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# SOUND IN LANDSCAPE: THE MAIN RESEARCH PROBLEMS

## *DŹWIĘK W KRAJOBRAZIE. GŁÓWNE PROBLEMY BADAWCZE*

**Key words:** geography, landscape perception, soundscape, Lublin region

**Słowa kluczowe:** geografia, percepcja krajobrazu, krajobraz dźwiękowy, Lubelszczyzna

### Abstract

At present, various initiatives related to the study of soundscapes/acoustic landscapes are developing around the world. Interdisciplinary soundscape studies were initiated in the 1970s by Raymond Murray Schafer and his *World Soundscape Project* research team. The goal of the present paper is to identify, from the perspective of a geographer, the key research problems related to sound in landscape. Based on the literature, the most important concepts are defined and acoustic ecology research in Poland is described. The empirical section of the paper presents the results of a questionnaire survey conducted at the beginning of 2013 among the students of UMCS in Lublin (mainly Geography and Tourism/Recreation students). The final part of the paper points out the challenges for soundscape research and focuses on the practical dimension of the survey as it reflects the social role of geography. The possibility to study the sound in landscape offers new prospects for the development of geography.

### Streszczenie

Współcześnie obserwujemy na świecie rozwój inicjatyw w zakresie badań krajobrazów/pejzaży dźwiękowych (soundscape) zapoczątkowanych w latach 70. XX w przez kanadyjskiego muzykologa R.M. Schafera. Celem artykułu jest rozpoznanie, z perspektywy geografów, głównych problemów badawczych dotyczących dźwięku w krajobrazie. Na podstawie literatury zdefiniowano najważniejsze pojęcia (m.in. audiosfera, krajobraz dźwiękowy) a następnie scharakteryzowano badania ekologii akustycznej w Polsce. W studiach empirycznych przedstawiono wyniki badań ankietowych przeprowadzonych na początku 2013 r. wśród studentów UMCS w Lublinie (głównie kierunku geografia oraz turystyka i rekreacja). Na koniec wskazano wyzwania dla studiów nad dźwiękiem w krajobrazie. Zwrócono także uwagę na praktyczny wymiar przedstawionych badań, odzwierciedlający społeczną rolę geografii. Możliwość badań dźwięku w krajobrazie to nowe perspektywy rozwoju geografii.

Geography is a science dealing with the spatial variation of physiographic and socio-economic structures as well as their interrelationships; it uses maps as a presentation method and analytic tool. According to N. Baranski (1957: 90), “geographical thinking denotes, firstly, territory-linked thinking that uses the map as a tool for analysis and, secondly, comprehensive thinking, not confined within a single element or branch; in other words, thinking that plays chords instead of single notes.” Geographers distinguish between various elements of space and classify them while seeing them as part of a whole; they also indicate their origins and occurrence and present them on maps. The subject of geographical studies is the geographic environment associated with landscape, particularly its complex structure and functioning.

Geographers, particularly those representing “new cultural geography”,<sup>1</sup> which focuses on people as beings capable of reflecting, judging and evaluating space, participate in acoustic ecology (soundscape ecology) studies, an interdisciplinary research field focusing on the interrelationships occurring between human beings and their environment through sounds (the perception and the historic-social aspect). Sounds, referred to as a neglected subject of geographical studies although equally important as the sights (Smith, 1997), play an important role in experiencing and remembering places (Pocock, 1989). English-language companions to humanistic geography/cultural geography use terms such as *soundscape*<sup>2</sup> and *sonic/music geography* (e.g. Smith, 2000; Dalbom, 2006; Saldanha, 2009). In scientific literature, the term *soundscapegraphy* is also used to denote a description of soundscape taking into account the physical, mental and social factors of the sonic environment (Hiramatsu, 2003). For more than 10 years, soundscape studies have also been conducted in Poland, as evidenced by the growing number of publications. Although soundscape research has become popular in geography only during the last few years, it should be remembered that the origins of the study of sound date back to the 1800s. Thanks to the artistic descriptions of the travels made by Alexander von Humboldt, the founder of geography, we can get acquainted with the world of sounds as an integral part of every country and region. In Humboldt’s publications,

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<sup>1</sup>“New cultural geography”, which sees cultures as a holistic, comprehensive and dynamic phenomenon, has focused on everyday life, ordinary objects and problems rarely discussed so far. From the mid-1960s, perception geography research has also been conducted; it is a separate field of research based on behavioural geography, partially on humanistic geography as well as other social sciences dealing with human spatial behaviour. Perception geography focuses on human images, attitudes and preferences with regard to the environment. According to a leading representative of this research approach, Y.F. Tuana (1987), human space is organised almost exclusively based on sight while the other senses broaden and enrich the visual space. With its brightness and dimensions, the visual space is strikingly different from the diffuse auditory, tactile and motoric spaces. An object or place attains a specific sense of reality if we experience it totally, with all senses as well as active and reflective thinking.

<sup>2</sup>The term *soundscape* was coined by a Canadian musicologist and composer R.M. Schafer. In the late 1960s and early 1970s, he opposed the onslaught of noise and suggested a positive approach to the sounds around us, describing them as a symphony of landscape co-originated by human beings.

we can find descriptions of special sound phenomena (in the atmosphere, on the surface and underground) as well as attempts at providing a scientific explanation of these phenomena (e.g. Humboldt, 1959). J. Granö, a Finnish geographer from the early 20<sup>th</sup> century, recognised landscape—perceived based on the sensory properties of the immediate environment—as a valid subject of interest for a geographer (Granö, 1997). Auditory phenomena, according to Granö, are a very significant factor creating the context for the perception of landscape in the area of close contact. These phenomena consist of tones, sounds, noises and harmonies/disharmonies. Granö built bridges between science and art, indicated the need to take into account the perception factor in environmental planning and spatial management, and proposed interdisciplinary research as part of the ecology of human beings.

