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MULTISPECIES SOUNDSCAPE CHARACTER: CONCEPTUALISING SOUNDSCAPE CHARACTER FOR/FROM MULTIPLE PERSPECTIVES

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ABSTRACT

Soundscapes are experienced through multiple perspectives, human and non-human. Accordingly, many research approaches and methods are currently being developed to characterise and improve soundscapes for people and wildlife, and to understand environments through their sonic character and expression. These methods include self-reports such as questionnaires, interviews, and soundwalks, alongside more ‘objective’ measures, such as acoustic indicators (e.g., sound pressure levels) and ecoacoustic indices. However, current approaches are not fully integrated and might favour one species (humans) over others (nonhumans). This skew could in part be due to communication limitations in accessing subjective experiences from other species, as well as ontological limitations that prevent us from experiencing the world other than through anthropocentric lenses.

Current approaches are also not integrated within landscape architecture and urban design practices as knowledge from research does not align with practitioners’ ways of working. In this paper, we develop a framework that seeks to integrate landscape-led approaches to character assessment, with knowledge, understanding and methods from ecoacoustics and soundscape research. Through the interweaving of various approaches to soundscape research with landscape practice methods, the proposed framework

has the capacity not only to translate research into practice, but also to expand soundscape concerns beyond the human.

Keywords: *multispecies, soundscape character, landscape architecture, soundscape management, soundscape design*

1. INTRODUCTION

1.1 Contextualising the need for an integrated definition of soundscape character

Could soundscape characterisation provide a tool for multispecies decision-making? Landscapes are inhabited by multiple communities, who sense and emit sound to communicate, navigate environments, and thrive within them. Evaluation of soundscape has been a methodological topic across multiple disciplines including acoustics, ecology, urban planning, and landscape architecture, to assess the resulting soundscapes. Those approaches, however, are currently not fully integrated for the assessment and design of holistic soundscapes for and from multiple perspectives.

In this paper we explore whether soundscape characterisation could provide a tool for multispecies decision-making in landscapes. We seek to develop a tool capable of capturing the unique natural, cultural and (more-than-human) social interactions that characterise each soundscape and that acknowledges how the quality of those soundscapes affect the lives of the plural communities living within them. To that end, we draw from approaches developed within landscape architecture and planning, specifically landscape character assessments, to draft an

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inclusive framework for conceptualising and assessing multispecies soundscape character.

Landscape architecture and related disciplines have been subject to critique regarding their focus on visual aesthetics [1,2]. This critique relates to postmodern discourses in philosophy discussing the hegemony of vision in the western world in general and during the modernistic era in particular [3]. The critique is partly speculative, as there is limited research on the topic, but it has been shown how other factors can be given priority over soundscape, even in a noise exposed landscape development situation [4]. There have also been reports from interviews with practitioners indicating that “noise as level” is given relatively more focus compared to “sound as opportunity” [5]. One problem is that questions on the sound environment are left to acousticians, who may be called in late in the process [6]. Landscape architecture is a complex field, where the landscape architect can be described as a generalist who is expected to have knowledge in everything from social interactions and traffic planning to soil chemistry, plant physiology and aesthetics. There is a need for tools and understandings about sound that align with how the profession works. Despite this historic focus on the visual, it is within the complexity and generalism of landscape architecture that holistic approaches for assessing landscape character have emerged. Our emerging framework for soundscape characterisations draws from these landscape-led approaches, and in turn provides the basis for integrating sound within them.

To contextualise our framework, we start by reviewing soundscape definitions over time. Next, we examine prevailing landscape definitions and characterisation methods and principles that can be extrapolated to multispecies soundscape characterisation. Finally, we introduce our emerging soundscape characterisation framework and conclude with key questions that have emerged from the process of drafting it. Our framework is a work in progress tool and a starting point for future development, and research and practice collaborations.

1.2 Overview of soundscape definitions over time

Soundscape is a concept with multiple meanings and understandings. The term started to evolve during the 1960s with early known usages by Fuller [7] and Southworth [8]. The concept is often associated with the Canadian composer, educator, and environmentalist Murray Schafer, who was an influential figure in the early development of soundscape research. Schafer drew on his background in music to discuss sound environments from an experiential perspective (see

e.g.,[9]). In the late 1960s, he initiated the interdisciplinary World Soundscape Project (WSP) that lay the ground for much of upcoming work in soundscape, and which is associated with at least two seminal works [10,11]. While Schafer and WSP have undoubtedly been influential, critique has also been raised suggesting the group took a normative stance for natural soundscapes while being less prone to acknowledge qualities in the urban soundscape [12]. Research in the WSP tradition has also been largely anthropocentric [13]. The term “acoustic ecology” tends to be associated with research following in the WSP tradition.

