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ORIGINAL PAPER
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PROTECTION OF THE QUIET AND NOCTURNAL LANDSCAPE

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ABSTRACT

Motives: We associate landscape primarily with the presence of vistas that change with the time of day, season and weather conditions. Landscape is shaped by light and darkness, sound and silence, all of which influence its perception. Quiet and nocturnal landscapes, however, remain on the margins of scientific interest in traditional landscape studies.
Aim: The main aim of the study was to identify the younger generation's awareness of the importance of nocturnal landscapes, light and noise pollution, and their preferences for protection against these threats. For this purpose, a diagnostic survey method was used. The results of the survey were referred to the 2015 TNS Poland report prepared for the Ministry of the Environment. In addition, the legal conditions of landscape protection in Poland were identified, with reference to protection against noise and light pollution. National and international experiences in the protection of quiet and nocturnal landscapes were also presented.
Results: The survey demonstrated that public awareness of light pollution is increasing. A nocturnal (and quiet) landscape is of high value to the respondents. Light pollution causes, among other things, energy waste and landscape degradation (change of landscape characteristics), while noise negatively affects human and animal health. Therefore, the nocturnal (and quiet) landscape should be protected by law. Currently, there are no direct instruments for the protection of nocturnal landscapes in Poland. On the other hand, in the case of quiet landscapes, there are some instruments (e.g. quiet zones), but they have not been used yet. It is encouraging that public awareness of light and noise pollution is increasing. It is necessary to link landscape protection with the protection of the night sky and quiet zones, for example through advertising resolutions and the establishment of cultural parks. It is also important to educate the public about the risks involved.

Keywords: landscape perception, noise, light pollution, soundscape, landscape protection, Poland

INTRODUCTION

Light and noise pollution are growing problems in the modern world. Currently, about 83% of the world's population and more than 99% of people in the European Union and the United States live under skies polluted by artificial light (Falchi et al., 2016). Every year, 125 million Europeans are exposed to traffic noise. Only about 18% of Europe can be considered quiet, while about 30% are potentially exposed to

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noise (Environmental Noise in Europe, 2020). Both light and noise pollution pose a threat to physical and mental health, cause huge social costs and have a negative impact on biodiversity (e.g. Cho et al., 2015; Kunc & Schmidt, 2019; Jägerbrand & Spoelstra, 2023; Mietlicki et al., 2022; Zielinska-Dabkowska et al., 2023). These phenomena are particularly intense in cities, where we are confronted with excessive artificial light emissions into the atmosphere as a result of an improperly designed outdoor lighting network and high noise levels associated primarily with motorization development and heavy traffic. In addition, a contemporary expression of urban development is its temporal expansion during night time, known as naturalization of cities (Koslofsky, 2011; Pawlusiński & Zmyślony, 2018). It is fostered by an increasingly widespread and extensive system of artificial urban lighting, exerting an increasingly strong influence on the functional structure of cities. This phenomenon is often associated with revitalization, through which degraded post-industrial and other buildings are transformed into cultural institutions, clubs, restaurants, concentrating activities in the afternoon, evening and night. The sphere of nocturnal consumption shapes public space, generates light and noise pollution and related social conflicts. Some of this has to do with the fertilization of cities, manifested, among other things, by cyclical light-and-sound evening events (Benett et al., 2014; Cudny, 2016). Both light and noise pollution can also affect non-urban areas (including naturally valuable areas), even at a distance of 320 km from a city, in the case of so-called urban glow (Olsen et al., 2014).

In the European Landscape Convention (ECC), landscape is defined as 'an area perceived by people, whose character is the result of the activities and interactions of natural and/or human factors'. It is considered a key element in the well-being of society as a whole and of individuals, and its protection and planning carries responsibilities for everyone. Landscape is experienced universally and therefore affects the quality of life of people wherever they are: in urban and rural areas, in naturally valuable and degraded areas, in special and ordinary, "everyday" places. As the ECC supplementary reports demonstrate, the perception of landscape is multisensory. Sound and smell, as well as touch and taste, contribute to people's positive or negative overall assessment of landscapes and influence quality of life (Landscapes and individual and social well-being, 2003; Landscape and sustainable development, 2006). Landscape enriches and develops sensory experience. Poverty of experience is associated with reduced quality of life. Contributing to the development of high-quality landscapes in order to improve the quality of life of Europe's citizens has been identified as a primary objective of the ECC (Landscape and sustainable development, 2006). Landscape is therefore shaped by light as well as by darkness, sound and silence, all of which influence its perception. Quiet and nocturnal landscapes, however, remain on the margins of scientific interest in the traditional landscape research stream. Research is dominated by issues of noise and light pollution (e.g. Buxton et al., 2020; Halferk & Jerem, 2021; Willems et al., 2022; Yu et al., 2023). Rarely has attention been paid to the interaction of sound and lighting in the context of landscape perception (Radicchi & Henckel, 2018; Flores-Villa et al., 2023). However, as early as the beginning of the 20th century, the Finnish geographer J. Granö considered the human-perceived landscape based on sensory impressions of the immediate surroundings as an object of interest for geographers (Granö, 1997). He considered auditory phenomena to be a highly significant factor forming the context of landscape perception in the zone of close contact. These consist of tones, sounds, noises and harmonies/disharmonies.

He also drew attention to landscape lighting as an element of visual phenomena with different qualities (including glows, flickers, shimmers). According to him, landscape photology is useful for describing the distribution of artificial light. Granö pointed out the need to take the perception factor into account in environmental planning and management (Wojciechowski, 2008).

A few years ago, Wartman et al. (2019) noted that silence and dark skies are ideal topics with which to illustrate the essence of landscape research

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as multidisciplinary. It is crucial to recognize how people perceive the landscape. To date, however, the conservation of quiet and dark skies (noise and light pollution) have rarely been addressed together, despite their interplay of potential cumulative effects (Buxton et al., 2020).