The goal of the present paper is to identify, from the perspective of a geographer, the key research problems related to sound in landscape. Based on the literature, the most important concepts are defined and acoustic ecology research in Poland is described. The empirical section of the paper presents the results of a questionnaire survey conducted at the beginning of 2013 among the students of UMCS in Lublin (mainly Geography and Tourism/Recreation students). A total of 208 questionnaires were completed by 126 women and 82 men residing mainly in Lublin (82 persons), in rural areas (51 persons) and other towns of the Lublin Province (39 persons). It should be stressed that the survey was conducted before the start of classes devoted to the “sound in landscape”. Therefore, the respondents should be regarded as a group of individuals whose answers were exclusively based on personal experience. The final part of the paper points out the challenges for soundscape research and focuses on the practical dimension of the survey as it reflects the social role of geography.

## **ACOUSTIC SPACE VERSUS SOUNDSCAPE**

Sound is an integral part of geographical space; it adds dynamics to space which would otherwise seem to be dead. Sound describes space and, at the same time, space constitutes an indispensable aspect of experiencing sound (Losiak, 2011). Space allows sound to manifest itself, it highlights certain qualities of sound (e.g. the tone, dynamics) and lends depth and richness to sounds. Sounds are characterised by dimensions associated with space, i.e. height, depth, length, volume. Space reveals the tone of sound and the acoustic potential manifested in reverberation. The propagation of sound depends on land relief, land cover and meteorological conditions. The perception of the quality of sounds accompanying various phenomena and characteristic of them (pitch, tone, intensity, consonances) and the perception of the movement quality of phenomena (speed, rhythmicity, dynamics, tempo) leads to a sharper perception of the outside world. A fuller understanding of the “image of the world” is impossible without the acoustic factor, including music, a carrier of aesthetic values.

According to Y.F. Tuan (1987), sound enhances the sense of space, expanding it by what we cannot see. Besides, sound adds drama to the experience of space. Sound is influenced by space through size and location; these parameters convey certain content. Sound lends a certain atmosphere to a place and is a rich source of information even though acoustic information appears and disappears very fast, making it difficult to analyse its meaning. Sound unifies, surrounds and flows into the listener, as opposed to sight which creates divisions and distinctions (Ong, 1992). While listening, we seem to be inside the phenomena we perceive. The auditory perspective is multidirectional rather than linear even if we can hear with one ear only. Sound is dynamic: it is the most variable and event-dependent of all the phenomena we perceive; it cannot be stopped and examined separately from its source and the forces that have created it. The context of sound is important. Sound enables us to locate its source (the object producing the sound), describe the movement of the object, the changes occurring in the object or phenomenon and its environment, and identify the characteristics of the object (size, elasticity, weight). According to one of the supplementary reports of the European Landscape Convention, the sound, alongside the smell, touch and taste, contribute to the appreciation or rejection of landscapes (Landscapes and individual and social well-being, 2003).

Polish researchers use various terms to describe phenomena associated with sound in space, e.g. audiosphere, phonosphere, melosphere, sonosphere,<sup>3</sup> aural horizon, soundsphere, acoustic landscape, soundscape, acoustic space, phonic space, the sound layer of landscape, acoustic climate (Bernat, 2008; Misiak, 2009). The first four concepts share the root, *sphere*, which denotes a spherical space extending around the listener, with a distinct centre and peripheries. The prefixes, *phono-*, *audio-*, *melo-*, and *sono-* indicate the relationship with sound and auditory activity. According to M. Gołaszewska (1997), audiosphere is the acoustic environment examined from the perspective of human perception abilities, and the following kinds of audiosphere are distinguished: colloquial (all the sounds of the immediate, domesticated and acoustically predictable environment); organised (set of various environmental sounds perceived by the listener as harmonious); specialised (sounds specific to a particular space, characteristic of a given environment). Sonosphere refers to the sonic qualities, melosphere – musical qualities and phonosphere – phonic qualities (Misiak, 2009).

Acoustic space, according to H.M. McLuhan (2001), is space that has no centre and no boundary, as opposed to strictly visual space. Acoustic space is organic and integral, perceived thanks to the harmonious balance of all senses. R. Losiak (2007) observes that the acoustic space of a city is where the everyday and functional experience occurs. The experience of the audiosphere builds a sense of closeness or alienation; it makes some phenomena seem more familiar or distant. Auditory experience, as recounted by listeners, is associated with a specific place, a precisely

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<sup>3</sup>The terms *phonosphere*, *melosphere* and *sonosphere* were proposed by Gołąb who tried to introduce some order in the conceptual chaos in the field of audiosphere (as in: Losiak, 2008).

located and limited space; it also refers to specific acoustic events. The delimitation of the audiosphere seems to be distinct and clear; sound phenomena are described as belonging to, and permanently associated with, a specific place or situation. In Losiak's research, the surveyed inhabitants of Wrocław indicate places characteristic of and peculiar to the city's audiosphere as well as areas lacking acoustic distinctness, acoustically empty. The experience of the urban audiosphere is a rich mosaic of places and acoustic events, mutually superimposed and concurrent but also opposing, separated from each other.