Schafer used the term soundscape in an interdisciplinary manner, believing that a broad and inclusive understanding would inspire collaboration between fields. Schafer thus refers to soundscape as “any acoustic field of study” or simply “the sonic environment” [10]. Furthermore, both actual sonic environments and abstract constructions (like recordings, radio, compositions, or music) are included. In a subsequent definition proposed by another member of the WSP group, Barry Truax included perceptual constructs and contextual relations in his definition [11]. Truax defines soundscape as an “An environment of sound (or sonic environment) with emphasis on the way it is perceived and understood by the individual, or by a society. It thus depends on the relationship between the individual and any such environment. The term may refer to actual environments, or to abstract constructions such as musical compositions and tape montages, particularly when considered as an artificial environment” [11].

Truax’s definition had an influence on the ISO/TC 43/SC 1/WG 54 working group that developed the ISO 12913 standard on soundscape [14,15]. In line with Truax’s definition, the working group chose to emphasize human perception [16,17] and the ISO 12913 defines soundscape as: “acoustic environment as perceived or experienced and/or understood by a person or people, in context” [18]. In addition to the anthropocentric focus, it is also noteworthy that the definition emphasizes “context”, which could include multiple factors like social aspects, cultural significance, weather, visual setting, and sensory interaction. Perhaps in part due to the contextual and perceptual aspects, the ISO definition has seen wide usage, but the focus on human perception limits the definition’s applicability in fields such as ecoacoustics, bioacoustics and soundscape ecology where other species’ perception are of importance. Moreover, the definition may not encourage planning and





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design of outdoor environments that are inclusive to all species [19].

Alongside the ISO definition, there have been attempts to define and/or describe soundscapes without focusing on anthropocentric perception. In soundscape ecology, for instance, where a more inclusive understanding is necessary, the usage of the term aligns with an ecosystem understanding, supporting the interactions and effects among multiple species. Soundscape, according to Pijanowski et al. is: “the collection of biological, geophysical and anthropogenic sounds that emanate from a landscape and which vary over space and time reflecting important ecosystem processes and human activities” [20]. This broader and process-oriented understanding does not focus on perception (for any species).

There have also been attempts to include other species’ perspectives into soundscape. Coming from ecoacoustics, Farina et al. make a distinction between an objective sonoscape on the one hand, and its interpretation (soundscape) on the other [21]. The sonoscape constitutes all sonic information (uninterpreted), while soundscape has been “cognitively interpreted into a mosaic of semiotic categories of geophysical, biological and human-generated sounds by an organism” [21]. While cognitive capacity varies among species, the inclusion of all organisms is a significant aspect of this definition.

Mitchell et al. recently proposed an alternative definition to harmonize the ISO definition of soundscape, drawing on usages in various fields [14]. The intention is to take account for human perception, while not excluding perception of other species. The suggestion is “a soundscape is the auditory environment of a place, setting, or community, whose character is the result of the interaction with non-auditory and/or contextual factors.”

The varying definitions of soundscape over time have guided the methods that have followed within disciplines and the aims of research projects that have adopted them. We turn to relevant methods in section 2.2 when introducing our framework.

2. DEVELOPING A LANDSCAPE-LED FRAMEWORK TO DEFINE MULTISPECIES SOUNDSCAPE CHARACTER

The earliest known usage of the word landscape is from the Dutch language in the late 16th century, (landschap, land + -

schap -ship). This early usage, primarily associated with visual art depicting natural sceneries, spread to other countries including England. The first part of the word “land” is referring to both a place and people inhabiting that place, while the second part has the same etymological root as shape (form, configuration) [22]. In more contemporary usage, landscape has been used to refer both to a representation of a scene (like in a pictorial view or image), or to a landform or region [23]. In 2000, the European Landscape Convention suggested a new and more holistic definition of landscape, which is less centred on the visual [24].

