Agnieszka **LOREK** • Paweł **LOREK**

ECOSYSTEM DISSERVICES IN URBANIZED AREAS – AN ECONOMIC AND SOCIAL PERSPECTIVE

Agnieszka LOREK (ORCID: 0000-0002-1812-9692) – University of Economics in Katowice

Paweł LOREK (ORCID: 0000-0003-3252-5234) – University of Economics in Katowice

Correspondence address:
1 Maja Street 50, 40-287 Katowice, Poland
e-mail: Agnieszka.lorek@ue.katowice.pl

ABSTRACT: The purpose of the article is to classify ecosystem disservices according to their impact on the quality of life. The research consisted of the following steps: (i) review of the literature on ecosystem disservices, (ii) preparation of a survey questionnaire on the perception of ecosystem disservices in the local environment, (iii) conducting survey interviews using the CAWI technique among adult residents of Poland in July-September 2023, (iv) statistical analysis using descriptive statistics and correlation analysis. The results indicate a complex approach to ecosystem disservices. Differences are revealed for characteristics such as age, education and place of residence (urban/rural areas). A limitation for a comprehensive analysis of the problem is the relatively small number of publications addressing the topic of ecosystem disservices. As a result, the article focuses mainly on Polish socio-environmental conditions. The article can be useful for a wide range of stakeholders (local authorities, spatial planners and local communities).

KEYWORDS: ecosystem disservices, ecosystem services, quality of life

Introduction

Nature provides humans and society with many benefits, among others, food and drinking water production, pollination of crops and green spaces for recreation. In order to protect these treasured services, we need to give them due weight in public debate, policy and ecosystem management. As a result of the globally growing human population and the associated urbanisation processes, more and more conflicts at the society vs. environment interface emerge. Also, competition for limited space and resources has occurred. For this protection to be effective, sound scientific knowledge on the assessment of the value of ecosystem services is crucial, and this includes the recognition of effects that are perceived by society as negative and related to ecosystem functioning (Schaubroeck, 2017).

A major challenge in analysing the existing body of science on ecosystem services issues has been its wide dispersion and the need to integrate knowledge originating from different scientific disciplines. This particularly refers to ecosystem disservices. While there are currently a large number of publications relating to ecosystem services (Ehrlich & Ehrlich,1981; Costanza et al., 1997; de Groot, 2002; Chee, 2004; The Millennium Ecosystem Assessment, 2005; Farber et al., 2006; Boyd & Banzhaf, 2007; Wallace, 2007; Costanza, 2008; Fisher & Turner, 2008; Solon, 2008; Mizgajski & Stępniewska, 2009; Mizgajski, 2010; Poskrobko, 2010; Graczyk, 2010; Fisher et al., 2011; Becla et al., 2013; Costanza et al., 2014; Mizgajski et al., 2014; Braat, 2014; Degórski & Solon, 2014; Famielec, 2014; Maes et al., 2018; IPBES, 2019), the issue of disservices is usually overlooked. The positive contribution of ecosystems to human life and well-being is well-established and undeniable, yet we may not ignore the negative effects resulting from ecosystem characteristics that are economically or socially harmful (Dunn, 2010; Lele et al., 2013; Campagne et al., 2018).

This article systematises knowledge and characterises ecosystem disservices from the perspective of economic sciences. A vital objective of the paper is to create a classification of ecosystem disservices relevant to the quality of life of residents. The source of quantitative data subjected to statistical analysis and inference were surveys conducted applying the CAWI method among the inhabitants of Poland in 2023.

Ecosystem disservices – a literature review

The concept of ecosystem disservices and definition of problems

In economics, the utility function is the sum of all the characteristics of a good that have the potential to create user satisfaction and the dysfunctions that create user dissatisfaction (the mere fact of taking up space in the user's environment, for example, can be considered as an example of such dysfunctionality). A good may have all these characteristics from the beginning of its existence (e.g. cigarettes), or they may appear over time as a result of transformations occurring in the product (waste).

The concept of demerit good, i.e., goods that have negative utility – causing dissatisfaction to the user – refers to the category of utility. In the case of demerit goods, which are a source of dissatisfaction when encountered, one cannot speak of consumption. Dissatisfaction-inducing contact with negative goods, which is always undesirable and, in many cases, unintentional, is called para-consumption or quasi-consumption. Consumers of negative goods strive to reduce para-consumption, and thus the dissatisfaction derived from it, as much as possible. For demerit goods, as for ordinary goods, there should be rules of economy, rules of production and consumption and the possibility of transactions. However, the scope of the applicability of market laws for ordinary goods to the category of demerit goods needs to be verified. The problem in this regard is that a specific material object is both a good and a demerit good, potentially having both positive and negative utility, with the determining criteria being subjective (Lorek, 2007). A good example of a demerit good is waste, which can be used as secondary raw materials and thus is subject to economic turnover under special conditions. The category of ecosystem disservices also refers to this concept.

