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Veröffentlichungsversion / Published Version

Zeitschriftenartikel / journal article

#### Empfohlene Zitierung / Suggested Citation:

Palmese, C., Arribas, J. L. C., & Antolín, A. R. (2024). The Soundscape and Listening as an Approach to Sensuous Urbanism: The Case of Puerta del Sol (Madrid). *Urban Planning*, 9. <https://doi.org/10.17645/up.7206>

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# The Soundscape and Listening as an Approach to Sensuous Urbanism: The Case of Puerta del Sol (Madrid)

Cristina Palmese <sup>1</sup> , José Luis Carles Arribas <sup>2</sup> , and Alejandro Rodríguez Antolín <sup>2</sup> 

<sup>1</sup> Social and Communication Sciences, Universidad Europea de Madrid, Spain

<sup>2</sup> Interfaculty Music Department, Autonomous University of Madrid, Spain

**Correspondence:** Cristina Palmese ([cristina.palmese@universidadeuropea.es](mailto:cristina.palmese@universidadeuropea.es))

**Submitted:** 19 May 2023 **Accepted:** 3 October 2023 **Published:** 16 January 2024

**Issue:** This article is part of the issue “Citizen Participation, Digital Agency, and Urban Development” edited by Simone Tappert (University of Applied Sciences Northwestern Switzerland), Asma Mehan (Texas Tech University), Pekka Tuominen (University of Helsinki), and Zsuzsanna Varga (University of Glasgow), fully open access at <https://doi.org/10.17645/up.i327>

## Abstract

This article focuses on the placemaking process and experimental research on the citizens' assessment of the soundscape in Puerta del Sol in Madrid. Numerous studies conducted in recent decades have shown that sound is a crucial element capable of providing new insights into the relationship between human beings and the environment. Sound possesses physical-sensory-perceptual qualities which connect the emotional and the rational aspects of the experience of the place, overcoming the aesthetic/scientific duality. By default, the soundscape is the result of a collective production. It is the resonant expression of the multiple activities and uses that inhabit a space. The soundscape of everyday life provides a vision of life in a particular place, giving meaning and a singular character to the fact of living there. The concept and methods of the soundscape arise from sensitive experiences of the place in direct relation to a community. This exploratory research focused on in situ methods (soundwalks, improvised interview mappings, sound archives, performances, and collective sound actions) as expressions of collective listening to place. This article also focuses on how to map and share the result of this research, the technology to build a collective digital place as a place of confluence of experiences, citizen knowledge, and reflection on the situated soundscape.

## Keywords

city life; Madrid; public space; Puerta del Sol; situated soundscape; soundwalk

## 1. Introduction

Traditionally, we have measured the city (in meters, decibels, lux), or we have described it from a sensitive subjectivity (seeing it, narrating it, painting it, singing it, etc.). We have projected it numerically (technically), or

according to cultural, patrimonial, or social considerations, but what tools do we have to propose a new and necessary transversal view? In one of their most controversial works, Lefebvre and Regulier (1992) proposed the point of observation as a central question: Are we immersed in the flow, in the movement that we want to characterise, or is it, on the contrary, our external “point of view,” dominating the phenomenon from above and in the distance? For us, this issue remains crucial.

This article addresses how to produce understanding in the motion of urban space, exploring the relationship between users, practices, and urban and architectural space (Thibaud, 2001), revisiting methods, techniques, and strategies that seek to imaginatively understand the heterogeneity and fluid urban environments by connecting quantitative data and qualitative data.

By rethinking the role of the researcher concerning the agents (citizens, artists, associations) of the studied environment, this article focuses on experimental research on the citizens' assessment of the soundscape in Puerta del Sol, a central square in Madrid where family and friends can meet to make memories, a space that is highly recognised by locals and tourists alike. This article also focuses on debating how to integrate the fluidity, resonances, and lived experiences of a place with the need to standardise this understanding. Concepts such as context, body, listening, and soundscape in situ are explored from different perspectives and with the involvement of creativity. Furthermore, it discusses the action and representation of technologies for a sensuous urbanism, proposing a sound map as a place of confluence of experiences, citizen knowledge, and reflection on the sound environment, geolocating not only sound but words, interviews, sound stories, etc. (Levy-Landesberg, 2022).

The soundscape of everyday life provides insight into life in a particular place and significantly influences the complex process by which spaces become places (Relph, 1976; Tuan, 1977). The complex and transversal dimension of the soundscape (physical, sensory, sociocultural) overcomes the aesthetic/scientific duality; it is, at the same time, a scientific and artistic tool, and we can connect quantitative data (decibels, acoustic responses, physical measurements) and affective relationships. We consider the concept of soundscape not only as an acoustic environment, as interpreted by physics, sounds located in space perceived by humans and animals, but also involving the memory and experience of listening and the knowledge that arises from the phenomenon of sound considering the meanings and representation of sounds over time. The first aim of this article is to situate the research in its theoretical background, the second aim is to explore and develop appropriate methods to evaluate the situated soundscape involving the citizen, and the third aim is to show the development and results of the research.