T. Misiak (2013) remarks that sound is entangled in numerous cultural contexts, and it is impossible to examine all aspects of its impact from a single research perspective. One can refer to the design and cultivation of acoustic space. The construction of acoustic space consists of adapting it to the needs arising from the correlation between the current state of the acoustic sphere of a particular environment and the kind of activity undertaken by those using the environment. Acoustic space can be constructed from scratch, or the existing conditions can be shaped and specific solutions can be introduced into a particular sphere. The cultivation of acoustic space is about maintaining the tradition, preserving the environmental and cultural heritage that provides the context for auditory sensations, and preventing the undesirable consequences of civilisational progress in the future.

In acoustic ecology, soundscape is defined as the sonic environment, with an emphasis on the way it is perceived by an individual or society (Truax, 1999). According to R.M. Schafer (1977), soundscape constitutes a comprehensive and largely non-random structure that lends itself to conscious and creative formation; every source of sound is an instrument. Using the category of soundscape, R.M. Schafer defines the acoustic environment of a specific place, region, event or situation. The concept of soundscape encompasses not only a correlation of auditory experience with a specific place or environment but also the recognition of an individual, emotional experience of the audiosphere (Losiak, 2007). According to R.M. Schafer (1977), soundscape, perceived as an "acoustic event", is formed through the overcrowding and intermingling of many and various sound fields, each of which has a single source. When he introduced the term *soundscape*, R.M. Schafer largely relied on the traditional, visual concept of landscape (Nacher, 2010). Therefore, he described soundscape using the notions of foreground and background. According to R.M. Schafer (1976), soundscapes consist of a background, referred to as "keynote sounds", and "sound events" that can be ascribed certain meanings by a specific community. Sound events can be analysed from the perspective of their source (e.g. nature, human beings), function and social context (warning, internal, landmark, relaxing, stress-inducing, status-indicating sounds) as well as associations and symbolism. Certain sound events are sound signals, i.e. sounds that one pays special attention to. A sound signal that, for some reason, is unique, or possesses qualities of particular value to a local community, was referred to by R.M. Schafer as a soundmark. Each sound event has its spatial range, described as a sound profile or acoustic space. It is an "area over which it may be heard before it drops below the level of the ambient noise"

(Truax, 1999). Azimuth denotes the direction of a sound in the horizontal plane. The acoustic horizon is “the farthest distance in each direction from which sounds may be heard” (Truax, 1999). Sound events have a temporal dimension, i.e. a specific rhythm and tempo. Rhythms can assume periodic patterns, isorhythms, or, still wider, cycles. A soundscape can also have a hi-fi or lo-fi quality. Hi-fi refers to an environment “where all sounds may be heard clearly without being crowded or masked”, whereas lo-fi refers to a soundscape where sounds “are overcrowded, resulting in masking and lack of clarity” and perspective (Truax, 1999).

According to M. Gołąb (2011), the Polish term *pejzaż/krajobraz dźwiękowy* that corresponds to *soundscape* is not precise because it refers to sound phenomena that do not exactly meet the musicological definition of sound. The acoustic landscape comprises various utilitarian and simple “sound formulas”, stemming from the civilisation- and culture-related social communication structures that make up our everyday lives, as well as “musical forms”, in the traditional sense, constituting the effect of human artistic intentions.

From the perspective of geography, soundscape can be defined as a complex of environmental and anthropogenic elements within a naturally delimited area; this complex is a source of currently perceived sounds representing specific aesthetic characteristics and complementing the scenery with specific information (Bernat, 1999). It also constitutes an additional layer of landscape – the sound layer. Soundscape is thus construed as a whole, but it is discerned based on the variation variety of stimuli. Soundscape is an element of the information system of the geographic environment, reflecting socio-economic, cultural and natural phenomena; specific to each region, it is part of the “spirit of the place”. Therefore, it constitutes the meaning, the essence and the image of a geographical region, both rural and urban. Soundscape, i.e. a layer of landscape varying in quality and having a transient (ephemeral) nature, is an important element of natural and cultural heritage, particularly sensitive to changes associated with the development of civilisation; it should be protected and restored as an aspect of intangible cultural heritage (Bernat, 2011). Sounds that, for some reason, are unique, or of particular value to a local community, occur in nearly every environment. A strong relationship, referred to as topophophilia, may occur between a human individual and a place defined by a soundscape (Drever, 2005). Changes in the sound layer of landscape are an important indicator of landscape changes (Bernat, 2004)

At present, various initiatives related to the study of soundscapes/acoustic landscapes are developing around the world. Interdisciplinary soundscape studies were initiated in the 1970s by R.M. Schafer and his *World Soundscape Project* research team. Currently, soundscape research is conducted by representatives of numerous scientific disciplines, e.g. acoustics, cultural anthropology, architecture, philosophy, geography, medicine, musicology, communication studies, psychology, sociology.

They cooperate mainly within the World Forum for Acoustic Ecology (WFAE) established in 1993.<sup>4</sup>

An interdisciplinary project *Soundscape of European Cities and Landscapes*<sup>5</sup> conducted in the years 2009 to 2013 encompassed 23 countries represented by 54 experts. The main goal of the project was to work out an interdisciplinary research approach with regard to soundscapes, aimed at improving the quality and protection of the acoustic environment through legal instruments and project-based practice. As part of field workshops, laboratory studies and conferences, efforts were made to harmonise the research methods, develop common soundscape assessment indicators and identify unique soundscapes and tranquil areas. During the implementation of the project, attention was paid to the links with health, quality of life, culture (intangible cultural heritage) and economy.