2.1 Landscape-led approaches to landscape character assessment

The definition of landscape that emerged from the European Landscape Convention [24], has influenced not only the way landscapes are conceptualised within Europe and beyond, but also the ways landscapes are characterised and assessed for their protection and management within policy and practice. The ELC described a landscape as “an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors” [24]. And it is to this definition that the ISO 12913-1 standards turn when defining “soundscape” as an aural analogue to “landscape” [16,18].

The inclusion of “character” within this definition encouraged the proliferation of landscape characterisation approaches as key tools for decision-making for landscape research, planning and management [25]. These approaches primarily drew from the Landscape Character Assessment (LCA) methods developed in the UK during the late 1980s and 1990s, as they matured at the time the ELC was published [26], and open access thorough guidance on its application was published online shortly after [27]. Although methods for LCA differ amongst and within countries, they share similar aims and principles with each other and with the ELC. The principles that sustain the LCA in the UK concur with the objectives of the ELC and can provide a starting point to develop a framework for multispecies soundscape characterisation and subsequent assessment in global settings. We turn to these principles now to contextualise our emerging multispecies soundscape characterisation framework.

2.1.1 Landscapes are everywhere

During the second half of the 20th century, in the UK, there was a progressive move from the protection of “best” landscapes to the acknowledgement that all landscapes are





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worthy of recognition, each with “a distinctive character that requires place-sensitive management” [26]. Accordingly, the LCA defines landscape character as “a distinct and recognisable pattern of elements, or characteristics, in the landscape that make one landscape different from another, rather than better or worse” [28]. So it follows that if landscapes are everywhere, and all matter, so do the human and non-human communities that inhabit them and are affected by them. Within its preamble, the ELC acknowledges that “the landscape is an important part of the quality of life for people everywhere: in urban areas and the countryside...in areas recognised as being of outstanding beauty as well as everyday area” [24]. Within the context of this paper, we extend the inclusivity of landscapes to the non-human communities inhabiting them as well.

2.1.2 Landscapes are scalable.

The methods developed for the characterisation of landscapes took into account that different types of scales are required for different levels of assessment. Accordingly, the resulting methods can be applied at any scale to suit the focus of the study. When it comes to multispecies landscapes, scalability in mapping and assessment aligns with the dynamism of ecological processes and their “feedbacks and interactions across scales” [29].

2.1.3 Landscapes are participatory and plural.

In parallel to the move from the identification and protection of “best” landscapes to all landscapes, the methods for characterisation of landscapes also moved from objective measurements by experts to perceptual assessments of landscapes by communities [26]. At the heart of both the LCA and ELC is understanding and capturing how landscapes are perceived and experienced by communities. Within the LCA, the fieldwork stage is essential to capture these perceptual qualities and for layering them with other measures and assessments of the landscape.

2.1.4 Landscape characterisations are “neutral”.

In the LCA, landscapes are characterised as baseline for follow up judgements, decisions, and recommendations. Both the LCA and LCE advocate for this 2-stage process of landscape characterisation and assessment. The output of the characterisation is a map and accompanying description of character types and character areas, which provides a neutral baseline of existing character that can then be used for different purposes. The separation of the characterisation stage from a follow up stage of judgement or evaluation, allows the later stage to be tailored according to the focus of the study (e.g., landscape management for specific species).

2.1.5 Landscape characterization can provide an integrated spatial framework for decision making.

The LCA method, that responds to the ELC landscape definition, embraces “all the physical, natural and social/cultural influences that have shaped the land, together with the ways that [more-than-human communities] interact with and perceive it, together again with the act of shaping future landscapes” [25]. The framework has the capacity to integrate different disciplinary perspectives and approaches in a sequence of work that includes desktop studies and extensive fieldwork. And it is to this integrated spatial framework that we turn to in the next section to propose a multispecies soundscape character framework that threads landscape and soundscape approaches.

2.2 Multispecies soundscape character: integrating landscape character with existing soundscape assessment approaches.

We concluded our overview of soundscape definitions and tools (2.1), with two recent definitions of soundscape, both of which could be considered to align with the landscape approaches and principles described above. The first definition, by Farina et. al, [21], expands prevailing soundscape definitions within soundscape ecology and eco- and bioacoustics to include perception by animal species, previously excluded from the definition, and thus aligning with principle 2.1.3 above (landscapes are participatory and plural). The second, by Mitchell et al. [14], expands the ISO understanding and includes “character” within its definition, paving the way towards “neutral” soundscape characterisations (principle 2.1.4) that can provide the baseline for a wide range of decisions, and judgements, according to the purpose of study, and human and non-human communities involved.