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In general, ecosystem disservices are often described in the subject literature as the disruption or loss of particular categories of services; in this sense, they are the effects of biodiversity loss (Chapin et al., 2000). Ecosystem disservices can also be described as the negative effects of ecosystem change (Balmford & Bond, 2005). Other academics understand ecosystem disservices as "ecosystem services perceived as negative for human well-being" (Lyytimäki & Sipilä, 2009; Lyytimäki, 2014b). In this sense, they can result from natural phenomena, such as damage caused by floods, earthquakes, and fires, and can also be losses caused by, for example, the release of toxic substances or the side effects of deliberate ecosystem manipulation. The division between natural and anthropogenic forces driving disservices is often unclear (Table 1).

Table 1. Examples of driving forces or root causes of different ecosystem disservices depending on the level of human impact and spatial scale

Spatial scale	Driving forces of ecosystem disservices		
	Ecological system	Socio-ecological system	Social system
Local/individual	Plants causing poisoning.	Leaves falling from the trees, which make the road surface slippery.	Disorder in the city park due to irresponsible behaviour of residents.
Regional/collective	Naturally occurring fires.	Release of a toxic substance polluting urban green areas.	Negative image of green areas due to poorly managed urban environment.
Global/all humanity	A large asteroid hitting Earth.	Sea level rise due to climate change.	Environmental damage in developing countries caused by the economic interests of developed countries.

Source: Gómez-Baggethun and Barton (2013).

In the latter view, ecosystem disservices are always related to ecosystem functioning, but the recipient is the entire socio-ecological system, which includes various interpersonal and individual factors (Tapio & Willamo, 2008).

The concept of ecosystem disservices was further detailed by Shackleton et al. (2016), noting that the definition must include the following two points. Firstly, ecosystem disservices are caused by ecosystem characteristics or ecosystem processes and not by human activities that have negatively impacted the ecosystem. Secondly, it has a detrimental effect on one or more dimensions of human well-being, and not on ecosystem services example: infectious diseases.

Assessing disservices is also a difficult task because the same ecosystem services can be assessed as services or disservices – depending on the evaluator and the current context. The variety of methods that can be used to assess ecosystem disservices is as wide as the methods used to assess ecosystem services. These include interview-based assessments of disservices (Fischer & Eastwood, 2016; Shackleton et al., 2024), newspaper text analysis (Lyytimäki, 2014a), quantitative assessment (Dobbs et al., 2014) monetary valuation (Schaubroeck et al., 2016) and expert judgement (Kopperoinen et al., 2014; Campagne et al., 2017; Campagne et al., 2018).

Ecosystem services and ecosystem disservices are mostly assessed separately in relation to specific ecosystems, e.g. urban ecosystems (Lyytimäki et al., 2008; Shuyao et al., 2021; Tian et al., 2020), urban forests (Dobbs et al., 2014; Escobedo et al., 2011; Roman et al., 2021), or agricultural lands (Zhang et al., 2007; Gutierrez-Arellano & Mulligan, 2018).

The concept of ecosystem disservices has been controversial in the scientific community and has generated debate over the past few years (Lyytimäki et al., 2008; Barot et al., 2017; Lyytimäki, 2014a; Schaubroeck, 2017; Shapiro & Baldi, 2014; Villa et al., 2014). Shapiro and Baldi (2014), for example, argue that the concept of ecosystem disservices can lead to an exaggeration of the damage caused by nature, and much of this damage is already taken into account by market mechanisms. In contrast, Villa et al. (2014) claim that the use of this concept hinders the development of an inclusive and constructive dialogue on the complex interactions between humans and nature.

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Ecosystem disservices in urbanised areas

The concept of ecosystem services can become a more useful tool for urban management if we contrast the benefits of ecosystem services with the ability of ecosystems to degrade human well-being. A more balanced treatment of ecosystem services and ecosystem disservices can provide a framework for an interdisciplinary and participatory social-ecological approach. Also, the evaluation of many ecosystem disservices requires an interdisciplinary approach, where the use of local knowledge is a prerequisite (evaluation of ecosystem services is mainly based on personal values and their perception). As Lyytimäki and Sipilä write, public participation methods in urban ecological management should be adapted to better take into account disservices and local knowledge about disservices should be systematically collected and processed (Lyytimäki & Sipilä, 2009). Knowledge of community perceptions of negative phenomena related to nature is fundamental for effective and sustainable urban management as it helps to diagnose and mitigate human-nature conflict situations. Nowadays, being aware of which urban ecosystem services are perceived as harmful is particularly important as more and more people live in urban environments.