A quiet landscape is a landscape characterized by the presence of silence, devoid of noise pollution. However, silence is a difficult phenomenon to define. It can be understood as the absence of sound, although such a state only occurs in a vacuum, outside the realm of human life. In this understanding, silence in the world does not exist (Szumidło, 2015). However, humans experience silence in opposition to noise. The interest in quiet landscapes stems not only from the threat of noise, but also from the development of soundscape studies. In light of the ISO 12913-1:2014 standard, the soundscape concept focuses on the interrelationship between sound, person and environment, both in space and time. It is not so much the sounds themselves that are important, but the context of their perception, through which a holistic approach is presented that treats sounds as a resource (rather than a waste) and an object of perception. Numerous tools exist to reduce noise, including noise standards, which are implemented in national laws. Unfortunately, few of them address the protection of areas where noise is hardly perceptible or absent. The Directive of the European Parliament and of the Council of 25 June 2002 introduces the concept of quiet (quiet) areas within agglomerations (where there is no exposure to noise from any source) and in open country outside cities (where there is no disturbance by traffic, industrial or recreational noise). The document stresses that the body responsible for the designation of quiet areas and the indicator showing the noise limit values in that area is determined by the Member State concerned. The 2020 Environmental Noise in Europe report proposes noise limits in these areas (below 55 dB Lden) and a difference in noise levels in quiet areas and neighbouring areas (between 6 and 15 dB). It is also recommended that these areas should be as much as possible biologically active (green areas) and publicly accessible (public). Proximity to residential areas is important. The report also shows that the vast majority of countries have legal definitions of quiet areas and criteria for their designation. Of these, as many as 60% have designated at least one quiet area in their territory and are taking measures to protect the acoustic climate in there. The practice of designating quiet areas has been presented for Sweden, among others (Cerwen, 2019).

Edensor (2013) noted that a nocturnal landscape with its lit and dark areas has different characteristics than a daytime landscape and is perceived in very different ways than a landscape illuminated by daylight. In the dark, we become more aware of the landscape as a mixture of effects. The nocturnal landscape allows for an alternative experience of the landscape, an appreciation of other landscape features, especially those perceived through the senses of smell, hearing and touch. These enrich the experience of space and give a sense of the vitality of the landscape. Sounds are clearer, heighten the impression of depth and trigger the imagination (Dunn & Edensor, 2023). In areas of dark skies (including the Galloway Forest Dark Sky Park in southern Scotland), a sense of silence is felt. The perception of the nocturnal landscape is thus conditioned by the activation of the various senses, associated with the absence of natural light. Sight in the dark tends to give way to the other senses, which provide a sense of place and allow orientation in space. In a nocturnal landscape, we go from being observers of the view to becoming part of it, 'sinking' into it, making it more mysterious to us (Frydryczak, 2020). The landscape is a whole with the sky, and the perception of a starry sky is an experience of light. However, the nocturnal landscape can vary depending on the arrangement of the celestial bodies in relation to the Earth (phases of the moon, arrangement of stars, visibility of planets and comets, meteor swarms), the time of night and the weather. Under natural conditions, the nightscape is characterized by low light and cyclical variability. The dominant source of light is the Moon, whose phases cause periodic variation in brightness in the nightscape. During its fullness, light intensity does not exceed 0.3 lux. In areas with high levels of light pollution, light intensity in brightly

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lit areas ranges from 5 to 200 lux. The degrading effect of lighting is strongest in urban landscapes (urbanized areas), where there is pervasive light chaos in public and private spaces. Artificial outdoor lighting disturbs the perception of the landscape (including the silhouette of the city as perceived from a distance). Light pollution degrades the night sky, an important part of humanity's cultural heritage (Dunn & Edensor, 2023; Edensor, 2013; Gallaway, 2010). In light of the La Palma Declaration (2007), it is necessary to include the nocturnal dimension of the landscape in the European Landscape Convention, given that the sky panorama is a key factor in the physical, mental and spiritual well-being of individuals and societies.

The European Green Deal identified light pollution as a type of pollution requiring monitoring (Zielinska-Dabkowska, 2022). Light pollution was on the agenda of the Czech presidency of the European Union in 2022. A report was commissioned at the time, listing 18 of the 32 European countries with some form of national legislation. More and more countries around the world are implementing effective tools and legal solutions to rationally illuminate their surroundings after dark. In some countries, the initiative has been taken by social activists and communities of institutions or organizations wishing to demonstrate the growing scale of the problem of artificial light pollution. Under the auspices of the International Dark Sky Association (IDA, DarkSky International), international dark sky communities are being established. This is driven by a concern for the local night sky landscape, the need to save electricity by upgrading the existing outdoor lighting network, to minimize the harmful effects of light pollution on residents' health, to bring the aesthetic and educational value of the night sky to the local community and to develop astrotourism (Dunn & Edensor, 2023; Iwanicki, 2019). According to the Dark Skies Advisory Group, 309 different types of dark sky conservation areas have been designated worldwide. These include areas protecting astronomical observatories, dark sky parks, cultural heritage areas, dark sky reserves, dark sky communities and others.

A TNS Poland report on noise, odour and light pollution was published in 2015. It presented the results of a survey among a representative group of Poles, which showed that as many as 95% of respondents had not heard of light pollution. Is public awareness currently at the same level? Is it possible to protect nocturnal and quiet landscapes? Is it necessary to educate the public before various protection tools are applied?

The research was mainly directed at identifying the awareness of the young generation about the importance of nocturnal landscapes and light and noise pollution and their preferences for protection against these threats. In addition, the legal conditions for landscape protection in Poland were recognized, with reference to protection against noise and light pollution.

MATERIALS AND METHODS

The aim of the survey was to identify the opinions of schoolchildren and students regarding awareness of light and noise pollution. The survey was conducted in 2023. The respondents were students of one of the secondary schools in Lublin and students of the Maria Curie-Sklodowska University. They were taken as representatives of young people – a group responsible in the future for decisions concerning the management of space and thus the quality of the landscape. This social group is of interest to various researchers, also in the context of landscape preferences (e.g. Bernat et al., 2022; Hami & Abdi, 2021; Li et al., 2021; Liu et al., 2021).