## 2. Theoretical Background

The concept of soundscape was born almost contemporarily in urbanism (Southworth, 1969) and music (Schafer, 1977), generating a wide field of research involving very different disciplines. In the last decades, environmental acoustics has also been interested in soundscape and has formalised its methodologies through an International Organization for Standardization (ISO) standard (ISO, 2014, 2018, 2019). This fruitful connection between different approaches opens a crucial debate between standardisation, epistemology, phenomenology, and the aesthetics of soundscape, involving the critique of Western scientific thought that started in the 1950s and has continued until today (Barrow, 1991; Bateson, 1972/1997; Capra, 1984; Prigogine & Stenger, 1983). In this context, our research seeks to experiment with

the connection between methods to deepen the knowledge of the dynamics, rhythms, and choreography created by the soundscape in public space.

### 2.1. *Sensory Approach to Knowledge*

Since the 1960s, the aesthetic relationship between the human being and the environment began to be investigated in many disciplines (geography, anthropology, ecology, urban planning, etc.), promoting a reevaluation of the culture of inhabiting or better valuation of inhabiting as a culture. Norberg-Schulz (1988, p. 23, translation by the authors) points out:

There is a need to return to everyday reality which, unlike scientific reality, is more simply the way of living, the way of living in a place, the way of having life. Returning to things themselves, as Husserl said, is becoming ever more urgent.

Urban planners Gordon Cullen and Kevin Lynch theoretically formalised the introduction of the perception of citizens, of the everyday, of the subjective in the urban project. Cullen (1974), in his book *Townscape*, incorporated the emotional reactions of the inhabitants in urban planning, thus reacting against the neutrality of the functionalist concept of public space. Techniques such as cognitive maps developed by Anglo-Saxon geographers and urban planners (such as Trowbridge, B. Goodey, T. Lee, or F. Lodd) played an important role in the work of Lynch (1960/1984) for the study of the image of the city.

Lynch developed and formalised the application protocols through the hypothesis of the legibility of the city, based on a topological “grammar” composed of five main structural elements (path, edges, district, nodes, and landmarks), which constitute the “image of the city.” These techniques were adapted to the sound field by the French urban planner Pascal Amphoux, who applied them in his research on sound urbanism and the perception of sound (Amphoux et al., 1991).

M. Southworth carried out a pioneering study taking sound into account in the evaluation of urban spaces. His work collected the reactions of several groups of people walking through three areas of the city of Boston, and shows how the responses of citizens to the soundscape (using this term for the first time, although the development of a theory or methodology of the soundscape did not follow) depend on the information contained in the sound, the urban environment where it is perceived, and the sound level (Southworth, 1969).

### 2.2. *What is Soundscape?*

Schafer (1977) will provide a complete theory and practice that will give continuity to this field of study. Schafer proposes listening to the world of sound as a collective musical composition, going beyond the physical characteristics and pointing out the importance of the meaning that sound has for people in their specificities and in their shared and constantly changing everyday social and cultural identities. Since the beginning, many questions have arisen about understanding the soundscape, the information it provides, the listener’s experience, who the listener is, and exploring an unexpected state of belonging where the human personality merges with the environment, as Tuan (1977) describes. The impact of sound on bodies, feelings, and emotions is also found in the work of scholars exploring ambience (Thibaud, 2011) and affective

atmospheres (Anderson, 2009). Inherent in these approaches is the recognition that sound is not something that can be perceived in an instant; rather it is a temporal and spatial event that unfolds around and through the materiality of place (Duffy, 2017, 2020). One of the most influential laboratories that has worked since 1979 on the multidisciplinary approach to soundscape was the CRESSON, directed in the first years by Jean Francois Augoyard, a philosopher and urbanist.

### **2.3. Music, Context, and Listening**

The expansion of music towards the appreciation of everyday sounds, which began with historical vanguards, stressed the importance of context and the development of a phenomenology of listening. That expansion towards the world of sounds has led to changes of sensibility in the field of musical creation but also had implications in the innovative exploration of the environment, in the revaluation of the body and movement, and in urban and environmental studies. This will eventually lead to the promotion of various transversal applications that also involve the urban space.

Sound artists and musicians such as Max Neuhaus, John Cage (1961/2002), Pierre Schaeffer (1966), and R. Murray Schafer (1977) propose theories and practices based on sound in a broad and complex sense, taking into account all kinds of everyday sounds beyond spoken language, noise, or music, giving the context a new meaning that will influence more technical and scientific disciplines such as urban planning and architecture. In the 1970s, Canadian composer R. Murray Schafer invited us in his book *The Tuning of the World* to listen to the sounds of the environment. For Schafer (1977), the world of sound is a world of events, of activities rather than artefacts, of sensations rather than reflections. This new way of considering landscape and sound and the human being opens up several lines of research to understand the informative and expressive (affective and emotional) richness that sounds provide.

### **2.4. Walking and Soundwalking: A Collective Exploration Between Art and Science**

In the last century, avant-garde movements that explored forms of anti-art, such as surrealism or dadaism, developed collective practices of understanding and experimenting with the city through walking, but it was only the situationist movement that directly involved architecture and the urban project. The consideration of the impact of architecture on people's lives transformed the critique of architecture into a critique of life in general. Guy Debord and the situationists, through the theory of psychogeography, proposed a combination of art and technology for the integral construction of an environment in dynamic relation with behavioural experiments (Careri, 2002).