Examples of ecosystem disservices occurring in urban areas are varied. Damage to infrastructure can occur due to root growth (e.g. destruction of pavements), microbial action (e.g. decomposition of building timber by microbial action), bird droppings (e.g. acceleration of corrosion of metal components and damage to buildings), vegetation growth (e.g. tall trees near houses can cause shade or maintenance problems for houses, shading vegetation can serve as hiding places for burglars). Another problem facing urbanised areas is the appearance of invasive species. Such species can contribute to biodiversity but ultimately reduce the potential to provide ecosystem services (DeStefano & Deblinger, 2005; McKinney, 2008). As urban sprawl continues, wild or semi-wild species will need to adapt to niches in urban areas. The growing areas of urban ecosystems are increasingly becoming home to species capable of rapid adaptation (Lyytimäki & Sipilä, 2009). Eliminating invasive species is often difficult, even if there is a common understanding of the harmfulness of the species. Harmful species can be threatening to species that are considered beneficial (cultivated plants, crops, and plantations that can be attacked by pests) or other protected species and thus will cause economic losses (Lorek, 2019).

An overview of potential ecosystem services occurring in urban areas with literature references is presented in Table 2.

Table 2. Disservices related to the functioning of ecosystems according to the literature on the subject

Ecosystem function	Disservice	Examples	Sample references
Photosynthesis	Air quality problems	Urban tree and shrub species emit volatile organic compounds (VOCs)	Chaparro and Terradas (2009) Geron et al. (1994)
Growth of plants and increasing their biomass	Blocking views	Obstruction of the view by trees growing close to buildings	Lyytimäki et al. (2008)
	Fear and stress	Formation of dense thickets. Unlit green areas are perceived as dangerous at night	Bixler and Floyd (1997)
	Damage to infrastructure	Tree root growth which causes damage to infrastructure e.g., streets and pavements	Lyytimäki and Sipilä (2009)
Plant pollen transmission	Allergies	Wind-pollinated plants can cause allergic reactions	D'Amato (2000)
Plant ageing	-Traffic accidents - Property damage	Broken branches and trees falling on roads, parking lots, power infrastructure, which can cause road accidents and damage to cars or power outages	Lyytimäki et al. (2008)
	Damage to infrastructure	Damage caused by microbes – decomposition of natural substances, e.g., rotting of wood used to build infrastructure	Lyytimäki and Sipilä (2009)

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Ecosystem function	Disservice	Examples	Sample references
Animal habitats	Habitat competition with humans	Animals/insects perceived by people as fear-inducing Damage to property caused by animals e.g., beavers, wild boar	Bixler and Floyd (1997) Lyytimäki (2014a)
	Health and hygiene risks	Risk of contracting animal- and insect-borne diseases e.g., rabies, Lyme disease Hygiene and health problems associated with animal faeces Contamination of drinking water Presence of potentially toxic algae in water Antibiotic resistance, spread of viruses New diseases potentially transmitted by invasive exotic species	
	Reduction in aesthetic value	Droppings of birds and other animals on built-up areas and green spaces Presence of nuisance species such as rats, seagulls, mosquitoes, for example Areas that are not intensively managed (e.g., unmown lawns, scrubs) can be perceived as ugly	

Source: authors' work based on Gómez-Baggethun and Barton (2013) and Lyytimäki (2014a).

From an economic point of view, urban ecological disservices increase the direct costs incurred, such as those resulting from attempts to control or remove unwanted invasive species (insects, weeds, birds and small mammals), damage caused by frosts, or by strong winds during storms. It is more difficult to estimate the indirect economic costs associated with the functioning of urban ecosystems. These costs include, for instance, the decline in property values due to the bad reputation caused by the proximity of an unmanaged green area. Opportunity costs arise because of obstacles to more beneficial use of space (in the case of brownfield sites, wetlands and wastelands). Areas that are not intensively managed are often considered unpleasant and ugly, although they may have high biodiversity, e.g., unmanaged parks and gardens are often considered an aesthetic and hygienic problem (Lyytimäki & Sipilä, 2009). Some of the ecological disservices may be considered insignificant or only minor nuisances compared to the benefits of ecosystem services that enable basic needs such as food or respiration to be met. Nonetheless, even relatively minor nuisances may be considered significant in the context of the urban lifestyles of affluent industrialised societies (Lyytimaki et al., 2008). For example, nuisances such as dew on the grass, odour or the appearance of decomposing organic matter may increase the demand for reduced biodiversity i.e., more intensively managed green spaces (too frequent mowing) or their conversion to barren paved spaces.

Public authorities, to deal with the problem of ecosystem disservices, can include this topic in the already used participatory tools in the governance of nature-based solutions in the city. Examples of citizen participation forms include (Kiss et al., 2022):

- advocacy planning, capacity development, appreciative inquiry, public spirit workshops,
- co-design workshops (e.g., participatory planning), citizen panels, joint planning groups, co-management (of certain) project aspects, task forces,
- specialized meetings, interactive workshops, district forums, focus groups, social media debates, drop-in Q&A, community-based activities, crowd-funding, participatory mapping,
- events, meetings (typically open space), e-mail feedback, interviews, surveys, citizen jury, geospatial decision support systems,
- newsletters, reports, public presentations, online information, webpages, field visits with interactions.