In US national parks, soundscapes are protected as a valuable natural and cultural resource. The *Careggi Landscape Declaration on Soundscapes* is a confirmation of the value of soundscapes as an element of heritage.<sup>6</sup> A new research field called soundscape ecology is developing at the interface of acoustic ecology, bioacoustics, ecology of space and psychoacoustics; it focuses on the structural-functional relationships between sound and landscape (Pijanowski et al., 2011). Depending on the source of sounds, biophones, geophones and anthropophones are distinguished in soundscape ecology. Spatial and temporal dynamics of soundscapes are analysed, and human impact on natural soundscapes is evaluated. Within the various types of soundscapes (natural, sensitive, endangered, unique, recreational, representative, cultural, and everyday soundscapes), values, threats, management objectives and monitoring directions are identified as the basis for planning protection (Dumyahn, Pijanowski, 2011). For the purposes of spatial planning, sound units, the so-called sonotopes, are distinguished; these are layers containing information and taking into account the diversity of geology, hydrology, use, sound propagation and perception (Hedfors, 2003). Soundscape research uses sociological methods (semantic differential, sound preference test, mental map, questionnaire, interviews, free descriptions) that complement observations (soundwalks) and acoustic measurements carried out in the field.

The last decade has seen the development of a number of internet projects that increase the awareness of the sound of places and show the relationship of soundscapes with places. Some of the projects are international in character, e.g. *Soundcities*, *Sonic Postcards*, *Save Your Sounds*, *Sounds of Europe*, *Sound Tourism*, *The Sound of Place*. Other projects concern specific places, e.g. *Sounds of New York* or *Favourite Manchester Sounds*, constituting part of the *Positive Soundscapes* project, and the *London Sound Survey* project that shows changes in London's soundscape accompanying civilisational progress. Collections of soundscapes are established, including recordings

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<sup>4</sup> Since 2000, the WFAE has been publishing *Soundscape: The Journal for Acoustic Ecology*.

<sup>5</sup> <http://soundscape-cost.org/>

<sup>6</sup> <http://www.uniscape.eu/allegati/Ref%20UNISCAPE%20CD2-14-06-12%20Second%20Careggi%20Declaration%20on%20Soundscapes%20draft%20new.pdf>

and descriptions mostly of characteristic sounds and sound signals associated with a specific place or region (*100 Finnish Soundscapes*). In Catalonia, sounds characteristic of 135 Catalan soundscapes are documented and the relationship of soundscapes with intangible cultural heritage is emphasised. Initiatives using the possibilities offered by new technologies are also implemented in other Spanish regions (Galicia, Basque Country, Andalusia, Valencia) and cities (Barcelona, Madrid).

## ACOUSTIC ECOLOGY IN POLAND

In 2012, 30 years have passed since the Polish publication of a large part of Schafer's *The Tuning of the World*, translated by D. Gwizdalanka (Schafer, 1982). That year can be regarded as the beginning of soundscape research in Poland. In 1987, *Ruch Muzyczny* [a Polish journal dedicated to music] featured a collection of Gwizdalanka's articles on acoustic ecology (Gwizdalanka, 1987). The 1990s saw a number of important events. In 1993, at the WFAE conferences, Poland was represented by L. Zielinska of the Academy of Music in Poznań, a musicologist, composer and author of the atlas of symbols characteristic of the Poland's acoustic space. In 1995, during the "Child and Sound" ("Dziecko i dźwięk") festival, R.M. Schafer visited Poznań, and this was followed by some popular science publications (e.g. *Monochord*, 8-9/1995; Schafer, 1995). In 1999, the first scientific works dedicated to soundscapes were published (Kapelański, 1999; Bernat, 1999). The first decade of the 21<sup>st</sup> century saw a distinct increase in the number of published soundscape studies conducted from the perspective of various scientific disciplines. The exploration of the subject of soundscapes led to the organisation of an interdisciplinary scientific seminar in Lublin in 2008, entitled "Sound in Landscape" ("Dźwięk w krajobrazie"); it brought together about 50 specialists representing various fields and scientific centres around Poland as well as representatives of the Finnish Association of Acoustic Ecology. It should be noted that already at the first landscape seminar<sup>7</sup> in Sosnowiec in 2000, an oral presentation entitled "The Soundscape of the Bug Valley" ("Krajobraz dźwiękowy doliny Bugu") (Bernat, 1999) was delivered; it presented new perspectives in the studies of landscape associated with its sound layer. The subject of sound in landscape was presented from various perspectives at subsequent seminars of the Polish Geographical Society's Cultural Landscape Committee, e.g. "Intangible values of cultural landscape" ("Niematerialne wartości krajobrazu kulturowego") (2010), "The sacred in landscape" ("*Sacrum* w krajobrazie") (2012).

In 2009, the Soundscape Research Studio was established within the Institute of Cultural Studies at the University of Wrocław; also in Wrocław, an interdisciplinary seminar "The Audiosphere of the City" ("Audiosfera miasta") was organised in 2010 and "The Audiosphere of Wrocław. Between Theory and Practice" ("Audiosfera Wrocławia – między teorią i praktyką") in 2013. In recent years, interest in taking up the research initiated by R.M. Schafer has been growing. Among those interested is

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<sup>7</sup> The Cultural Landscape Committee was established then.

another musicologist, K. Marciniak who represented Poland at the WFAE in Darmstadt (2012) and noted that acoustic ecology in Poland is a dynamically developing discipline, already boasting significant achievements and having clearly set goals for the future. The development of this research field requires the harmonisation of terminology (common points of reference) and creating an organisation within which researchers and artists would be able to freely share their experiences, and which would represent Poland abroad (Marciniak, 2012).