One of its main manifestations would take place in the creation of cartography, with the objective of transforming architecture and urbanism. Thus, for Debord (1967/2014, p. 6):

The spectacle inherits the weakness of the Western philosophical project, which attempted to understand activity by means of the categories of vision, and it is based on the relentless development of the particular technical rationality that grew out of that form of thought. The spectacle does not realize philosophy, it philosophizes reality, reducing everyone's concrete life to a universe of speculation.

Among the situationist procedures, *dérive* is the technique of uninterrupted wandering. In the *Situationist Manifesto*, Debord explained that people who abandon themselves to *dérive* no longer act normally in relationships at work and in their everyday lives.

### 2.5. Francesco Careri's Contribution

Another form of wandering is walking as a critical and cognitive tool of the landscape. Francesco Careri, in his book *Walkscape*, studies the human-walker-landscape relationship:

The walk is a form of expression that underlines a place by physically tracing a line. The fact of traversing; an instrument of phenomenological knowledge and symbolic interpretation of the territory, is a form of psychogeographic reading of the territory comparable to the walkabout of the Australian Aborigines. (Careri, 2002, p. 11, translation by the authors)

Walking becomes an aesthetic instrument with which to explore and transform the spaces of the contemporary city. In this way, the importance of subjectivity arises from the exploration of each walk. Careri argues that we not only create landscapes by filling the territory with objects but also by filling it with meanings; thus, through walking, human beings begin to construct the natural landscape around them, exploring and transforming it.

### 2.6. Soundwalk

In the 1970s, the World Soundscape Project exposed Hildegard Westerkamp's ideas about soundwalking through a specific site that the audience is encouraged to explore in their own ways, with her suggestions and questions as guides: "A soundwalk is any excursion whose main purpose is listening to the environment....The intention of soundwalking is listening. Soundwalks can take place in the mall, at the doctor's office, down a neighbourhood street or at the bus stop" (Westerkamp, 1974, p. 18).

As "qualified time" (in the words of the French philosopher Jean-François Augoyard), sound expression provides us with a dynamic image of each place, in which the "material" or spatial context acts as a sounding board for the everyday situations that give life to that space (Palmese & Carles, 2013). The soundwalk, with its several complementary techniques, is one of the most complex tools for exploring the city's soundscape (Piga et al., 2021). This potential of the soundwalk is also captured in the ISO standard, which recognises in a more technical framework the soundscape as "a sound environment (or sonic environment) with emphasis on how it is perceived and understood by the individual or by a society" (ISO, 2017, p. 4).

Based on an in situ and dynamic urban approach, Thibaud's method of commented walk developed in the CRESSON laboratory aims to analyse the sensitive experience, mainly sound, of the inhabitant in movement in urban space in a transversal manner, considering qualitative and quantitative data. There are three principles of action—to walk, to perceive, and to describe—and they are framed in three fundamental hypotheses aimed at apprehending the sensitive environment: reaffirming the importance of context in the survey protocol; relating, describing and perceiving, which implies bringing into play the ability of citizens to describe the environment in which they live; and in-situ data collection protocol (physical measurements, observations, interviews, etc.) focusing on the urban walk (Thibaud, 2001).

This approach aims to demonstrate how the dimension of sound is a specific and direct way of understanding the morphology of urban spaces. Augoyard (2008, pp. 127–152) made a distinction between “the sound itself” and the sound interpreted or experienced by the citizen, strongly determined by a situation or context.

All these references are crucial for our work to explore what a context is, considering the complexity of the relationship between being and environment, and above all, they help us to broaden our perspective by incorporating ephemeral, situated variables linked to place, to affects, to memories, and to the body. These questions also open up a fruitful debate on how to study the soundscape of a particular place, and how to combine this multi-sensory and phenomenological approach with more numerical and reductionist approaches (Carles et al., 1992).

Within this background, our research questions are:

RQ1: How can we study the citizens’ assessment of the situated soundscape?

RQ2: How can we involve the population in open and non-directed research, to collect spontaneity, perception, and feelings towards the soundscape?

RQ3: How can we analyse the rhythms and urban choreographies of Puerta del Sol by situating ourselves as researchers in the environment?

RQ4: How can we represent and share the results?

Starting from the hypothesis that it is not enough to consider the acoustic environment as interpreted by physics and its discrete perception by the inhabitants (Carles & Palmese, 2004), we explore methods that allow us to consider collective listening, the affective aspects and emotions experienced in the place, the transitory, emergent, and unexpected events of unforeseen resonances determined by being in a place. Our main goal is to study the soundscapes, rhythms, and urban choreographies generated in the daily life of Puerta del Sol through the perceptions and narratives of those who inhabit this public space.

### 3. Case Study: Puerta del Sol

Puerta del Sol (Figure 1) is one of the key points of the ongoing research Soundscape Map of Madrid: Identity and Listening, an interactive and accessible online map-based system focused on creating an informal digital space of situations, actions, experiences, listening, and physical data, capable of highlighting the importance of sound in everyday life in the centre of Madrid. Since the first development of the city in 1500, this square has always played a very important role in city life. It has been a place for social gatherings, meetings and shopping, and it is noteworthy that it was the site of the 2011 camp (known as 15M), the start of a protest movement that has had an impact in many parts of the world.