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An open discussion on the importance of different disservices in relation to services is needed in the urban management process. One of the key challenges for urban ecosystem management is to combine the expectations of residents modified by urban lifestyles with the services that urban ecosystems produce. Ecosystem services and disservices must be analysed in their respective time frames as well as social and economic contexts. Some issues that are currently perceived as disservices may change over time. Importantly, services and disservices also need to be examined, taking into consideration the interests of particular population groups, such as different age groups or groups with different cultures. All this diversity of views should be taken into account in a balanced manner, and used as a resource in urban ecological management (Lyytimäki & Sipilä, 2009).

Research methodology

The research procedure adopted covered the following three stages:

Stage I. A systematic review of the literature on the subject and available pieces of research relating to the issue of ecosystem disservices. In the article below, following Shackleton et al. (2016), it has been assumed that ecosystem disservices are related to a feature or process in the ecosystem and are unrelated to human activities and that they affect the sense of well-being among residents. Adopting this definition influenced the selection of the phenomena/disservices to be studied. The choice of disservices analysed was also influenced by the previous research experience and interests of the article's authors. They also reflect the most relevant issues in the studied area, which covers the territory of Poland.

Stage II. Selection of the research tool and preparation of the questionnaire. A survey questionnaire was chosen as the research tool. In this paper, a multi-item question is analysed, which allows to evaluate how residents perceive disservices in their local environment, i.e., in their neighbourhood. Specifically, the survey participants were asked, "how they rate the occurrence of the following vegetation and animal-related events in their place of residence?" As the authors were interested in cognitive beliefs, i.e., perceptions, the survey participants responded on a standard five-point Likert scale, ranging from 0, which means that the factor does not occur and is not a nuisance, 1 – occurs rarely and the nuisance is moderate, 2 – occurs sometimes and the nuisance is acceptable, 3 – is observed quite often and poses a nuisance, 4 – occurs very often and poses a serious nuisance.

The second question analysed was an enquiry about the evaluation of the following statements:

- unmown lawns look unsightly,
- trees growing alongside the pavement damage the surface,
- overgrown areas are dangerous,
- lying leaves are dangerous for pedestrians.

Respondents in this case could agree with the statement, disagree or refuse to answer.

The questions analyzed in the article are part of a larger study on ecosystem services. The pilot studies can be considered as the earlier survey studies from 2018. Analyzing the responses to the questions (especially the open ones) in 2018, answers regarding the negative perception of ecosystem services were noted, which suggested the validity of conducting deeper research on ecosystem disservices and wider consideration of this topic in the survey form.

Stage III. Conducting the survey. The research was conducted applying the survey method by a specialized creator of on-line questionnaires. It was conducted based on a sample of 858 inhabitants of Poland in 2023 (from July to September). The questionnaire was addressed to people using the Internet who completed the electronic questionnaire on their own using a link to the research that they received. The links were posted on the on-line research platform Swpanel[1]. The sample was characterized in terms of age, gender, education, average monthly net income, place of residence, occupational status, and type of dwelling.

Stage IV. Data analysis. Based on the data collected through the questionnaire, a database was created, which was used to interpret the data and create a classification of ecosystem disservices relevant to the quality of life of residents. The analysis focuses specifically on the answers to two questions:

[1] Swpanel is a portal whose respondent base corresponds to a nationwide sample (as of January 2023, it comprises over 313,000 people who agreed to participate in surveys); Ankieteo (2025).

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1. Which factors are perceived as unfavourable?
2. How do perceptions of individual disservices differ according to the characteristics of the respondent?

The surveyed issues included:

- assessment of the intensity of specific events related to vegetation and animals (allergies caused by pollen, breaking tree branches or whole trees, occurrence of invasive species displacing domestic plant or animal species, intensity of insect bites, diseases spread by animals, dangerous encounters with animals and destruction of property by animals),
- attitude towards selected phenomena related to natural processes (whether lying leaves pose a threat to pedestrians, whether trees growing by the pavements cause damage to infrastructure, whether overgrown areas are dangerous and whether unmowed lawns look unsightly).

The development of the results included the determination of descriptive statistics and the determination of correlation coefficients between the studied variables and demographic factors. The correlation analysis procedure included: zero-one encoding of variables, verification of the statistical dependence of variables with the Chi-square test at the 0,95 confidence level, and calculation of Pearson correlation coefficient for statistically dependent variables.

Social perception of ecosystem disservices in Poland

Own study results

The analysis presented in subchapter 3 is concerned with assessing the intensity of occurrence of specific vegetation and animal events and respondents' attitudes towards selected phenomena related to natural processes. The characteristics of the research sample are presented in Table 3.