At present, three major scientific communities dedicated to the subject of soundscapes are active in Poland, namely:

- cultural scientists (cultural anthropologists), musicologists, e.g. Robert Losiak (Wrocław), Tomasz Misiak (Poznań), Krzysztof Marciniak (Warsaw),
- geographers, e.g. Sebastian Bernat (Lublin), Iwona Szumacher and Wojciech Lewandowski (Warsaw),
- acoustic scientists, e.g. Urszula Jorasz and Anna Preis (Poznań), Jerzy Wiciak (Kraków).

Furthermore, the acoustic space (soundscape, audiosphere) is gaining more and more ground as part of the research conducted by representatives of other scientific disciplines, e.g. architecture and landscape architecture, landscape ecology, aesthetics, ethnology, philosophy, history, psychology, sociology and urban planning. The need to establish the ecology of tranquillity as a subdivision of ecology (Sztumski, 2010) and soundscape preservation as part of the ecology of space (Sztumski, 2011) is emphasised. An increasing number of projects and publications stressing the auditory aspects of landscape appear in the field of landscape architecture (e.g. Pawłowska, 2012; Skalski, 2008). In spatial planning, attention is paid to sound as a determinant of the value of residential properties (Senetra, Szczepańska, 2011). More and more often, historical analyses are carried out, primarily concerning the 20<sup>th</sup> century (e.g. Szymańska-Ilnata, 2012) but also reaching back to the Middle Ages (Myśliwski, 2000) and the Romantic era (Janicki 2008). According to Grzegorz Miliszkiewicz (2007), after the passage of many years, the sound in a historic item constitutes an asset that is the closest to the original, to a greater extent than the size, texture, colour or smell. Owing to the fact that sounds represent an unknown and undocumented element in the life of a town, G. Miliszkiewicz made an attempt at reconstructing the landscape characteristic of the Lublin region before the Second World War, for example. Analysing cultural landscape changes in rural areas as exemplified by Węglówka (municipality of Wiśniowa), J. Hernik (2011) proposed a register of cultural landscape changes as an instrument helpful in the preservation of open cultural landscapes in rural areas. The register also contains a record of sound in places of high historical and cultural value as well as places representing a high level of development.

Unfortunately, Poland suffers from a lack of interdisciplinary projects that would integrate various scientific and artistic groups as was the case with the group

created by Schafer<sup>8</sup>. Furthermore, scientists from Poland rarely participate in international interdisciplinary projects.<sup>9</sup> However, the last decade has seen a considerable increase in the number of publications<sup>10</sup> showing the enormous potential of soundscape research (e.g. Bernat, 2008; Jorasz, 2010; Losiak, Tańczuk, 2012; Misiak, 2013). At various departments in various academic centres (e.g. Warsaw, Wrocław, Poznań, Kraków), more and more master's and bachelor's theses dealing with the soundscape of a particular city are prepared. The subject of acoustic ecology is also taken up by journalists (e.g. Pęczak, 2000; Woźniak, 2009). Besides, the practical dimension of designing soundscape is appreciated, as exemplified by the collaboration between the Institute of Acoustics at Adam Mickiewicz University in Poznań and the Special School and Education Centre for Visually Impaired Children in Owińska. The subject of soundscapes is also present in tourism research (e.g. Rogowski, 2012; Rypiński, 2013).

Despite the development of studies on "sound in landscape", the term *soundscape* remains a subject of scientific debate in Polish geography. F. Plit (2011) regards soundscape studies as part of the geography of tangible cultural landscapes on the grounds that sound is a real, tangible being in a sense (a wave motion in an elastic medium), the difference being that it is perceived with a different sense than sight. U. Myga-Piątek (2012) subsumes soundscape studies under the real and semiotic category and derives them from studies on the perception of the environment. A. Richling and J. Solon (2011) appreciate the importance of soundscape studies in their research on the physiognomy of environmental systems conducted in the field of landscape ecology. In their opinion, soundscape studies are derived from the idea of multisensory landscapes proposed by T. Bartkowski (1985), which opened a new stage in the debate on the concept of landscape. Multisensory landscapes, construed as an objectively existing structural and territorial reality perceived with several senses, was the subject of A. Kowalczyk's studies (1992) on developing recreational areas in the suburban zone of Bydgoszcz.

Originating in K.H. Wojciechowski's (1986),<sup>11</sup> interest in issues of perception and aesthetic judgement of landscapes, studies conducted by Lublin-based researchers focus on analysing the changes of soundscapes, identifying noise threats, examining soundscape resources (characteristic sounds), assessing their attractiveness, identifying places/landscapes that are attractive/unattractive in terms of sounds, analysing social conflict related to noise/sound in landscape, and examining the possibilities of protecting the acoustic qualities of landscape. The basic research methods are

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<sup>8</sup>The only known example of an attempt at integrating various groups is the "Audiosphere of Wrocław" ("Audiosfera Wrocławia") project coordinated by R. Losiak (Institute of Cultural Studies, University of Wrocław).

<sup>9</sup> The only known example of collaboration within international soundscape projects is the participation of A. Preis and T. Kaczmarek (Institute of Acoustics at Adam Mickiewicz University in Poznań) in the *Soundscape of European Cities and Landscapes* project.

<sup>10</sup> The Soundscape Research Studio plans to create a serial publication dedicated to audiosphere research, entitled "Man and the Environment" ("Człowiek i środowisko").