Puerta del Sol Square is a predominantly commercial area. The urban, economic, and socio-cultural changes in this area of the city have caused changes in the uses and customs of its citizens, which is reflected in its soundscape. It is therefore necessary to propose a study of this evolution focused on this sonorous reality, requiring a process of data collection, observations, recordings, etc. The interdisciplinary study, Urban

Landscape Needs and Functionalities of the Square System in the Surroundings of Sol Madrid, carried out by the Instituto Juan de Herrera of the Technical University of Madrid, which did not include the study of the soundscape, was used for demographic information, functional characteristics of the square, historical evolution, and socio-economic analysis.



Figure 1. Puerta del Sol. Image from Google Maps.

### 3.1. Listening as a Central Tool

For this research in Puerta del Sol, listening is a central tool. We must indicate that this is understood as:

- A long-term process, considering the memory, the stories of bodies with history, and the relationships shaped over time by the physical and social-cultural environment (Haraway, 1991, pp. 149–181);
- A process of inclusion, to facilitate a way to unlearn, embracing unfamiliar viewpoints as an exercise to recognise diversity;
- The embodiment of listening (“indissolubility of being and place”) is not only about studying the existence of self-consciousness of the experience of place but also how, through the experience of listening, individuals and communities make sense of places (Feld, 2012).

### 3.2. Methodological Itinerary

For the development of our research, the challenge will be to deeply intertwine methodologies and tools applied to the interdisciplinary field of soundscape. Our main objective is to observe, with the help of citizens, events, practices, and processes taking place in urban space, such as rhythms, rituals, and choreographies that we often ignore. We invite participants (citizens, artists, experts) to experience and describe the territory in situ, to share their sensations, memories, and collective representations of the everyday use of the city, and



thus also discover possible hidden spaces. All the methodological steps are related to each other, and all the insights and scenarios obtained in the first step are translated into the following steps.

### 3.2.1. First Step: Digital Questionnaire (Google Forms)

The first methodological step was to set up an online questionnaire to get an overview of the residents' feelings, perceptions, awareness, or ignorance of the soundscape. The aim is to identify the sound situations that characterise the neighbourhood as perceived by its inhabitants. The neighbourhood is an administrative unit, but also an identity unit and the two do not always coincide. Inhabitants are invited to talk about the sounds, sensations, and feelings they perceive and the sounds they hear most in their daily lives, their auditory memory and their representations of them. They are invited to think about collective and community spaces and whether they are related to sound, intersensory, and collective characteristics of their daily listening, focusing on the neighbourhood, and are openly asked about the sound quality of their environment. The positive and negative aspects are approached from a personal point of view without an external influence.

### 3.2.2. Second Step: Impromptu Interview

Open interviews have been conducted by approaching people on the street to gauge their spontaneous sensitivity to soundscapes by interrupting the urban dynamics without giving the person time to prepare answers or think much about the subject. This type of interview focuses on quantifiable characteristics such as sound type, height, and identifiability, as well as memories, inter-sensory relationships, and resonances. Urban experiences are often limited to standardised behaviours that limit our ability to fully experience our surroundings. Engaging in conversations about the soundscape opens our ears to the environment, to others, and to ourselves. It is possible to access the sound map under construction and to listen to this interview (Palmese & Carles, 2022).

### 3.2.3. Third Step: Soundwalk

The main objective of the soundwalk is to collect the in-situ sensory experience of the citizens, following the proposal of Amphoux and Tixier (2017) and Thibaud (2020). The comments and representations collected during the walk will allow us to share our wishes related to the possible transformation of these spaces. The aim is to encourage citizens to be more active and aware of their surroundings while experimenting with strategies aiming to involve them in the process of constructing the public space.

The first typology, following Westerkamp's (1974) indications, consists of, with and without recordings, exploring local concerns and political aspects of spaces.

The second typology, augmented soundwalk, focuses on technical/aesthetic exploration (for 90 minutes). These are more limited explorations, with the double purpose of collecting qualitative and quantitative data (recording sounds, collecting visual data, text, and commentary via individual stops in the walk, etc.). The subjects are supported by a questionnaire guide (Google Forms), intended for the exploration of specific points of the walk and subsequent digitisation.

The third typology, augmented soundwalk, comprises explorations and actions of long duration (six to seven hours) to tour the space for a long time, altering the routine in the space through actions with a varied group of volunteers (citizens, artists, researchers). This requires a previous analysis of the space to be explored, interacting with the occasional users of the public space with random interviews and/or inviting them to participate in the actions. This form arises from the situationist approach, with a group of volunteers built via an open call and with the objective of understanding through the act of sharing a public space, its characteristics and eventual problems, but also from a relationship with the context through the imagination, sound experiences, daily experiences, happenings, and casual encounters with the inhabitants. For this journey, we can synthesise Careri's (2016) proposal of "losing time to gain space." Careri (2016, p. 127) adds: "We know that whoever goes around setting a goal and a definite time loses all the possibilities that derive offers." The results of this tour/happening will be compiled at the end of the session. The plurality of results (videos, recordings, interviews, stories, drawings, photos, etc.) will be shared and analysed in a second session, to be later geolocalised in a layer of the tour area map, to map ourselves, our communities, and our surrounding environments.