The survey was conducted in the form of a questionnaire, both in a traditional (paper) version and using a GoogleForms. It included both open-ended and closed-ended, single-choice and multiple-choice questions. Students received an e-mail invitation to participate in the survey. Only those who gave informed consent were allowed to participate. High school students, on the other hand, with the consent of their teachers and their own, were asked to fill out a questionnaire distributed in paper form in geography

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classes. The students represented the majors of spatial management, tourism and recreation, and geography. A total of 115 respondents voluntarily took part in the survey (78.3% students, 21.7% high school students). Due to the limited participation of high school students, the results of the survey were combined with the students' responses. The vast majority of respondents were residents of a city with more than 100,000 inhabitants (56.5%). The remainder of the survey respondents were residents of medium-sized towns (20,000–100,000 inhabitants) – 5.2%, small towns (up to 20,000 inhabitants) – 10.4%, and rural areas – 27.8%. Participants were informed about anonymity and the fact that the results of the survey would be used for research purposes.

The results of the survey were additionally compared with the TNS Poland report prepared in 2015 on behalf of the Ministry of Environment. The report dealt with noise, odour and light pollution. A representative group of 1,022 Polish residents aged 15 and over took part in the TNS survey. Respondents aged 15–29 (including pupils and students) accounted for 23%.

Questions from both surveys were only partially repeated. Questions relating to the nightscape were added to their own questionnaire, while questions relating to odours were omitted. As a result, the questionnaire used in the study consisted of 13 questions and a metric. The results of the study are presented in graphs. In the case of the comparison graphs, the responses of students and pupils were signed as Respondents, while the responses of TNS survey participants were signed as Report.

In addition to the survey research, a content analysis of documents, reports and legislation was carried out with regard to noise and light pollution protection. In particular, attention was paid to quiet areas and dark sky areas. In addition, an analysis of scientific literature dealing with the indicated issues was carried out.

RESULTS

The first part of the survey concerned the protection of the nocturnal landscape. Respondents were asked what they associate the nightscape with (open question). The vast majority of answers referred to the night sky, the stars and the visibility of the moon (42%). A large proportion of respondents also noted the presence of artificial light in the nightscape (30%). A large number of responses associated the nightscape with peace and quiet at night (16%). Responses categorized as "other" mainly referred to meeting friends, attending events and walking at night.

The next question sought to assess the importance of the nightscape for respondents. For the majority of respondents, the nightscape has a high value (43.5%). In contrast, it was rated as very high by 29.6% of respondents and medium by 21.7%. Only 5.2% (6 people) declared that the nocturnal landscape has a low or very low value for them. It can also be seen that the importance of the nightscape is dependent on where one lives (Fig. 1).

Respondents were also asked their opinion on the protection of the nocturnal landscape. As many as 73.9% of respondents believe that the nocturnal landscape should be protected.

The next question was related to the one asked in the TNS study. The results clearly proved that the respondents do not know what light pollution is (Fig. 2). Research conducted among students and schoolchildren shows a completely different result (Fig. 3). Respondents know what light pollution is. The majority associate it with too much artificial light (59%), as well as a lack of visibility of the night sky (22%). Respondents also point to the nuisance of video screens and illuminated advertising.

In the Report, respondents were given the opportunity to state whether the problem of excess lighting at night is a major problem for them. According to the majority, it is not a problem. Some said it was a problem in Poland and/or worldwide and only a minority said it was a problem where they lived or in the immediate

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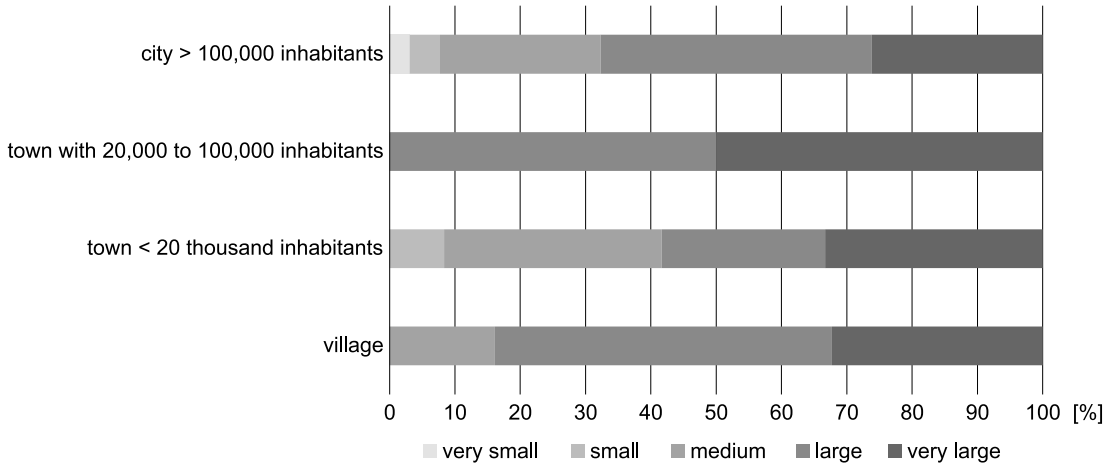

Fig. 1. Value of the nightscape for pupils and students
Source: own elaboration based on survey.