<sup>11</sup> K.H. Wojciechowski (1986:38) believes that it is vital to attempt working at the interface of various scientific disciplines.

sociological methods (mainly questionnaire surveys, free description) aimed at identifying the preferences of students. Additional methods include soundwalks, oral history and analysis of literary descriptions and noise protection programmes. The studies are conducted mainly in the Lublin region but they also concern Polish national parks and many cities. Good practices with regard to protecting the environment against noise, acoustic design, sound tourism and acoustic revitalisation are presented.<sup>12</sup>

Beside the increasing number of scientific publications, the appreciation of the role of sound in landscape in Poland is also evidenced by many new initiatives that use the results of soundscape studies to promote regions, portray the realities of various periods in the past or organise recreational activities (multimedia walks around cities, sound maps posted to the internet, interactive exhibitions, radio programmes, sonic postcards, multimedia publications, etc.), e.g. "The Sounds of Małopolska" ("Dźwięki Małopolski"), "Sonic Postcards from the Benedictine Abbey in Tyniec" ("Pocztówki dźwiękowe z Opactwa Benedyktynów w Tyńcu"), "Tonopolis", "Soundwalks" ("Dźwiękospacery"), "Sonic Postcards from Bytom" ("Pocztówki dźwiękowe z Bytomią"). The acoustic uniqueness of certain cities and regions is appreciated. Discovering soundscapes and developing the culture of listening becomes a new challenge for contemporary culture.

## RESULTS OF THE QUESTIONNAIRE SURVEY

The questionnaire consisted of 12 questions concerning the following: places that are friendly/unfriendly in terms of sounds, the most characteristic sounds of one's place of residence, the role of sound in experiencing landscape, landscapes that are friendly/unfriendly in terms of sounds, changes in soundscape over the last 20 years, the threat of noise pollution in the place of residence, social conflicts associated with sound (noise, tranquillity) in landscape, the need for acoustic design and soundscape protection, possible actions for noise reduction and protection of characteristic soundscapes, forms of presenting soundscapes on a map.

When asked about places that are friendly in terms of sounds, the respondents most frequently mentioned forests (124 persons), meadows (45), sea and coastal beaches (39), parks (28), mountains (26), rivers and river valleys (16), rural areas (16), own room or home (14), lakes (10). The other, less frequent answers were: fields, water bodies, national and landscape parks, forest clearings, home gardens, municipal parks, one's own town/village, places far from the road traffic, open country, natural areas, marshy areas, football stadium, car, motorcycle, music club, train, botanical garden, museum, shopping gallery, empik [Polish chain selling books, press and various media products], wilderness, philharmonic hall, theatre, zoo, church

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<sup>12</sup>As defined by the Polish association Forum Rewitalizacji (Revitalisation Forum), revitalisation is a process of spatial, social and economic changes in degraded urban areas, aimed at improving the inhabitants' quality of life, restoring spatial order, achieving economic recovery and rebuilding social ties.

interiors, town courtyard, city by night, cinema, caves, waterfall, mountain stream, ocean. The respondents also gave examples of specific places in Lublin (Zemborzycki Lake, Old Town, Stary Gaj forest, Saxon Park, LSM housing estate, Dąbrowa forest, Tesco), in Poland (the Tatra, Bieszczady and Beskidy mountains, Roztocze Upland, Baltic Sea, Mazuria, Sobiborski Landscape Park, Solska Forest, Wieprz river valley, Białowieski National Park, Kozienska Forest, Roztoczański National Park, Kazimierski Landscape Park, Kazimierz Dolny, Sokolec, Mazurian Lakes, Tricity, Polesie region) and outside Poland (Spain, Ukraine, Niagara). Only two persons did not indicate any places. The responses above were justified with the fact that the indicated places were characterised by tranquillity, calm, delicate and gentle sounds (83 persons), sounds of nature (48), singing of birds (83), rustle of trees (42), swoosh of the sea and swoosh of the wind (28), rustle of the leaves (15), sounds of animals (24), sound of water (37) as well as buzzing of insects, rustle of the grass, echo, various sounds, talking, sound of a train, sound of an engine, excitement accompanying a sports event, historic monuments, hubbub of voices, music of street musicians, clock chimes, favourite music. The sounds are pleasant (13), soothing (19), conducive to relaxation (9); they preserve harmony, bring back memories and ensure a nice atmosphere; there is no car noise. The sound level is medium, not too loud, not too quiet, there is no noise.

The responses concerning places that are unpleasant in terms of sounds were not as varied as above. The most frequent answers were: conurbations, centres of large cities (79 persons), streets, roads, motorways and the neighbouring areas (63), industrial areas, factories, shop floors (27), construction sites (10), railway stations, terminals, (12), municipal transport vehicles (9), markets (8) and shops (8). Other places mentioned by the respondents included: airport, bus or train stations, bus stops, stadiums, shopping galleries, fire stations, playgrounds, discos, city, sports arena, student dormitory, kindergarten, schools, beach, noisy places, sawmill, public places, recording studio, dentist's surgery. As regards specific places, Lublin (13), particularly busy city streets and Warsaw (9) were mentioned most often. Other answers included the Silesia region, Kraków, Katowice, Ball Bearings Factory in Kraśnik, the Lublin-Warsaw route. Only four persons did not mention any places at all. The answers above were justified with the fact that they were characterised by noise, drone of traffic, hubbub of the street, clamour, rumbling, pounding and roaring sounds (100 persons), sounds of cars (whirr of the engine, hooting, squeal of tires, clatter) (90), human voices (39), including shouting, chatter. The other factors mentioned included: chaos, sirens, music, telephones, fireworks, bangers, subway, banging of doors, machines, construction work, trolleybuses, motorcycle, ambulance, train, shopping centre, factories, alarm signals, lights, dust, smell of exhaust fumes. Sounds were described as loud (31), high-volume (10), high-intensity (14), 8 in the scale from 1 to 10 (12), irritating, tiring, unfriendly, aggressive, annoying, unwanted, frightening, arousing negative emotions, unpleasant, drowning out one's own thoughts, not allowing to concentrate, making one feel unwell, piercing, squeaky, heavy, conveying irritating content, long-lasting, artificial, cancelling each other out,

coming from various sources, accumulated, intensifying, with a suddenly increase in intensity, reflecting the all-pervasive chaos, exerting a negative impact on the environment.