Table 3. Characteristics of survey respondents

Gender	
Female	64.3%
Male	35.7%
Age	
18-25	29.4%
26-39	33.7%
40-65	31.2%
>66	5.7%
Education	
basic	6.9%
lower secondary	3.5%
vocational	9.6%
secondary	35.5%
post-secondary	11.0%
bachelor/engineer	8.5%
master's degree	25.0%
Average monthly net income	
10,000 PLN and more	4.8%
6,000 – 10,000 PLN	11.0%
4,000-5,999 PLN	20.2%

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2,000 – 3,999 PLN	29.6%
Below PLN 2,000	9.9%
No income	8.2%
Refusal to answer	16.4%
Type of apartment	
Apartment in a tenement house or block of flats	50.1%
House	41.8%
Terraced house	8.0%
Place of residence	
Large city (100,000 inhabitants and more)	28.3%
Medium-sized city (20 – 100 thousand inhabitants)	28.6%
Small town (less than 20 thousand inhabitants)	16.9%
Village	26.2%
Professional status	
Employed	49.7%
Student	15.6%
Pensioner/ retiree	11.1%
Self-employed	6.2%
Unemployed	7.1%
Housewife	4.2%
Farmer	1.7%
Refusal to respond	4.4%

A summary of respondents' responses in terms of attitudes towards specific phenomena from flora and fauna see on Figure 1.

None of the surveyed categories, in the opinion of the respondents, is distinguished by a particularly high level of nuisance. The category most often indicated as burdensome or very burdensome is insect bites. When analysing the distribution of responses, it can be noted that the most common nuisances related to ins ect bites are noticed by rural residents (41.3% of responses considering this phenomenon to be very common and very burdensome as well as frequent with high nuisance).

Another studied phenomenon is dangerous encounters with animals. After analysis of the data, only a correlation of identifying dangerous encounters with animals as frequent as running one's own business was found (correlation 0.11). Taking into account the respondent's place of residence, the responses perceiving such events as very frequent and very bothersome and frequent with high level of bothersomeness were as follows:

- large city – 16.9% of respondents from large cities,
- medium-sized cities – 15.1% of respondents from medium-sized cities,
- small town – 17.9% of respondents from small towns,
- village – 16.9% of respondents from the countryside.

The analysis of the correlation of the remaining categories with demographic factors yielded the following results: a negative correlation of the threat assessment from breaking tree branches as very rare with living in a terraced house (correlation -0.12), a positive correlation of very rare allergies with earnings above PLN 10,000 (correlation 0.11) and in residents of small cities (correlation 0.10). On the other hand, the very frequent occurrence of allergies correlated positively (correlation 0.10) with the performance of housewife's work (however, it is difficult to assess whether co-occurrence is associated with exposure to natural or abiotic factors such as household chemistry).

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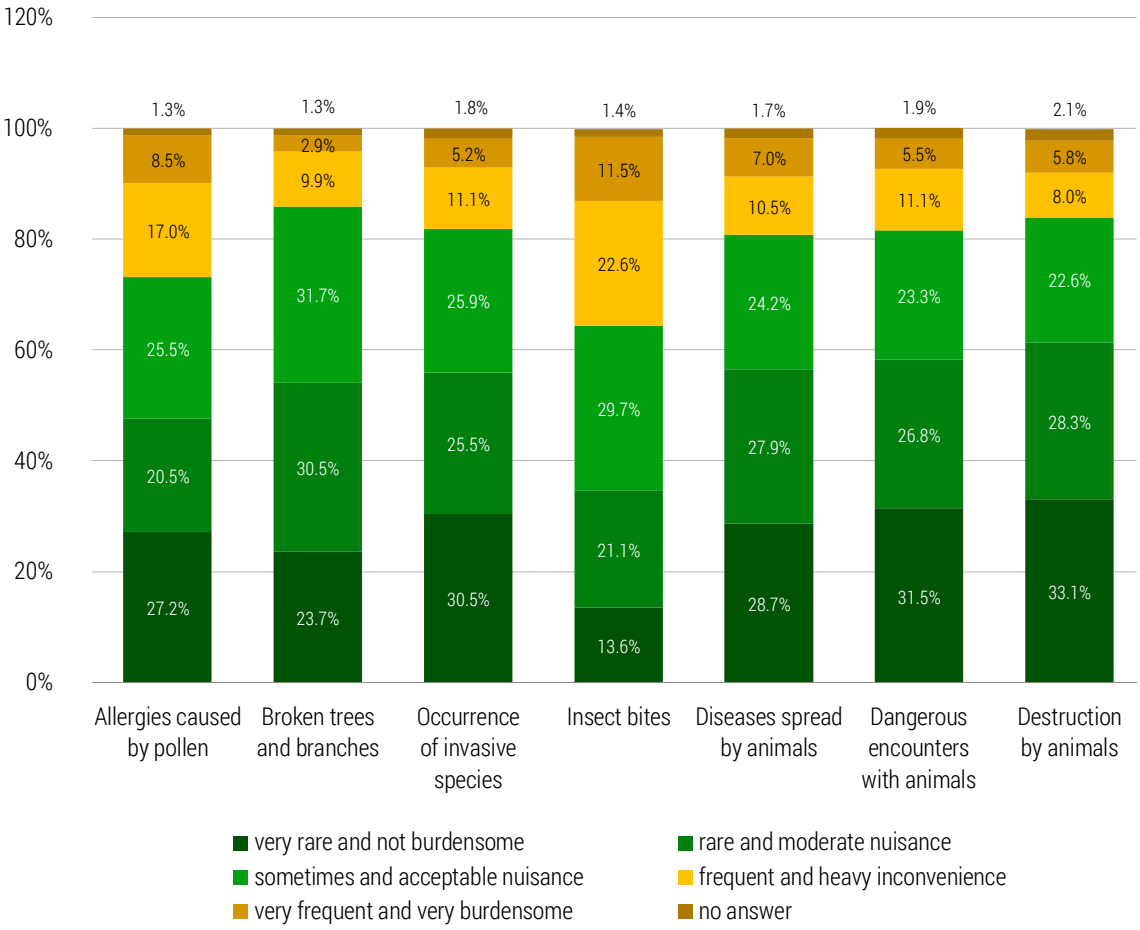