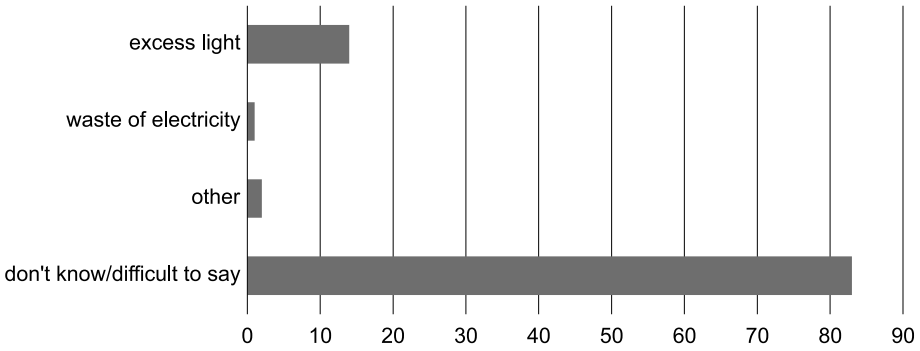

Fig. 2. Associations related to light pollution
Source: TNS Poland report (2015).

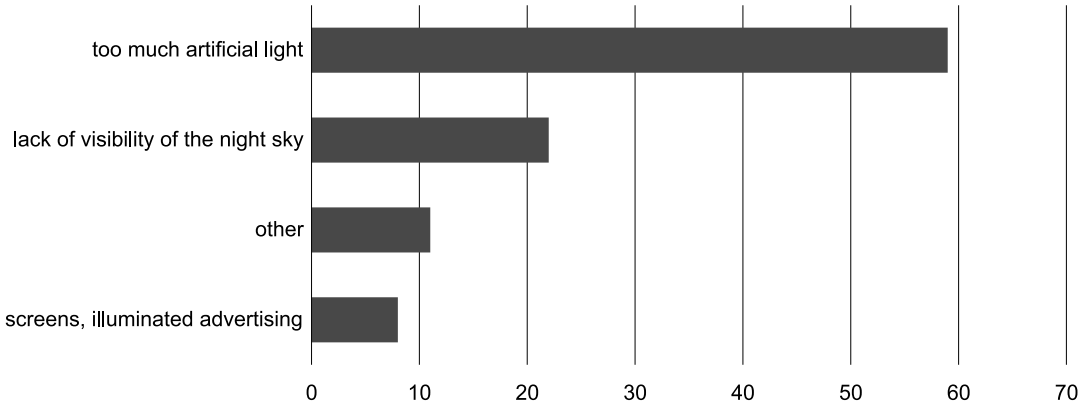

Fig. 3. Pupils' and students' associations with light pollution
Source: own elaboration based on survey.

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vicinity. In the survey of pupils and students, the distribution of answers was also different. The majority of votes were given to the answer "hard to say". It is not a problem at all for 26.1% of the respondents. 20% thought it was a problem worldwide and 14.8% in Poland. 23.5% of respondents considered that the problem is noticeable in the immediate vicinity of their place of residence, and 7.8% in the locality in which they live. The results of the survey are compared with the results presented in the Report in Figure 4.

The research shown in the Report points that excess lighting does not bother respondents. Most responses were for the options „never" (56%) and „rarely" (32%). It can also be seen that excess lighting never or rarely bothers pupils and students (Fig. 5).

The next question concerned the possible consequences caused by excessive lighting at night. Respondents were asked to identify, in their opinion, the three most serious consequences of this phenomenon. Among the most frequent answers were waste of energy, negative impacts on human or animal health. In addition, students and pupils noted effects in the form of a change in the character of the landscape (Fig. 6). Probably this was related to the fields of study represented by the students.

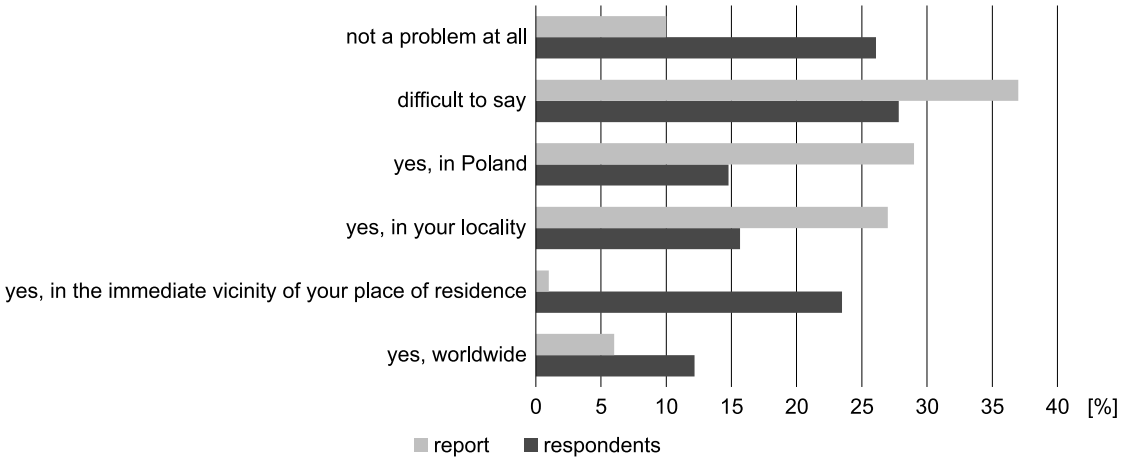

Fig. 4. Opinions regarding excess lighting at night
Source: own compilation based on survey and TNS Poland Report (2015).

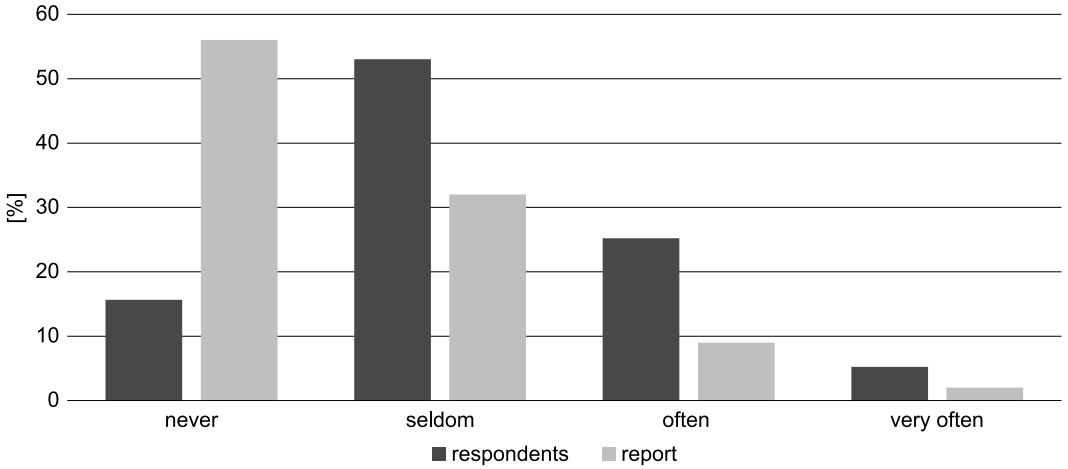

Fig. 5. Frequency of nuisance of excessive lighting at night according to pupils and students
Source: own compilation based on survey and TNS Poland Report (2015).

