| Reference to the role of education or communication | Yes — indications regarding information and educational activities aimed at the public and producers. | A clear emphasis on the need to support Member States in raising awareness, standardizing communication, and improving the quality of separate collection. | The directives emphasize systemic obligations (separate collection, recycling targets), highlighting the role of local authorities in implementing communication and infrastructure. |

Cont. table 1.

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|--|--|--|--|
| Specific, measurable goals related to awareness | None (no clear KPIs regarding knowledge or attitudes). KPGO operationalizes goals mainly at the level of waste streams, not awareness. | CEAP stresses the need to monitor the quality of collection and standards but does not impose explicit indicators of citizens awareness. | The directives require monitoring of waste management results (e.g., % recycling) but do not define indicators of social knowledge or attitudes. |
| Financing of educational activities | Possible sources mentioned (national/ EU funds), but no dedicated financing mechanism. | CEAP indicates support mechanisms (EU programs) — general support frameworks. | Financial instruments depend on national implementation; the directives do not define a direct budget for education. |
| Recommended operational actions | Campaigns, school education, support for local initiatives, development of infrastructure for separate collection. | Standardization of separate collection quality, support for pilot projects, development of EPR (Extended Producer Responsibility). | Requirements for separate collection and recycling targets, emphasis on the responsibility of local authorities for implementation. |

Source: Own elaboration based on ISAP. (2023). *Krajowy plan gospodarki odpadami 2028 (KPGO 2028)*. Warsaw: Ministry of Climate and Environment. European Commission. (2020). *Circular Economy Action Plan: For a cleaner and more competitive Europe*. Brussels: European Union, European Environment Agency (EEA). (2023). *Municipal waste management in Europe: 2023 country profiles*, European Environment Agency (EEA). (2024). *Progress towards waste recycling targets in the EU*.

The analysis of the data presented in Table 1 indicates that the National Waste Management Plan 2028 (KPGO 2028) treats education as a so-called ‘soft measure’, while the Circular Economy Action Plan (CEAP) emphasizes the need to standardize the quality of separate waste collection and to strengthen support instruments for the member states. However, none of the documents specify measurable indicators related to citizens’ knowledge or attitudes, which makes it difficult to monitor the effectiveness of the implemented initiatives.

Quantitative data on the effectiveness of waste management in Poland and the European Union are presented in Table 2.

Table 2.

Waste Management Indicators: Poland vs. the European Union (Selected Years)

| Indicator (year) | Poland | European Union (average) |
|--|---|--|
| Share of preparation for reuse and recycling of municipal waste (2022) | 41% — increase after a period of stagnation | 48-49% (2022/2023); upward trend (48% in 2023) |
| Recycling rate (new calculation method) (2021) | 26% (based on the new national calculation method and audit data) | 48% (stable growth in recent years) |
| Generation of municipal waste per capita (2023) | 357 kg per person (2023) regionally diversified values; moderately increasing trend | 511 kg per person (2023) |
| Risk of failing to meet the 2035 target (landfilling $\leq 10\%$) | Poland identified as a country at risk of non-compliance | Several Member States also at risk; CEAP recommends intensifying actions |

Source: Own elaboration based on European Environment Agency (2023); European Commission (2024); Eurostat (2024); Najwyższa Izba Kontroli (2023).

As shown in Table 2, in 2022 the level of preparation for reuse and recycling of municipal waste in Poland was approximately 41%, while the average for the European Union ranged between 48-49% (EEA, 2023; Eurostat, 2024). Despite the observed increase in this indicator in recent years, Poland still remains below the EU average. Moreover, according to the assessment of the European Environment Agency, Poland has been identified as one of the countries at risk of failing to meet the target of reducing municipal waste landfilling to $\leq 10\%$ by 2035 (EEA, 2023).

Audit reports (NIK, 2023; EEA, 2024) clearly show a gap between what is declared in strategies and what is actually implemented. The causes of this inconsistency can be attributed to several key, interrelated factors:

- lack of operationalization of the concept of environmental awareness. Although strategic documents acknowledge the need for environmental education, they lack precise indicators of its effectiveness, such as the level of citizens' knowledge, attitudes toward waste separation, or sorting accuracy indicators. Consequently, it is impossible to clearly link educational activities with recycling outcomes (NIK, 2023);
- unstable and insufficient funding of educational activities. The National Waste Management Plan 2028 refers to the possibility of using national and EU funds, but it does not provide a dedicated financing mechanism for environmental education. Audit reports indicate that educational campaigns are often implemented incidentally or as short-term projects, which limits their durability and scale of impact (NIK, 2023);
- both EU and national documents assign a significant role to local authorities in implementing actions. However, coordination, technical guidance, and financial support from the central level are often insufficient. Municipalities are required to implement solutions without adequate infrastructure and informational support, which weakens the educational effect. Even when awareness increases, the lack of convenient infrastructure (collection points, containers, bio-waste options) limits real behavioral changes (EEA, 2023);
- methodological and interpretative variability of data. Frequent modifications in reporting procedures, including changes in the calculation methods for the recycling rate since 2020, create difficulties in interpreting trends and hinder data comparability over time (Eurostat, 2024).