Figure 1. Assessment of the intensity of specific vegetation and animal events

Figure 2 summarises respondents' answers regarding attitudes to issues such as the lack of lawn mowing, the presence of trees growing next to pavements and roads, the presence of spontaneously overgrown areas in the neighbourhood and leaves lying in pedestrian areas.

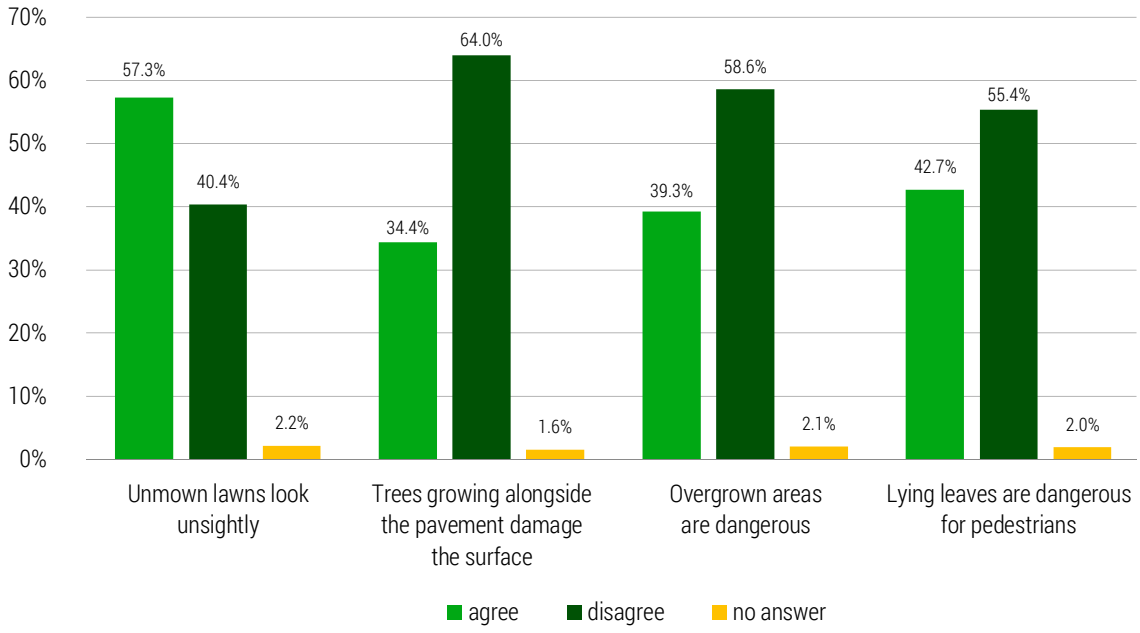

Figure 2. Attitude of respondents to selected phenomena related to natural processes

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The negative attitude of respondents to the above-mentioned issues was confirmed only in the case of unmowed lawns, which the majority of respondents assess as unsightly. Urban residents are less likely to perceive an unmowed lawn as unsightly (44% of respondents from large cities believe that unmowed lawns are unsightly compared to 60% in medium-sized cities, 66.9% in small towns and 62.7% in villages). Similar results were obtained based on the question about the ratio of the respondents to trees growing by roads and pavements (while again, the majority of residents of large cities do not notice damage to infrastructure caused by trees 71.5% of the surveyed residents of large cities compared to 60.3% in medium-sized cities, 62.4% in small cities and 64.9% in villages).