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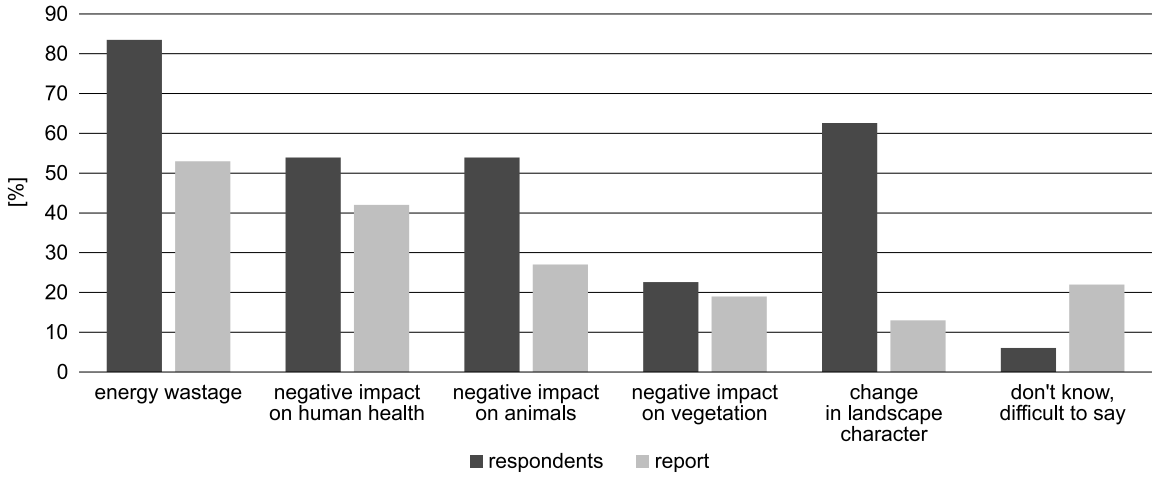

Fig. 6. Perception of the consequences of excessive lighting
Source: own compilation based on survey and TNS Poland Report (2015).

Another question was related to the solutions respondents would be willing to accept in order to reduce light pollution. The largest number of responses concerned a ban on the illumination of large-scale advertisements at night, the replacement of lamps that direct light only downwards, or lamps equipped with motion sensors. Furthermore, the results of the Report indicate that a large proportion of respondents do not want to reduce light pollution in their neighborhood (Fig. 7).

In the second part of the survey, respondents were asked to list their own associations with noise. The majority (more than 40%) associate noise negatively, causing discomfort, anxiety, nervousness or headaches. In addition, respondents particularly highlighted sounds associated with traffic, car traffic (34%). The "other" category included responses referring to loud parties, conversations, street noise.

In the next question, respondents were asked whether noise at night was a major problem for

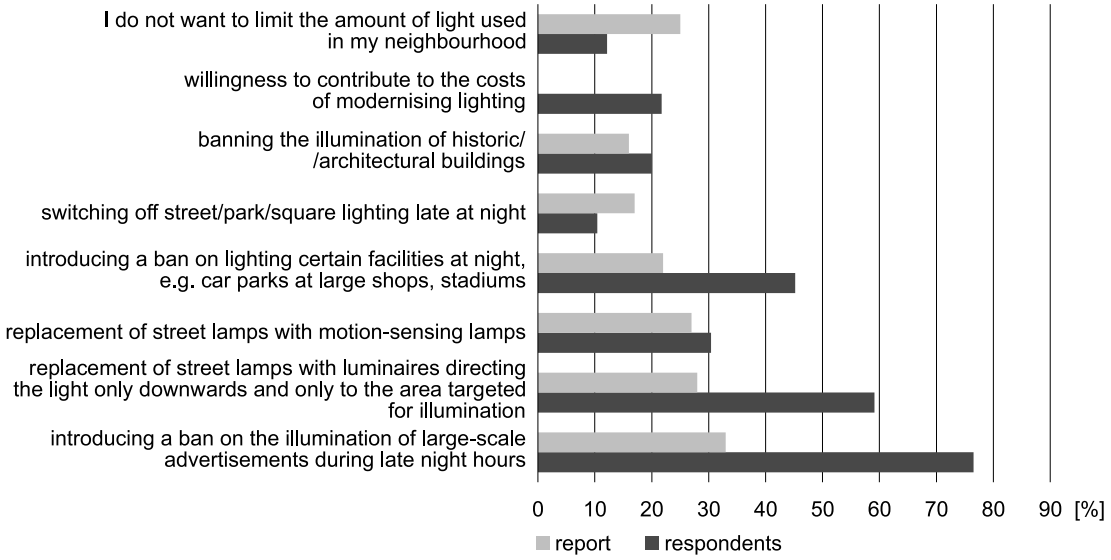

Fig. 7. Proposed solutions to reduce light pollution
Source: own elaboration based on survey and TNS Poland Report (2015).