Both definitions align with our argument that a landscape-led framework can provide a suitable integrative model for multispecies soundscape character assessment. Such a framework would emerge from a working definition of soundscape character that envisages the soundscape as “the aural expression of the landscape and its communities (human and non-human), as perceived and experienced by those communities”. In turn, soundscape character, as an analogue for landscape character, could be defined as “a distinct and recognisable pattern of sounds, or aural characteristics, that are spatially located and make one soundscape different from another, rather than better or worse”.





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An integrative multispecies soundscape framework has the potential for weaving a wide range of existing soundscape methods from different disciplines that have differing but complementary purposes, including:

- ISO 12913 standards and approaches, that study and analyse soundscapes through human perception. [18]
- Other methods of capturing human perception and experiences (e.g., [2,19,30,31]) for landscape projects.
- Methods for capturing existing sonic and aural effects that influence the propagation of sounds and how these are perceived [19,32].
- Acoustic measurements (objective and quantitative; including sound pressure levels) that provide objective and quantitative.
- Ecoacoustic indices, that study the soundscape as a vehicle to understand the health and composition of habitats (see for example [33]).
- More-than-human participatory methods that capture non-human perception and experiences of soundscapes. To our knowledge, this is an area yet to be explored, however, more-than-human participatory research methods have been attempted within environmental humanities [34], opening an avenue for future exploration. Existing human perception methods could also be expanded, through for example, the inclusion of animal personas as part of assessments [35].

For the purposes of our emerging framework, these methods could be grouped into four categories to provide a composite assessment of soundscape character: physical; cultural and social; human perceptual and aesthetic; and other-than-human perceptual and aesthetic, as detailed in Figure 1. Table 1 details how the framework has emerged from Figure 1 of the Landscape Character Assessment [28] and the Townscape Character Assessment [36].

Our integrative framework (Fig. 1), weaves methods from differing disciplines that pursue different aims. Accordingly, the framework has the capacity to characterise holistic soundscapes as *scalable*, *participatory*, and *plural*, and *neutral*, as well as considering that *soundscapes are everywhere*, linking with the principles introduced earlier (2.1.1-2.1.5). In *scalable* soundscape characterisations, the level of detail can be fine-tuned according to the area of study and chosen scale, and linked with other studies, such as Green Infrastructure Strategies. In *participatory and plural* soundscape characterisations, relevant human and non-human communities present on site can be included. In *neutral* soundscape characterisations, characterisations can be undertaken prior to judgement, to tailor judgements

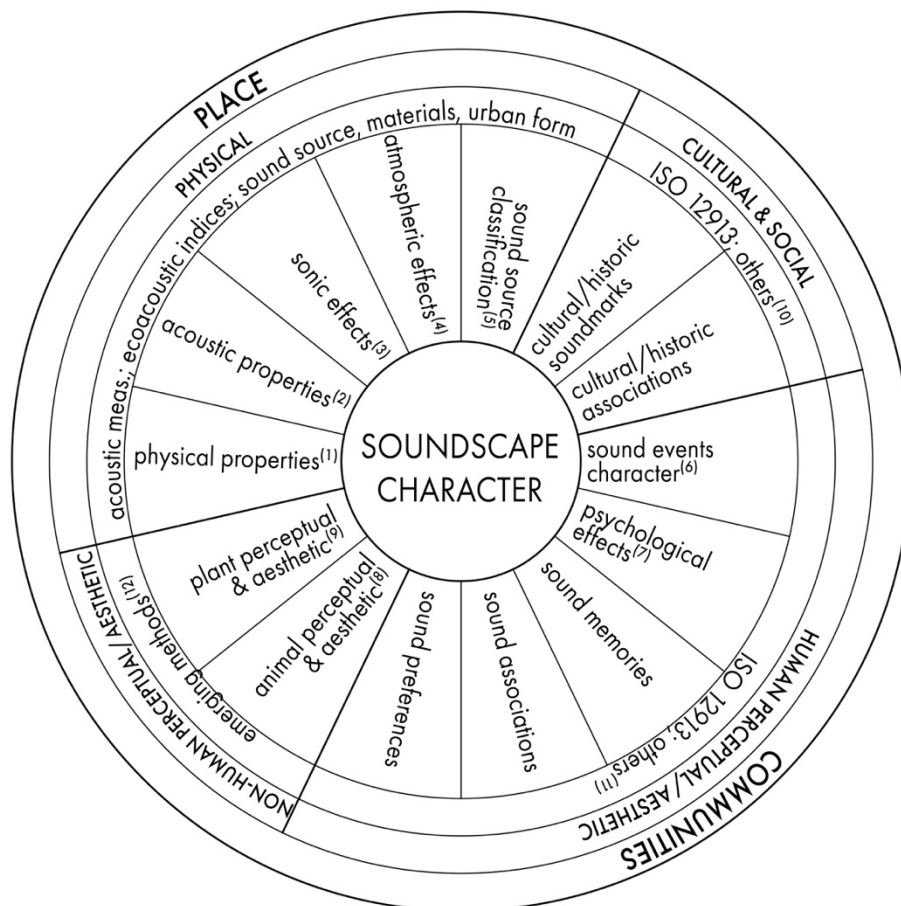
according to purpose of study. Finally, in soundscape characterisations that consider that *soundscapes are everywhere*, all soundscapes are worthy of study and characterisation can be applied to urban, peri-urban, rural, and coastal soundscapes.