#### 3.2.4. Fourth Step: Sound Mapping and Cartography---Digitisation of Sound Data and Experiences in Urban Environments

We propose a digital space of collectivity and connectivity between researchers and inhabitants of a given space, reflecting the importance of working with formats and environments accessible to all and forums for data exchange. Thus arises the idea of the sound map, a dynamic digital space composed of multiple layers where the local population, artists, and researchers can work together, sharing their knowledge and experiences about the sound environment in which they live. The map as a geographical and codified representation of physical spaces becomes a fluid, subjective, dynamic, and changing environment, not only because of the plurality of data it contains but also because of the multiple readings that can be made of these data. It is about creating an environment of shared knowledge, but also a place of projection of future scenarios for the urban space in which everyone's voice is heard.

These sound maps allow us to locate verbalisations, impressions, and/or memories, through a process of research/action to collect qualitative and quantitative data. The points geolocated on the map no longer correspond to neutral spaces, measured and equal for every observer located outside the map; now, these points are the impression, memory, and perception that the inhabitant has of this place (Levy-Landesberg, 2022).

## 4. Puerta del Sol (2022–2023): First Results

In this phase of the research, people answered the Google Forms survey, 15 people answered the impromptu interviews, and 13 people participated in the soundwalk's first typology. The tools used were:

- Digital form;
- On-site measurements by CESVA SC-2 digital sound level meter;
- Zoom H4 and H6 omnidirectional stereo digital hand-held recorders;
- Sound Man Omnidirectional OKM II Classic/Studio A3 stereo ambient microphones for sound tours;
- Sennheiser AMBEO smart casque binaural microphones.

#### 4.1. Observation

Early analyses based on Google Forms and impromptu interviews show general soundscape descriptions that include sound typologies expressed by:

- General descriptions: “Voices, different languages, murmur, the hustle and bustle of the square...building work, clock strike.”
- Verbalisations: “The constant murmur and background noise of the building work is unpleasant, irritating....The noise of the building work makes it impossible to hear the bells....I like the sound of the bells....I find the excessive noise and the noise of the construction work unpleasant.”
- Sound identifications: “Crowd echoes, helicopters, bells, construction work noise.”

#### 4.2. Soundwalk First Typology: Participants' Stories

This soundwalk was designed based on information obtained from Google Forms and impromptu interviews. It starts at kilometre zero from Puerta del Sol and arrives at Plaza Mayor through Plaza de Pontejos (Figure 2). Participants had the opportunity to define their own forms of representation, share their way of categorising sounds, and add suggestions for representing space. The analysis of the soundwalk verbalisations confirms the results obtained with the previous methods (general descriptions and sound identification), but in this case, the participants describe relationships between elements that are shown separately in the forms, with more elaborate expressions that include complementary and opposite elements (noise/silence, up/down, inside/outside, etc.) and synonyms and more complex rhetorical expressions. There is also selective listening. People refer to both what they hear and what they do not hear. Subjective and emotional responses to sounds and their relationships to objects and architectural elements are evident.

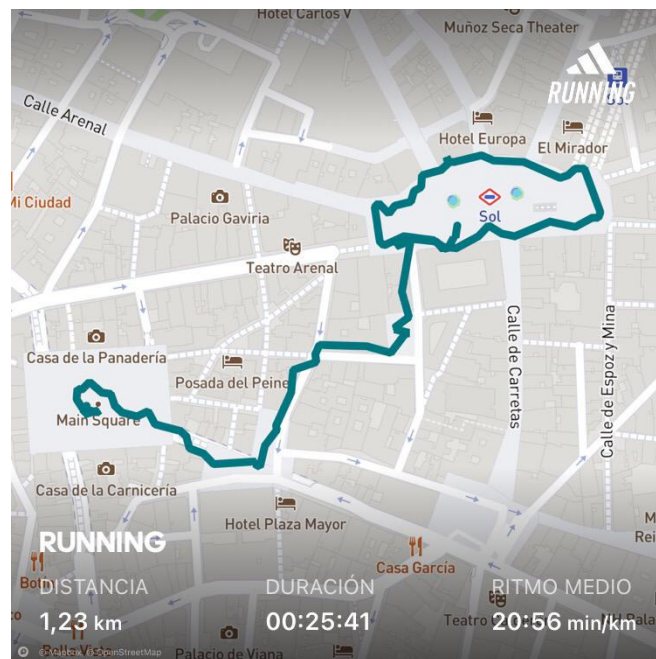


Figure 2. Route for the soundwalk.

In short, what these responses describe in the soundwalk are not just simple reactions to a stimulus or simple subjective evaluations or answers to predetermined questionnaires but describe aesthetic processes in which sound phenomena are perceived in situ, integrated with the temporal experiences of a specific space. The verbalisation of the soundwalk provides a rich lexicon that describes the sound environment and helps to understand the participants' sound experiences. Below are sound effects identified in the first soundwalk typology, following Amphoux et al. (1991) and Augoyard and Torgue (2005):