The students surveyed had no difficulty indicating the most characteristic sounds of their place of residence. The main ones were as follows: singing of birds (57 persons), sounds of cars (60), tranquillity (16), barking of dogs (16), sounds of nature (13), sounds of agricultural machines (12), sounds of church bells (11), sounds of children (10). The respondents also mentioned: the rustle of trees, sounds of the forest, swoosh of water, rustle of the wind, sounds of animals, sounds of the city, sound of an ambulance, noise, sound of aeroplanes, trains, trams, machines, streets, shouts, people talking, sounds produced by neighbours, music, sounds of grass being mowed, rustle of leaves, cooing of pigeons, meowing of cats, crowing of a rooster, croaking of frogs, sounds of wild ducks, a grasshopper, sounds of life, a market, a siren, a meadow, a village, a construction site, and pilgrims.

To a majority of the respondents, these sounds were important (116 persons) or even very important (68) in experiencing landscape. Landscapes that are friendly in terms of sounds are primarily the ones having the recreational-tourist function (53 persons), forest (43), mountain (31), seaside (31), rural and small town landscapes (22), and noise-free zones (30). Other functions, components and characteristics of landscape were also mentioned: agricultural and protective function, lush green, birds, leaves, trees, green hill parks, sand dunes, animals, lakes, water, parks, wind, estate where I grew up, rivers, fields, meadows, stream, brooks, cave, echo, vantage points, mountain trails, non-urbanised and natural landscapes, absence of roads, low traffic intensity, absence of heavy industry, bright colours, friendly, gentle, melodious, beautiful, colourful, warm, aesthetically pleasing, simple, harmonious, vast, relaxing, pleasant, open.

Landscapes that are unfriendly in terms of sounds are primarily urban landscapes (52 persons), with the predominance of the traffic function, i.e. roads, streets (65) and industrial function (33). The respondents also mentioned landscapes with a residential function (particularly tower block housing estates) as well as with a tourist, service, commercial and entertainment function, squares, mining areas, construction sites, discos, crowded beaches, shopping centres, airport, trains, highly developed infrastructure, schools, playgrounds, swamps, felled and burnt-out forests, chaotic, ugly, anthropogenic landscapes, large population centres, closed spaces, aggressive, loud, confusing and irritating spaces. 15 persons were unable to describe friendly landscapes and 18 persons – unfriendly landscapes.

A majority of the respondents (116) noticed that certain sounds had disappeared from the landscape over the previous 20 years, namely sounds of farm animals (41 persons), particularly cows, horses, sounds of children outdoors (16), singing and other sounds produced by birds (20), including sparrows, skylarks, owls, woodpeckers, storks, wild pigeons, terns. Furthermore, respondents mentioned the sounds of nature, tranquillity, sounds of forest animals and frogs, rustle of trees, sounds of sharpening scythes and cutting, sounds of factories and signals marking

the end of the work, sounds of a train, construction machines, a tractor and noisy agricultural equipment, lorries, dustcarts and bells.

Despite the increasing motor vehicle traffic, most of the respondents (114) did not notice a threat of noise pollution in the place where they lived. Other respondents indicated cars (55 persons) and aeroplanes (11) as the main sources of noise pollution. The respondents also mentioned factories, ambulances, trains, bangers, construction machines and house repairs, agricultural machines, helicopters, motorcycles, city noise, loud music, tourism.

The respondents demonstrated a poor knowledge of social conflicts associated with sound (noise, tranquility) in landscape. Only 79 persons were able to give examples of such conflicts, mostly concerning noise barriers, motorways, cars [parked] along roads (24) and noise produced by neighbours (night quiet time, music) (26). Other conflicts mentioned by the respondents were associated with construction work ("too early" or "too late") (9), outdoor concerts (4), noise from discos, pubs and bars (7), sounds connected with religious practices (bells, singing) (3), noise caused by factories (2), agricultural machines at night (2), city noise, noise coming from playgrounds, stadiums, airport, shooting ranges, wind farms, motocross trails and forests. They also provided specific examples: the road from Lublin to Świdnik, construction of a new road across an estate of detached houses, Makuszyńskiego Street in Częstochowa, bus station, Lublin-Świdnik airport, motocross rally near the Zemborzycki Lake in Lublin, Old Town in Lublin, the Rospuda valley, the Kołbiel ring road, a racetrack in close proximity of a blocks of flats in Zemborzycka Street in Lublin.

Most of those surveyed (130 persons) believed that soundscapes should be the subject of acoustic/sound design, particularly in large cities, conurbations, residential areas and roads with heavy traffic, motorways and expressways. Similarly, a majority of the respondents (95 persons) were in favour of protecting soundscapes (40 persons were against it), particularly in environmentally valuable areas. However, only a handful of the respondents (6) were prepared to sacrifice "something" for the sake of soundscape protection, e.g. use a bike or walk instead of driving, pay a tax for this purpose, accept longer travel times, restrictions concerning building and the functions of a given area, or give up outdoor concerts.