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them. This was a multiple choice question. Most responses were directed at the problem of noise in the immediate vicinity of the respondent's home (34%) and in the world (31%). Only 2% of respondents felt that noise was not a problem (Fig. 8). On the other hand, the results of the report indicate that noise is most often a problem in Poland and worldwide. In addition, it should be noted that a significant number of students marked the option 'hard to say'.

Respondents were then asked about the annoyance of noise. They were able to state whether noise in everyday life bothers them very often, often, rarely or never. The majority are rarely bothered by noise. It is often a nuisance for 30% of pupils and students and very often for 16% (Fig. 9). In the case of the TNS survey, the significant proportion of "never" responses is noteworthy.

The next question concerned the consequences associated with the presence of noise at night. Respondents were asked to identify the three (in their opinion) most serious consequences of this phenomenon. The most frequently noted were the negative impacts on human health (89%) and on animals (84%). A sizable proportion of respondents (44%) highlighted the change in the character of the landscape. There are fewer indications (less than 20%)

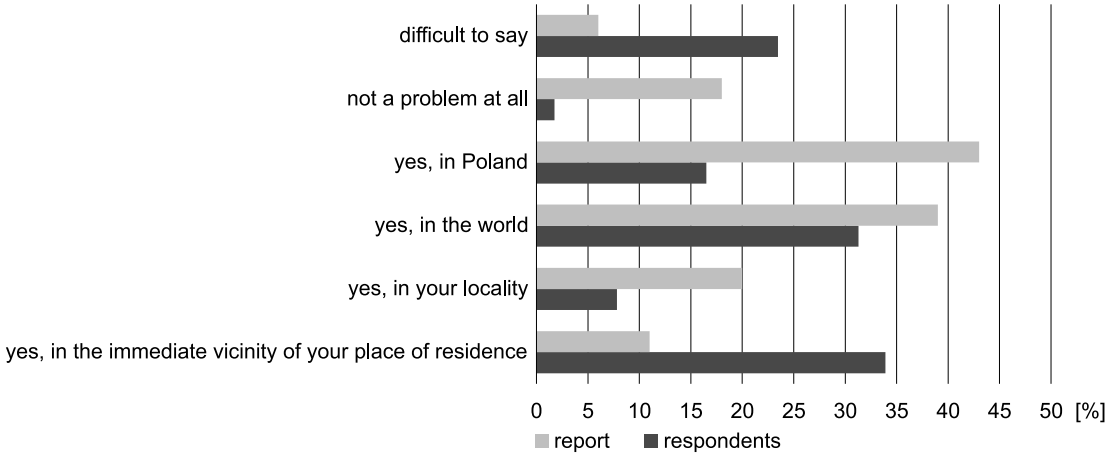

Fig. 8. Perception of the noise problem in relation to scale
Source: own elaboration based on survey and TNS Poland Report (2015).

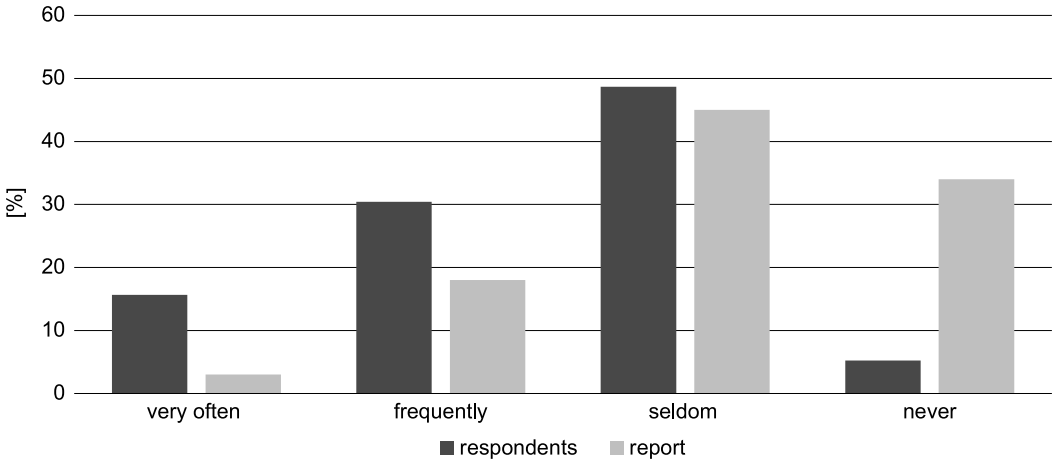

Fig. 9. Assessment of noise nuisance
Source: own elaboration based on survey and TNS Poland Report (2015).

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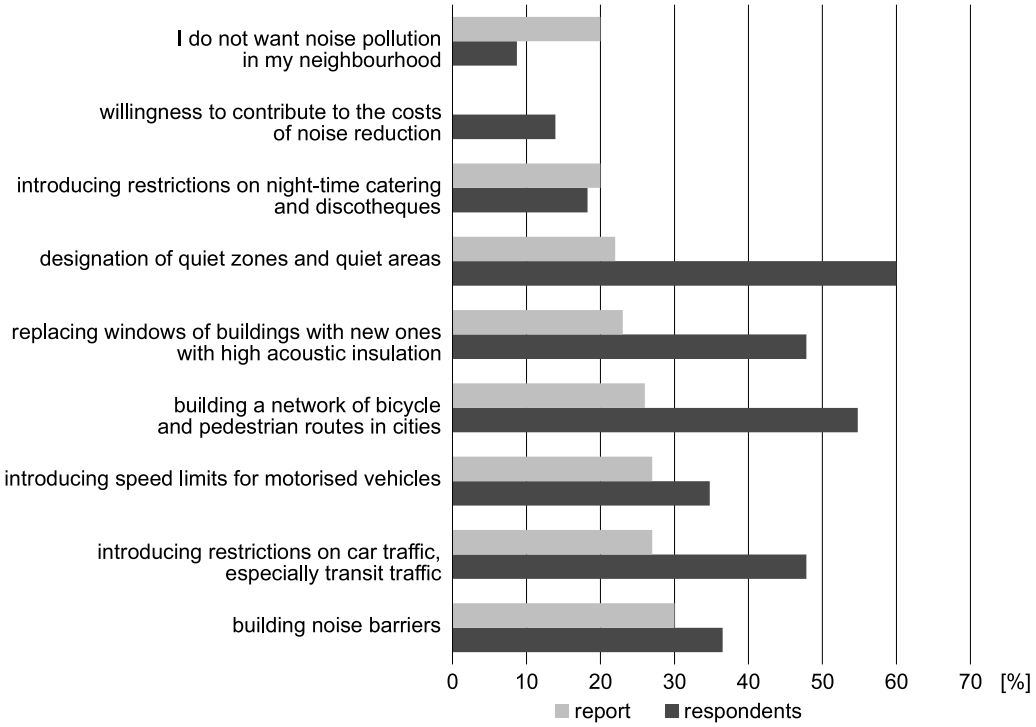