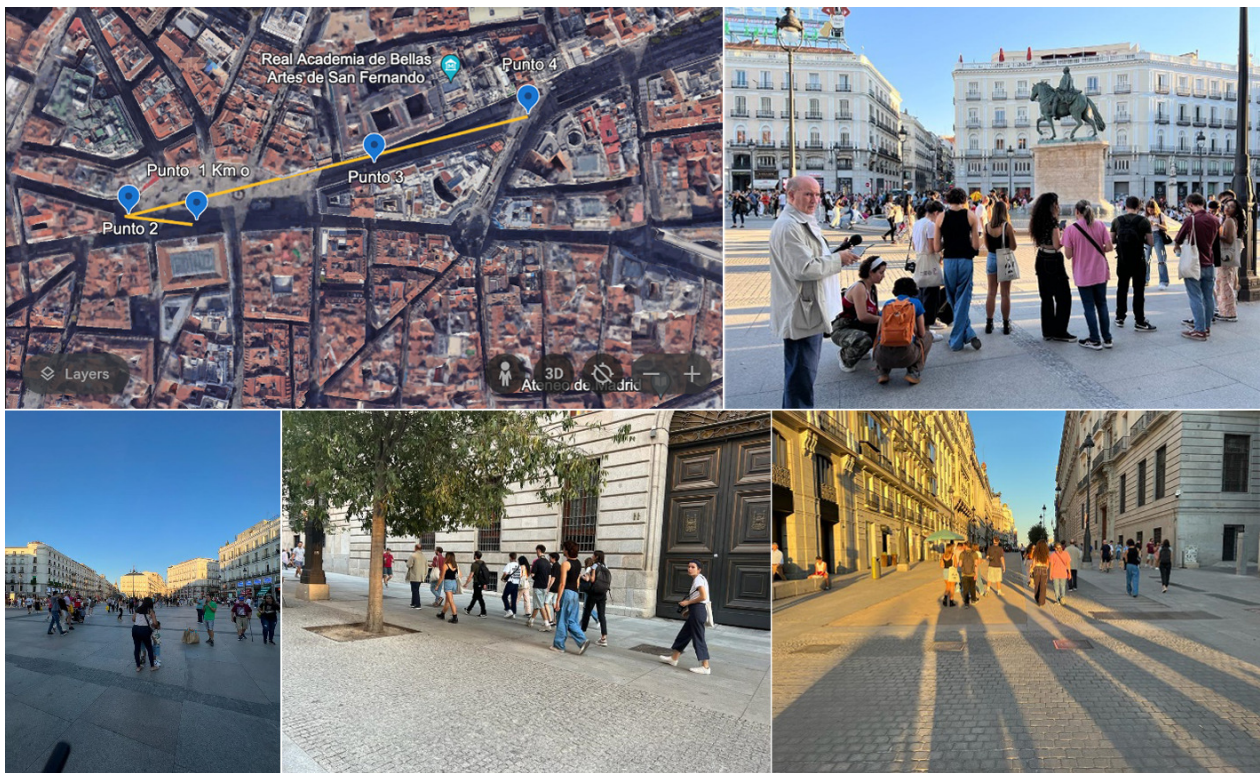
- Directionality: "There are those who are in a hurry because they must go to the station, those who take a leisurely stroll and enjoy the company, those who go to work and have a regular rhythm."
- Legibility: "The most characteristic sounds of the recording, apart from the footsteps, the conversations in different languages and the noise of the crowd are the brakes of a motorbike passing by the Mallorquina, a rented motorbike."
- Anamnesis: "The next thing to note is the sound of a bell, even if it was after 7 p.m. It is a very characteristic sound of all churches, although it is true that each one has a specific timbre that can vary a little."
- Resonance: "I also hear the sound of heels, of a person walking elegantly, probably going to an event or to work, because this is an area where we find many offices and conference rooms or important meetings."
- Attraction: "We moved to another area with quite different acoustics despite being next to our first study area. We arrive at a place where we find a fountain in the middle of a small square with the characteristic sound of water."
- Cut out: "We hear the sound of the water falling into the fountain, but although it is quiet at first, as soon as we approach it from the front, the volume increases drastically. It is a strange thing to study because, with a simple movement, we can perceive a big difference. We seem to be transported from a place where the fountain is far away to a place where it seems to fall on us quickly."
- Ubiquity: "The exchange of raised voices is characteristic throughout the recording. Being an area with so much loudness, it is not easy to maintain a more moderate level. We can even hear how a man indicates the street where he is, giving instructions to someone he is talking to on the phone: 'I'm on Preciados Street.'"

### 4.3. Augmented Soundwalk

We use the term "augmented" with a double meaning. On one hand, the use of technology helps us to amplify or augment our senses; on the other hand, the possibility of inhabiting possible worlds thanks to the activation of the imagination through attentive listening. The augmented soundwalk aims to make us aware of the sound environment and to appreciate the influence it has on our orientation in physical space, appealing to the present and past experiences of all participants. Through a series of questions, we can guide the participants without limiting their experiences, inviting them to use their tools of analysis of urban space by introducing the sound variable and especially listening as conscious practices. The participants are volunteers among the inhabitants and researchers. They are divided into groups of 20 people, taking a walk in silence. This leads to a narrative of the tour that includes texts, images, drawings, poems, and sounds. The assembly of these materials allows a reconstruction between the real and the imaginary place, while the different descriptions, verbalisations, images, recordings, and comments allow us to delimit shared recurrent elements that define the place studied.

#### 4.3.1. Description of the Soundwalk Augmented Path in Puerta del Sol, Alcalá

The soundwalk starts at kilometre zero (Figure 3), passing by the Mallorquina bakery, one of the points most frequently mentioned by respondents and in Google Forms, to Calle Alcalá, a monumental street that has been redesigned in recent years and is a favourite among street musicians. The soundwalk had four stop points. At each stop, we collected responses to a form including questions following ISO 12913-2:2018 (ISO, 2018) recommendations about sound identification and soundscape assessment, and creative input from participants. The researchers took acoustic measurements, sound level, and audio and video. Sixteen people between 19 and 22 years old, 10 females and six males, participated. The data obtained are on the quality and quantity of sounds heard, the quality of the sound environment, the quality of the visual environment, the congruence or incongruence between the soundscape and the visual landscape, memory, and impression.