Table 1. Translating landscape and townscape character into soundscape characterization categories and sub-categories.

LANDSCAPE/TOWNSCAPE CATEGORIES & SUBCATEGORIES	SOUNDSCAPE CATEGORIES
Natural/Physical	Physical
Geology	Sound sources; Physical properties; Acoustic properties
Landform/topography	Sound sources; Physical properties; Acoustic properties
Hydrology/waterways	Sound sources; Physical properties; Acoustic properties
Air & Climate	Sound sources; Atmospheric effects
Soils	Sound sources; Physical properties; Acoustic properties
Land cover: flora, fauna (inc. humans), materiality	Sound sources; Physical properties; Acoustic properties
Architecture, urban scale & mass	Sonic effects
Cultural/social	Cultural/social
Land uses, land ownership	Sound sources
Cultural expression	Cultural/historic soundmarks & associations
Time depth	
Perceptual/aesthetic	Human perceptual/aesthetic
Memories	Sound memories
Associations	Sound associations; Psychological effects
Preferences	Sound preferences
Sight (colour, texture, pattern, form)	Sound events character
	Other-than-human perceptual/aesthetic (NEW)
	Plant perceptual & aesthetic
	Animal perceptual & aesthetic



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⁽¹⁾Physical properties of sound, incl. sound pressure levels.

⁽²⁾Acoustic properties, incl. surface effects of materiality (hard & soft) & hydrology.

⁽³⁾Sonic effects resulting from architecture, urban scale & massing.

⁽⁴⁾Atmospheric sonic effects.

⁽⁵⁾Sound source classification: Biophony (sonic expression of vocalising fauna); Geophony (sonic expression of geology, air & climate, hydrology, landform, soils); Anthrophony (sonic expression of humans & their machines).

⁽⁶⁾Sound events character (rhythm, duration, texture, pitch).

⁽⁷⁾Psychological sonic effects and psychoacoustic indices (ISO 12913).

⁽⁸⁾Animal perceptual & aesthetic, potentially incl. sound associations (e.g. stressors, food sources, mating), preferences (e.g. for behaviour), memories.

⁽⁹⁾Plant perceptual & aesthetic, potentially incl. sound associations (e.g. stressors), preferences (e.g. for locating water), memories (?).

⁽¹⁰⁾Other methods of capturing cultural and sonic associations, incl. creative methods.

⁽¹¹⁾Other methods for sound memories, associations, preferences, and character (e.g., [2,19,30,31]).

⁽¹²⁾Emerging methods incl. arts methods, more-than-human participatory methods, ecological methods.

Figure 1. Proposed emerging Soundscape Characterisation Framework.



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3. CONCLUSION

The emerging framework for soundscape characterisation introduced in this paper has the capacity to aid decision making for landscapes from a multispecies lens. The framework integrates varying existing soundscape and acoustic methods that serve different purposes, and in analogy with landscape characterisation, consider the physical environment and how that environment is perceived and experienced by the communities (human and non-human) inhabiting them.

The development of the framework, and in particular our attempt to consider non-human communities at a par with human ones, has opened questions for future research and development. We would like to conclude this paper with two of those interrelated questions: how can we characterise non-human perception? And to what degree are human perception categories (memories, associations, and preferences) transferable to non-human communities?

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