The issue of correlating the surveyed opinions with demographic characteristics is as follows:

- perception of unmowed lawns as unsightly correlated slightly (correlation 0.12) with the age of 18-25 years, while a negative correlation occurred in the case of factors such as higher education (correlation -0.11) and living in a large city (correlation -0.17),
- opinion on the negative impact of roadside trees on infrastructure is slightly more often expressed by men (correlation 0.11) and people with vocational education (correlation 0.12),
- people with a net income level of PLN 4,000-5,999 (correlation 0.10) more often agreed with the opinion about the threat brought by lying leaves, while non-compliant answers were more often given by pupils and students (correlation -0.10),
- in the case of the ratio of spontaneously overgrown areas (subject to natural succession), no clear correlations were obtained, but more often the answers indicating the threat were provided by residents of small cities (47.6% of respondents in small cities) and villages (40.4%).

Discussion

The obtained results indicate that the most frequently reported ecosystem disservice was the reduction of aesthetic values due to unmowed lawns. It is difficult to assess why only the lack of lawn mowing causes a clearly negative reaction among the respondents. Among the possible reasons, we can indicate primarily the marketing impact promoting the aesthetics of English lawns (perfectly even surfaces, with sharp edges, mono-species, devoid of flowering plants). Further analysis showed a clear change in attitudes among residents of large cities, who less often perceive such areas as unsightly. Such a change can be linked to education and a higher level of environmental awareness of the benefits of flower meadows (temperature mitigation, increased biodiversity). Based on the conducted research, negative correlations were found between perceiving unmowed lawns as unesthetic and higher education as well as living in a large city. The existence of relationships between ecological education and pro-ecological attitudes is also indicated by the studies of Krasny and Roth (2010), Smith et al. (2016), and Ruiz-Mallén et al. (2022).

Other commonly reported ecosystem disservices are feelings of fear and stress related to the possibility of accidents (slipping on untidy leaves) and the dangers of overgrown areas (fear of crime: theft, assault, rape). Threats related to overgrown areas are especially articulated by residents of small towns and villages, where traffic is lower, thus the feeling of fear in a secluded area is growing. Other frequently communicated disservices that reduce the living comfort of residents are damage to infrastructure caused by growing tree roots (damage to pavements, road surfaces, drains), as well as health hazards associated with insect bites.

On the other hand, phenomena not considered a nuisance can include habitat competition with humans and damage to property by animals. This is a phenomenon that is often publicised in the media and discussed on social media. Such incidents are also used as an argument in political disputes, and the lack of reliable research makes it difficult to have a substantive discussion.

Survey results indicate that the mostly positive attitude of respondents towards trees growing next to roads and pavements. This opinion stands in stark contrast to the common practice in Poland of destroying roadside trees under the pretext of repair or maintenance work. The findings suggest that there is a need to change the approach of administrative units to this issue. Currently, the most frequently cited reasons for tree felling are: safety issues (breaking branches, roads being disrupted by roots, traffic accidents – collisions with trees growing by the road) and the necessity to widen the road, e.g., for a bicycle path. Tree felling in such cases is the easiest solution. Often, alternative solutions are not considered, such as alternative road routes, separating lanes, or reducing speed limits. Other motives for roadside tree felling may involve the desire to obtain and sell wood. Such problems

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are highlighted by cases of conflicts regarding roadside tree felling, e.g., the widely publicised conflict concerning tree felling in the Sokółka County (Kijowska, 2024; Matuk, 2024; Dąbrowski, 2024). To prevent such cases (at least partially), the Ministry of Climate and Environment (2025) announces changes in the law – for example, a ban on burning high-quality wood in mass energy production, or – the requirement to exercise due caution for people entering wooded areas (to prevent trees from being hastily cut down out of fear of liability for the landowner) (Knorps-Tuszyńska, 2024). An important element influencing the change in tree felling practices in cities will also be the ecological education of decision-makers.

To summarise the conducted research, a ranking of the most perceived ecosystem disservice was created, as presented in Table 4. This list can be helpful in conducting further study carried out by both research teams, as well as social organisations and local government authorities.

Table 4. Ranking of ecosystem disservices in Poland

Position in ranking	Disservice	Example	% answers
1	Reduction in aesthetic value	Unmown lawns	57.3
2	Fear and stress	Uncleaned lying leaves	42.7
		Overgrown areas	39.3
3	Damage to infrastructure	Destruction of pavement by trees	34.4
4	Health hazards	Insect bites	34.1*
		Allergies caused by pollen	25.5*
		Animal-borne diseases	17.51*
6	Habitat competition with people and property destruction	Dangerous encounters with animals	16.61*
		Occurrence of invasive species	16.31*
		Destruction by animals	13.82*
		Broken trees and branches	12.09*

*% is the sum of the responses in the categories: the phenomenon is frequent and of high nuisance and the phenomenon is very frequent and of high nuisance.