The following were mentioned as possible measures for noise reduction and protection of characteristic soundscapes: noise barriers (54 persons), green barriers, trees, parks (25), restricted traffic (access) (22), restrictions or ban on building in the vicinity of environmentally valuable areas (11), designation of noise-free zones (8), construction of noise-absorbing walls (5), ring roads (4), development of public transport (4), noise prohibition (4), restrictions on road construction/repair (3), establishment of nature reserves and landscape parks (3). The respondents also mentioned noise limits, education, building tubes over roads, spatial planning, recreation zones, special protection measures, diversions, infrastructure, filters, silencers, arrangement of buildings, protection of natural soundscapes, zoning, frequent inspections, penalties, fees for tranquillity, no admission to groups, no entry for quads, cycling, banning the use of telephones, elimination/reduction of sources of noise, underground

transport, isolation from civilisation, surveillance. As many as 61 persons did not propose any actions aimed at reducing noise and protection characteristic landscapes.

The most frequently proposed methods of presenting soundscapes on a map were the following: symbols (signatures), e.g. trumpet, birds, musical stave, note, treble clef, headphones and loudspeakers in specific places (87 persons), colour scale (sound intensity/pleasure): red – unpleasant, green – pleasant (26). The respondents also mentioned patterns, ranges (boundary lines), isolines, a cartodiagram and a description. As many as 79 persons did not propose any methods.

## CONCLUSIONS AND FINAL REMARKS

Geography should tackle the problems of the modern times such as the threat of noise pollution. The development of research in the field of acoustic ecology reflects the growing need to counter the onslaught of noise. Soundscape research inspires thinking about the future and can thus be a long-term investment. The focus on soundscapes makes it possible to discover the unusual aspects of the ordinary, arouses interest in the problems of everyday life, and encourages looking at reality from the perspective of an ordinary person. According to T. Bartkowski (1985), the possibility to study more than the visible landscape opens up prospects for the development of landscape ecology as well as the preservation and shaping of the environment and spatial planning. Studying sound in landscape also offers new prospects for the development of geography.

The questionnaire survey indicates that sounds are important or even very important in experiencing landscape. Landscapes can be classified as friendly and unfriendly in terms of sounds. Experiencing soundscape is part of the geographical experiences and is linked with places. Thus, characteristic sounds can be distinguished for the particular places, and these sounds are often a very important component of the identity of the place. The appreciation of the value of sound in landscape contributes to the appropriate shaping of landscape and its preservation. Therefore, soundscapes should be the subject of acoustic/sound design and protection, particularly in environmentally valuable areas.

In recent years, geographers have marked their presence in research and activities in the field of tourism, spatial management and geoinformation where the role of sounds is increasingly recognised. In the postmodern era, tourists seek not only beautiful, unusual or interesting places but also new ways of experiencing travel (Urry, 2007; Wiczorkiewicz, 2008). Visual sensations on which numerous mass tourism undertakings have drawn seem to be too weak an attraction to the holiday-makers of today. Tourists are adventure seekers and experience collectors.

Revitalisation measures focus on the quality of public spaces, which offers an opportunity to create high quality soundscape where sounds are distinct, authentic (unique in their kind), non-continuous, intermittent, linked with the function of an area and enhancing the character of a particular place.

The tone and intensity of sound can also become an element of spatial information, a subject of analysis and method of presentation (Krygier, 1994). In a virtual reality environment, three-dimensional sound can also be used for orientation purposes (Kraak, Ormeling, 1998).

Studying sound in landscape faces many challenges, usually associated with the transient character of acoustic phenomena and subjective nature of the research methods. Typically, the listening experience remains untold and unrecorded, and thus it is lost to our awareness. The conventions of language can prove to be an obstacle that makes it impossible to adequately express the experience of the audiosphere (Losiak, 2010). Therefore, interviews and descriptions of soundscapes most frequently describe the situation or activity that generated the specific sounds. Such a presentation of soundscape is limited, mainly due to the difficulty in verbalising the auditory sensations. Therefore, it is important to document soundscape by recording sounds; such recordings are a valuable supplement to the image etched in memory. Given the scarcity of archive materials, the reconstruction of soundscapes from the distant past remains a huge challenge. Designing soundscapes using the experience of visually impaired people (boundaries in landscape) and digital modelling technology (sounds on maps) has a future as well. Furthermore, it is worth considering the creation of a national sound library in Poland ("Atlas of the Soundscapes of Poland"), following the example of such projects implemented abroad. This goal can be achieved by conducting an open competition or in the form of an internet-based initiative featuring interactive and multimedia solutions. Again, the example is set by initiatives in the United States (*The Sound of Place*) and United Kingdom (*Sonic Postcards*). The threat of noise pollution and the search for new tourist attractions accompanied by the development of cultural tourism and need for a high quality of life provide a rationale for undertaking efforts to create a list of world heritage soundscapes. To prepare such a list, it is necessary to precisely define the criteria for identifying and assessing soundscapes suggested for inclusion in the list.

Finally, it should be clearly stated that geographers, as representatives of a scientific discipline encompassing nature and culture, seem to be particularly marked out for conduct dialogue and work for a mutual understanding among representatives of exact sciences, humanities and art. Geographers should not cease in their efforts to work at the interface of various disciplines, science and art. In interdisciplinary research, including acoustic ecology, they can offer a comprehensive approach which makes it possible to understand reality.

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