Fig. 10. Proposed solutions for noise reduction
Source: own elaboration based on survey and TNS Poland Report (2015).

of energy wastage and negative impact on vegetation. It should be noted that the TNS Report did not provide a response to this question, making comparative analyses impossible.

The last question of the questionnaire was related to solutions that the surveyed students and pupils would be willing to undertake to reduce noise (Fig. 10). Most responses related to designating quiet zones and quiet areas (60%), building a network of bicycle paths in cities (55%) or replacing building windows (48%) and introducing car traffic restrictions (48%). 9% of respondents say they do not want noise restrictions in their neighborhood. In contrast, building noise barriers (30%) is most frequently indicated by participants in the TNS survey. The proportion of respondents who do not want to reduce noise in their neighborhood is also relatively high at 20%.

DISCUSSION

Quiet and nocturnal landscapes are not protected in Poland, although according to respondents they should be, which is related to increasing noise and light pollution, posing a threat to the life and health of humans and other living organisms. Admittedly, there are some instruments in the form of legal forms of protection, with prohibitions in force (the largest in national parks), as well as binding permissible noise levels and the optional institution of quiet areas in agglomerations and outside agglomerations. However, the latter instrument is not used by local authorities. It should be noted that in 2022, some recommendations were developed for the identification of quiet areas in Poland (Good practices for creating quiet areas). In contrast to noise protection in Poland, there are is no legal basis for the development and implementation of an outdoor lighting policy in the current Polish legislation (Memorandum). Light pollution is not

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categorized as environmental pollution in Polish law. On the other hand, on the initiative of social scientists, 7 dark sky areas have been designated, including 2 parks: Izerski and Bieszczadzki. Dark sky areas, however, are not legal forms of protection and are mainly designated in naturally valuable areas and rural areas. Light and noise pollution, however, mainly concerns urban areas, while quiet and nighttime landscapes are mainly associated with naturally valuable areas (including legally protected areas) and rural areas and urban green areas.

In 2023 Sopotnia Wielka was announced by Dark Sky International in the USA, the first location in Poland with Dark Sky Community status. According to a report prepared by Light Pollution Think-Tank in 2023, light pollution is widespread and increasing in Poland (Light Pollution). This threat has also been identified for national parks, especially those adjacent to agglomerations. Unfortunately, it is not monitored by state services. Counteracting light pollution in Poland is currently the domain of NGOs and individual municipalities, which may have a positive impact on its reduction, but only on a local scale.

As Iwanicki (2019) rightly notes, taking care to maintain a nocturnal landscape undisturbed by artificial lights in naturally valuable areas is a widely understood goal. However, the introduction of similar solutions in urbanized areas can be met with a lack of understanding from both local communities and local governments. This has to do with two main factors. The first is the perception that the installation of outdoor lighting in streets, parks and squares is a sign of civilizational development. A brightly lit public space is often seen as synonymous with safety among drivers, but also among passers-by and residents, especially in busy areas and neighbourhoods with a bad reputation. Unfortunately, the negative effects of excessive lighting are often not recognized by local authorities (Machnowska, 2023). Taking light pollution into account in urban planning could assist cities in reducing it. It is important to inhibit urban sprawl associated with new sources of artificial light and the distribution of individual functions in order to prevent the location of specific services and productions involving intensive lighting, mainly in the vicinity of housing and valuable natural areas. In addition, local authorities have the opportunity to apply principles related to sustainable outdoor lighting to the areas they own and manage.

One has to agree with Szlachetko (2023a) that it is necessary to include 'light pollution' among the categories of environmental pollution listed in the Environmental Protection Law. The consequence of this is, among other things, the establishment of permissible levels of artificial light emissions for individual zones, differentiated according to the degree of nature protection, the needs of users and residents, and the functions and use of the area in question. In addition, it is necessary to define a reference methodology for artificial light emissions, which will enable emission control and ongoing monitoring of outdoor lighting. It is also important to designate dark sky protection areas (as well as quiet areas), which will not be adversely affected by artificial light emissions due to their natural and landscape values, and to extend the catalogue of obligatory elements of the local plan provided for by the rules on the location, modernization, extension and construction of outdoor lighting infrastructure.

In the current state of law, a recommended tool to counteract light pollution is the so-called advertising (landscape) resolution and the creation of cultural parks. The strength of the resolution as a tool against harmful light emissions is the possibility of zoning. The biggest drawback of the resolution, however, is its optional nature, which affects the negligible interest of municipalities in adopting these acts of local law. The creation of cultural parks, on the other hand, allows the use of various tools to protect the historic cultural landscape, including from advertisements (Marcinek et al., 2021).

Despite the lack of a 'hard' (statutory) legal basis for counteracting light pollution, the strategic and planning documents available to the municipality make it possible to implement certain measures to reduce harmful light emissions from outdoor lighting infrastructure devices (Machnowska, 2023). However, their use depends on the awareness of designers.