Proper identification and understanding of ecosystem disservices will enable communities to develop new adaptation strategies based on ecosystem services that, on the one hand, minimise negative impacts on people's quality of life and, on the other hand, increase community resilience to the impacts of climate change. From an urban management perspective, it is vital to understand which ecosystem disservices are most likely to reduce the quality of life of residents, and which are considered non-obtrusive and acceptable. Effective green space management requires consideration of ecosystem disservices in order to not only maximise the benefits of green space development but also to identify and reduce potential threats, e.g. intensively managing green spaces in areas identified as unsafe.

Based on the conducted research, the following actions can be recommended:

- A broader inclusion of programs that involve the community in the planning of urban spaces, e.g., programs in which residents can participate in planning and establishing urban gardens, flower meadows, pocket parks, etc. During such consultations, problems related to the existence of ecosystem disservices should be identified and discussed (this topic should not be omitted, as later negatively perceived phenomena cause community dissatisfaction),
- Intensification of educational activities, with the authors believing that better results than theoretical lectures will be achieved through participatory education, e.g., establishing school gardens, excursions, and meetings with people involved in various types of ecological activities (e.g., nature conservation, establishing urban gardens, urban space planning).

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The authors list the following research limitations:

- Lack of comparative data – a small number of studies on ecosystem disservices,
- Limitations related to the specifics of online survey research (difficulties in researching certain categories of respondents – the phenomenon of digital exclusion and possible over-digitalization of some respondent groups).

The obtained results indicate the validity of the undertaken topic and the need to continue it in the future.

Conclusions

The above literature review confirms the existence of an important gap in research on ecosystem disservices, which the authors of this article intended to fill to some extent, while providing inspiration for further in-depth analyses of this issue. The literature review also shows that the knowledge on this problem is still scattered and fragmented and requires consolidation and critical evaluation.

The presented study is the first (to the authors' knowledge) attempt to assess the ecosystem disservices in Poland. The ranking of ecosystem disservices created on the basis of the authors' own research indicates that the most frequently perceived and troublesome disservices in Poland are phenomena related to the reduction of aesthetic values and feelings of fear and stress. The most negatively assessed category is unmowed lawns, while when assessing this category, one can notice a change in attitudes (residents of large cities and people with higher education are less likely to perceive such places as unsightly). In turn, the phenomena related to habitat competition with people and property destruction, including dangerous encounters with animals, the occurrence of invasive species, damage caused by animals and breaking trees and branches, were considered to be the least burdensome.

When analysing the problem of ecosystem disservices, it is vital to bear in mind that it is burdened with ambiguity and the perception of a particular phenomenon as unfavourable largely depends on the world-view of the evaluator. The same phenomenon can be perceived variously – both positively and strongly negatively. Nevertheless, knowledge and proper recognition of the perception of ecosystem disservices is a tool helpful in shaping the overall picture, which is essential for the successful management of urban systems using ecosystem services. It allows necessary compromises to be made, conflict situations to be avoided and social dialogue to take place. Negatively perceived phenomena (e.g. unmowed lawns, uncleaned leaves or the presence of animals and plants considered dangerous) are often publicised in social media and used as an argument in the political game. For this reason, reliable research showing the real public perception of such phenomena facilitates dialogue, allows necessary compromises to be made and conflict situations to be avoided.

The contribution of the authors

The article was written in collaboration by all authors.

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Agnieszka LOREK • Paweł LOREK

ANTYUSŁUGI EKOSYSTEMÓW NA TERENACH ZURBANIZOWANYCH – UJĘCIE EKONOMICZNO-SPOŁECZNE

STRESZCZENIE: Celem artykułu jest klasyfikacja antyusług ekosystemowych według ich wpływu na jakość życia mieszkańców. Metoda badawcza składała się z następujących kroków: (i) przeglądu literatury dotyczącej antyusług ekosystemowych, (ii) przygotowanie kwestionariusza ankietowego dotyczącego percepcji antyusług ekosystemowych w lokalnym środowisku, (iii) przeprowadzenie wywiadów ankietowych techniką CAWI wśród pełnoletnich mieszkańców Polski w okresie lipiec-wrzesień 2023, (iv) analiza statystyczna przy pomocy statystyk opisowych i analizy korelacji. Uzyskane wyniki wskazują na złożone podejście do antyusług ekosystemowych. Różnice ujawniają się w przypadku cech takich jak wiek, wykształcenie i miejsce zamieszkania (obszary miejskie/wiejskie). Ograniczeniem dla kompleksowej analizy problemu jest stosunkowo niewielka liczba publikacji poruszających tematykę antyusług ekosystemowych. Na skutek tego, artykuł koncentruje się głownie na polskich uwarunkowaniach społeczno-przyrodniczych. Artykuł może być przydatny dla szerokiego grona interesariuszy (władz lokalnych, planistów przestrzennych i społeczności lokalnych). Tematyka poruszona w artykule jest szczególnie istotna dla reorientacji polityk środowiskowych na poziomie lokalnym w obliczu zmian klimatycznych.

SŁOWA KLUCZOWE: antyusługi ekosystemów, usługi ekosystemów, jakość życia

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