In summary, the findings confirm that environmental awareness is a key component in achieving circular economy objectives. At the same time, the lack of its clear operationalization and integration with the system of indicators limits the effectiveness of both national and EU waste management policies. Future research should focus on developing measurable indicators of environmental awareness that would enable a quantitative assessment of the impact of educational activities on waste management outcomes (NIK, 2023; EEA, 2024; Eurostat, 2024).

The results demonstrate that while ecological awareness is acknowledged in all analyzed documents, it remains weakly operationalized. None of the documents define measurable indicators, and the financial mechanisms for education are either general or absent.

5. Discussion

The findings indicate that ecological awareness continues to function primarily as a declarative rather than an operational element within waste management strategies. This observation corresponds with previous studies that have identified a persistent “policy–practice gap” in environmental governance (OECD, 2022; EEA, 2023).

The lack of clearly defined and measurable indicators of environmental awareness limits policymakers’ ability to evaluate the actual behavioural outcomes of educational and communication initiatives. Furthermore, inconsistent funding and weak coordination between central and local authorities impede the long-term continuity and effectiveness of awareness programs.

From a theoretical standpoint, these findings reinforce behavioural models of environmental action (Ajzen, 1991; Schultz, 2014), which underscore the interdependence between attitudes, perceived behavioural control, and supportive infrastructural conditions. Incorporating behavioural insights into waste management policies could enhance citizen participation and improve the overall efficiency of waste sorting and recycling processes.

At a practical level, the results suggest that municipal authorities should integrate awareness-related metrics—such as knowledge, attitudes, and practice (KAP) surveys or other behavioural indicators—into their monitoring frameworks, while linking educational initiatives with concrete incentives and infrastructural improvements to ensure lasting behavioural change.

6. Conclusions

The conducted analysis confirms that ecological awareness constitutes a fundamental determinant of effective municipal waste management and a key prerequisite for achieving the objectives of a circular economy. Both Polish and EU strategic documents—such as the *National Waste Management Plan 2028* (KPGO 2028), the *Circular Economy Action Plan* (CEAP), and EU waste directives—recognize the importance of environmental education and public engagement. However, these commitments remain largely declarative, as they lack measurable indicators, dedicated financing mechanisms, and consistent monitoring systems. The persistent gap between strategic declarations and implementation outcomes indicates that

ecological awareness is not sufficiently embedded within policy frameworks. The absence of clear key performance indicators (KPIs) concerning citizens' knowledge, attitudes, and behaviors makes it difficult to assess the real impact of educational and communication initiatives on recycling rates or waste reduction. Moreover, unstable, project-based financing weakens the continuity and effectiveness of awareness campaigns, while limited coordination between national and local authorities undermines the long-term integration of educational, infrastructural, and regulatory measures.

Strengthening the role of ecological awareness in waste management requires going beyond general declarations and developing measurable, practical frameworks. This includes the development of standardized indicators of ecological awareness, systematic evaluation of educational programs, and the integration of behavioral insights into policy design. Stable financial support and stronger cooperation between central and local authorities are also essential to ensure that awareness translates into sustained behavioral change and improved waste management outcomes. Promoting ecological awareness is not only an educational challenge but also a governance issue, requiring coherence between communication strategies, infrastructure development, and economic instruments. By embedding ecological awareness into measurable, well-financed, and coordinated policy actions, cities can accelerate the transition toward sustainable urban systems—enhancing both environmental quality and the quality of life of urban residents.

This study highlights the crucial yet still underutilized role of environmental awareness in the municipal waste management system. A comparative analysis of Polish and European Union strategic documents indicates that, although the importance of public engagement in this area is widely acknowledged, its practical implementation remains limited.

The research is based exclusively on secondary sources, without the use of primary data derived from surveys or interviews. Therefore, future studies are recommended to focus on empirically measuring citizens' environmental awareness and assessing the effectiveness of specific educational and communication interventions.

The article argues that the development of measurable indicators of environmental awareness and the integration of behavioral components into waste management policies are essential to translate declarative environmental consciousness into tangible outcomes in waste management practices. Moreover, the need is emphasized for the creation of standardized measurement tools, the establishment of stable mechanisms for financing environmental education, and the strengthening of cooperation between local and national stakeholders.

Future research should incorporate quantitative analyses of pro-environmental behaviors and long-term evaluations of educational campaigns aimed at fostering sustained public awareness in the field of municipal waste management.

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