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Therefore, one has to agree with Zielinska-Dabkowska (2022) that education is crucial to reducing light pollution. This should not only be extended to adults (including designers, officials), but also to the youngest generation. A sustainable outdoor lighting policy aesthetises public space, brings out local identity, creates a unique climate for the city, and is aimed at creating functional and attractive spaces, while making rational use of resources and protecting the night-time landscape by reducing light pollution. These measures will contribute to improving the quality of life and creating user-friendly spaces (Dunn & Edensor, 2023). The night-time illuminations of objects used must be created for a specific place, taking into account its topography, climate, urban composition, inhabitants, characteristic smells, and sound that make up the surroundings (Zienowicz et al., 2016). The inspiration for creating nocturnal landscapes should be to enhance the views that are observed during the day.

Due to the limited possibilities to protect against light pollution in Poland, the discussion primarily addressed this problem. However, it should be noted that it is important to link it to noise protection. This was pointed out, among others, by Buxton et al. (2020). Their study showed that park areas in urban areas had the highest probability of co-occurring high light and noise exposure, while park areas with varying light and noise exposure were most often found within 5-20 km of urban areas and in parks with roads.

Reductions in human activity during the COVID-19 pandemic led to a marked decrease in light pollution (Bustamante-Calabria et al., 2021) and a reduction in environmental noise (Steele & Guastavino, 2021). Silence became a signature experience of the times. A study of students found that during the pandemic period there was a greater appreciation of the qualities of nature and landscape and their healing effects, also associated with the presence of silence (Bernat et al., 2022). However, after the lifting of the pandemic in 2022, the night sky in Poland was on average 147% brighter than the natural sky, and in cities even several thousand brighter (Light Pollution). This indicates a growing threat, which the pandemic has contributed only marginally to reducing.

In protecting quiet and nocturnal landscapes in Poland, it is worth drawing on the experience of other countries and cities. Among others, the measures implemented in London deserve special attention. Already in 2014, the London Plan required development policies to manage noise by improving acoustics and promoting areas of good acoustic quality (including quiet areas). The document stipulates that local authorities and others should have guidance on the identification and designation of quiet areas, as well as their protection. Noise management includes not only counteracting the negative effects of already existing noise, but above all improving and protecting places with favourable acoustic conditions through a soundscape approach. In addition, the obligation to identify and protect quiet areas is imposed by the national planning policy framework. It should also be noted that the City of London Noise Strategy, as recommended by the World Health Organization (WHO), identified areas where daytime noise levels did not exceed 55dB LAeq. This requirement was only met in a few open spaces in the city. Using a study by the city of Amsterdam, which showed that an area can be considered 'quiet' if the noise level there is about 6dB lower than its surroundings, areas were designated where the typical daytime noise level is about 65 dB LAeq (10 dB more than the WHO recommendation). Despite exceeding the recommended noise levels, these places were still considered by users to be quiet and peaceful. Areas of particular interest are river valleys, squares, parks, open spaces as sanctuaries of peace and balance (tranquillity). Spatial planning is intended to promote zones of tranquillity and areas of relative balance and special soundscapes (areas of relative tranquillity or special soundscape interest). Already in 2010, a study 'Quieting Open Spaces' was prepared for London, including recommendations for the design of quiet areas. Noise was addressed here as a landscape problem, due to its significant impact on the perceived character and quality of the landscape (Stevens, 2010).

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A Light + Darkness in the City lighting strategy has also been developed for London. It aims to provide standards for artificial lighting using a creative, holistic and intelligent approach where light and darkness are better balanced to meet both functional and aesthetic needs. The strategy also outlines how light can be used to reinforce the city's identity as a global business centre, while respecting its heritage. It also aims to encourage walking and cycling after dark by creating welcoming and safe public spaces. It has been proposed to preserve natural darkness in sensitive areas (including church cemeteries, parks and gardens and along the Thames riverbed), reduce the impact on biodiversity and reduce light pollution, thus providing visual tranquillity, a sense of quiet, privacy and intimacy. It also emphasized the need to illuminate landmark buildings (by adjusting the intensity, contrast, colour and scale of light), which will help to create a more comprehensible nightscape and enhance the accessibility of public spaces and the display of the city's heritage. Views of illuminated bridges over the Thames are being promoted as part of the 'Illuminated River' project, making them an integral part of the landscape after dark, creating its character. Similarly, a sustainable outdoor lighting policy is being pursued in Copenhagen as part of a sustainable policy tailored to the needs of people, the environment and the economy, shaped in the city's climate change adaptation plan, lighting strategy and operational outdoor lighting masterplan (Szlachetko, 2023b).

CONCLUSIONS

The survey showed that public awareness of light pollution is increasing. A nocturnal (and quiet) landscape is of high value to respondents. Light and noise pollution are seen as both a local (in the vicinity of where they live) and global problem. However, light pollution is not a problem for some respondents. It causes, among other things, waste of energy and degradation of the landscape (change of landscape character), while noise negatively affects human and animal health. Therefore, the nocturnal (and quiet) landscape should be protected by law according to a large majority of respondents.

In order to reduce light pollution the largest number of responds concerned a ban on the illumination of large-scale advertisements at night, the replacement of lamps that direct light only downwards, or lamps equipped with motion sensors. When it came to solutions that students would be willing to take to reduce noise, the most responses related to designating quiet zones and quiet areas, building a network of bicycle paths in cities or replacing building windows and introducing car traffic restrictions.

Currently, Poland lacks direct instruments for the protection of nocturnal landscapes. On the other hand, in the case of quiet landscape there are some tools (e.g. quiet areas), but they are not used so far.

It is necessary to link landscape protection with the protection of the night sky and with the protection of quiet areas (protection from light pollution and protection from noise), as exemplified by, among others, the urban policy of London. Currently in Poland, the protection of quiet and nocturnal landscapes can result from optional advertising (landscape) resolutions and the creation of cultural parks. Unfortunately, the use of these instruments has so far received little attention from local authorities. Therefore, public education is necessary, involving not only adults (including officials), but also the youngest generation. Furthermore, it is important to take into account the qualities of quiet and nocturnal landscapes in design and planning.

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