**Figure 3.** Route and images of the soundwalk. Photos by Cristina Palmese.

The first interesting result was about the open answer. Some comments highlight the reduction of the questions aimed at simplifying the Soundscape to a few categories, highlighting the need to broaden and complexify:

In this case, I don't think a category is missing, but it is true that the sound of water that predominates in this landscape is not exactly natural, so I don't know if we should look for a different category for these kinds of sounds that are difficult to classify.

Perhaps the way in which we perceive these sounds, that is to say, if they are fleeting sounds (like the voice of a person passing by you quickly) or continuous (like the sound of the fountain).

Contextual sounds (that locate space temporally).

At this moment, we are analysing and cross-checking all the results to design the third type soundwalk and generate the map with the data and recordings.

#### 4.4. Previous Project

Tables 1 and 2 show a sample of the results of two projects implemented at two different times in Puerta del Sol in Madrid, the first one from 1996 and the second from the project Soundscapes of Madrid (2006).

**Table 1.** Results from 1996.

<b>Methods</b>	Mental map, survey, and reactivating listening.
<b>Summary</b>	Recordings, re-activated listening interviews. Groups of emigrants in Puerta del Sol, near the end of Preciados Street. Microphones oriented towards the central clock of the square. Conversations of those emigrants are heard. We can also hear the chimes (11 p.m.).
<b>Sound levels</b>	67 dBA.
<b>Appreciation</b>	Re-activated listening interviews. Easy recognition, especially at the moment when the chimes ring out.
<b>Reception</b>	Strong appreciation of the chimes and negative reception of the voices. Comments refer to the evolution of the place. Nostalgic evocation of a “traditional” Madrid versus Madrid as a cosmopolitan and open city.
<b>Space</b>	Subjects reconstruct the space easily, recognising the wide and semi-enclosed space with the crowd noise and movement, plus the sound signal of the chimes. Recognised as an intermediate space of social exchanges and “dealings” among people.
<b>Time</b>	Everyday moment in the big city. The chimes evoke the New Year’s Eve celebration at this place. Feelings of nostalgia, of when this square was a meeting place and emblem of the Madrid tradition.
<b>Madrid’s representativeness</b>	Highly representative. Representative of the Madrid of the 1990s and the demographic and urban social changes, marked by the voices of the emigrants. Strong emblematic character of the central clock chimes.
<b>Cultural semantics</b>	Comments referring to the changes in the area, the evolution of the city itself, which has led to a loss of the emblematic character of a traditional city, a meeting place for locals and newcomers from the provinces, in favour of an impersonal place, a transit and a meeting point to go to another place of the city. Some comments refer to feelings of insecurity.
<b>Sound material</b>	Voices, raising the debate between a traditional and a cosmopolitan city. In another “sound dimension,” the chimes are strongly recognised and appreciated, being an “emblematic sound” of the city. This sound evokes the traditional world (the church, the town square, etc.).

The results of the two studies show how by listening to the citizens you can read the changes and characteristics, social and cultural, of Puerta del Sol Square. In recent years, Madrid has become an important tourist destination. Puerta del Sol Square is a central and iconic place in the city. It has evolved as the city has undergone several changes in its design (it has been redesigned three times since 1996), and its occupancy and activities have changed, and these changes are evident in these previous studies.

**Table 2.** Results from 2005.

<b>Methods</b>	Book by artist, audiovisual analysis, observation, and deep listening.
<b>Summary</b>	Diffuse and indeterminate sound mixture of the city. Recognition of some sounds with tonal character (horns, beeps of the traffic guards, metallic sounds of machines).
<b>Sound levels</b>	73.4 dBA.
<b>Appreciation</b>	Dense and annoying conjunction of work noises versus the evocative sound of the chimes (significant and attractive for inhabitants and visitors).
<b>Reception</b>	The sound of the chimes is almost inaudible in some parts of the square, due to the constant noises of the construction work.
<b>Space</b>	Semi-enclosed space recognised as a meeting place, a place of sociability and a transit point.
<b>Time</b>	The clock as a time marker, restoring a sound memory of the city and imprinting a character to the landscape.
<b>Madrid's representativeness</b>	Highly representative. Urban noises are representative of the big city, while the chimes refer to a traditional and local vocation.
<b>Cultural semantics</b>	Noisy atmosphere, sometimes annoying, but representative of the vitality and exuberance of the city.
<b>Sound material</b>	Intense, indefinite, broad-spectrum sound mix. Particular sound signatures (horns, sirens, beeps, bells) that orient and mark rhythms and places.

## 5. Discussion and Conclusion

The characterisation of the soundscape situation in space and time is a fundamental tool to support the planning and management of urban space. The participants' critical analysis of the closed criteria of sound cataloguing established in the questionnaires is interesting. By offering the possibility of commenting on the questionnaire, the participants bring new, personal, and elaborated ways of describing the sound space (for example, the sound of the fountain in the square makes a participant doubt whether it is a natural sound or not). We were able to verify through the verbalisation of the participants that the characteristics of the sonic space are specific to each place, each moment, and each social and environmental context. Although we recognise the usefulness of establishing sound categories in initial forms (natural sounds, animals, traffic, humans, etc.), it is crucial to consider the rich perceptual come from an in-situ analysis of sound phenomena that integrates the present with the absent, the quantitative with the qualitative. The difficulty lies in the need to constantly adapt the methodology to a specific place, to have enough time to develop a complex methodology, to work with changing and subjective variables, and to involve enough people to understand the characteristics of the soundscape and its influence on the quality of life of citizens.

The application of qualitative methods from the artistic, compositional, and musical fields can be combined with tools from sociology, environmental psychology, geography, or ecology with the necessary and appropriate contribution of urban planners and designers to adapt the results to the urban project processes. The combination of soundwalks, walks including random interviews (impromptu), in-depth interviews, in-situ and online questionnaires, acoustic measurements, and other data collection strategies (recordings, videos, geolocation applications, drawings, etc.), guarantee a collection of quantitative data. It is a work in progress, in which we have also relied on results from previous soundscape studies, showing how sound evolves and

represents changes in public space. This study is in an initial phase, so the sound map is under construction, actively involving stakeholders and qualitative data to reflect the perceptions and experiences of citizens.

We are aware of the difficulty of analysing results, and we think it is necessary to propose these approaches, which do not tend only to create archetypes that can be transferred to other similar realities, but rather highlight the experience lived in a specific place, with its resonance, its specificities, its rhythms, and its diversities.

To deeply understand our way of living in a place, we need to rethink our connection to the environment. The results also show that users do not pay much attention to the quality of public space in all its aspects. Puerta del Sol has become a transit and shopping area, and the new design of the square includes uncomfortable seating to discourage users from lingering. Inviting people to listen carefully also means reconnecting with the environment, reflecting together on the qualities of our increasingly hostile public spaces, and, above all, raising awareness of the challenges posed by climate change.

The next step of our work will be to design an augmented soundwalk, considering the results already obtained and integrating scientific and artistic tools in a long-term data collection session in Puerta del Sol, and to complete the sound mapping (Palmese & Carles, 2022).

The new GIS technologies and the new sound cartographies make it possible to go beyond the traditional noise maps to include the aural experience of the territory, considering sensory and qualitative variables and the contexts linked to the territory. This ongoing research, with preliminary results, highlights the potential for open experimentation, for an intuitive and aesthetic approach that, although difficult to categorise, provides valuable feedback on the local place and its users. Another challenge will be to go beyond the descriptive aspects through new analyses: semantic, phonetic, linguistic, discourse analysis, spatial-sensory associations, etc.:

The situated knowledge i.e., an intuitive and multiple experience of place is hard to categorize or even describe due to its almost instinctive and ever-changing nature. Therefore, it will be necessary be about and take place through multiple and collective in-situ experience of place. And the main result of this research process will be the experience itself, making sense of place. (Sand & Atienza, 2016, p. 54)

### **Acknowledgments**

We would like to thank María Paloma Ramos Riesco and María Elvira Chover Alvarez Monteserin and their team for their support during the realisation of the project Soundscapes of the Central District of Madrid: Identity and Listening. Thanks to all the people who kindly participated in all phases of the project. This article is based upon work from COST Action DOPMADE, CA18204, supported by COST (European Cooperation in Science and Technology).

### **Funding**

The work was supported by Dirección General de Patrimonio Cultural, Madrid City Council.

### **Conflict of Interests**

The authors declare no conflict of interests.



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## About the Authors



**Cristina Palmese** graduated in architecture from the University of Naples. She is a specialist in Urban and Architectural Design, having graduated from the same university and the Technical University of Graz in Austria. She holds a PhD from the Higher Technical School of Architecture of Madrid. She is an independent researcher and director of the Paisajesensorial Office-Lab. She is the curator of *Semana del Sonido Madrid* and co-director of the programme *La Casa del Sonido* (House of Sound) on Radio Clásica of RTVE. She develops work in interdisciplinary fields that combine theoretical, applied, and creative research.



**José Luis Carles Arribas** is an ecologist and composer, as well as a doctor of Biological Sciences (Autonomous University of Madrid) and a professor at the Interfaculty Department of Music, Autonomous University of Madrid. His research focuses on acoustic ecology and soundscapes. He collaborates with international research groups and publishes the results in national and international journals on music, landscape, acoustic ecology, and urbanism. Between 1986 and 2001, he was a researcher at the Institute of Acoustics (CSIC–Madrid), National Centre for Scientific Research. He is, since 2002, the director of the programme *La Casa del Sonido* (Radio Clásica, RTVE).



**Alejandro Rodríguez Antolín** (Ferrol, 1995) holds a PhD in Musicology (Autonomous University of Madrid), specialising in music, sound technologies, and digital humanities. His academic studies are related to interdisciplinary and multimedia creation in relation to electroacoustic music and sound art, as well as computer and automatic/algorithmic music creation and contemporary music. His doctoral thesis, *Beyond the Electric: Electroacoustic Music in Spain. Multimediality and Interdisciplinarity*, related to the history, situation, and particularities of Spanish electroacoustic music, was defended in March 2023.