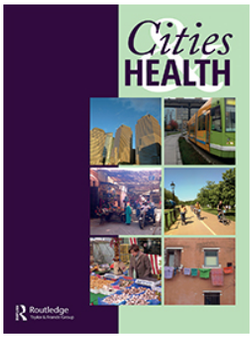

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REFLECTIVE PRAXIS -THINK-PIECE

Acoustic sustainability in urban design: lessons from the World Soundscape Project

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ABSTRACT

The pioneering work of the World Soundscape Project in North America and Europe in the 1970s has laid a foundation for acoustic ecology, soundscape composition and a model of the acoustic community. Based on this work, the author suggests some guiding principles for the qualitative aspects of urban acoustic design and sustainability that address quality of life issues.

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Acoustic Ecology; acoustic community; quality of life issues

It is widely recognized that the pioneering work of R. Murray Schafer and the World Soundscape Project (WSP) at Simon Fraser University in the 1970s has laid a foundation for the contemporary understanding of acoustic ecology and how it supports current work in sound studies and context-based soundscape composition. Moreover, its concepts have contributed to a contemporary understanding of acoustic sustainability, which I define as our ability as a culture to live within a positively functioning soundscape that has long-term viability. Schafer's turn from an anti-noise stance to a listener-centred approach based on the soundscape concept in the late 1960s was the seminal shift that allowed a subjective, cognitive, and culturally based model to be formulated that described the soundscape as a system of auditory relationships. Although the WSP group did collect quantitative data, the emphasis in its research embodied a more qualitative approach in terms of sound perception, and an informational approach in terms of how sounds functioned in shaping a community. Enlarging the scope of the soundscape model from the individual listener to larger social structures resulted in the concept of the acoustic community, and developed fieldwork methodology to establish how in practice such communities function, and how they continue to evolve, as well as to what forces they are vulnerable. Based on this work, this article suggests some guiding principles for the qualitative aspects of urban acoustic design and sustainability that address quality of life issues.

The extensive WSP field recordings from Vancouver, across the breadth of Canada and selected European locations, all in the 1970s, as evidenced by the Subject Index of its recording catalogue, included everything from natural and human sounds, to all aspects of community soundscapes, technological sounds, and sounds as indicators. Although Schafer initially focused on noise issues, as in his *Book of Noise* (1970) and the WSP's *Survey of Noise By-Laws in Canada* (1972), the WSP's first soundscape analysis was about its home city, with *The Vancouver Soundscape* (1973), a booklet and two long-play recordings. It included historical accounts of the city's soundscape as it grew, called 'earwitness accounts' derived from interviews and print documents, and a survey of the features of the city's soundscape, classified as its keynotes, signals and soundmarks. Keynote sounds and sound signals refer to the perceptual aspects of the soundscape, as characterized by background and foreground listening habits respectively, whereas soundmarks are based on their cultural importance in the community, including social, political and economic factors. Significantly, electroacoustic sounds and audio media were also analyzed for the ways in which they shaped perception and extended the concept of the acoustic community. The study also used Schafer's metaphor of 'hi-fi' and 'lo-fi' soundscapes to describe the range of soundscapes in terms of their clarity and acoustic balance, thereby framing noise as not merely the source of negative health effects which needed to be regulated and mitigated, but placing it within the concept and practice of 'acoustic design' of the soundscape as a whole.

Subsequent recording projects of Vancouver took place in the 1990s with digital recordings, as well as in the most recent decade, such that the WSP's Vancouver collections now comprise a longitudinal survey of the city's soundscape as it has evolved over the past 40 years. An interactive Google map allows the sites of the various recordings to be identified, and links within the online catalogue allow users of the WSP Database to compare similar locations recorded in each decade. A double CD issued in 1997 included recordings from the 1973 and 1996

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projects, and an audio documentary that presented examples of how the soundscape had changed over that period. The two CDs also illustrated how soundscape composition had changed from the largely collectively produced 1973 soundtracks in a style now known as the phonographic document (i.e., with minimal or only transparent manipulation), to individually authored sound compositions based on various soundscape themes.

However, in terms of the noise issues normally associated with cities, the major breakthrough for the WSP came with the 1975 European tour and the extensive study of five specific villages that had a clearly defined and highly varied acoustic character, located in Sweden, Germany, Italy, France and Scotland. That research resulted in the *Five Village Soundscapes* publication in 1978 along with selected recordings from each site. Prior to that trip, the group had documented a specific rural, bioacoustic habitat and recorded it over a 24-hour period, with the aim of compiling a one-hour audio portrait of the daily cycle at midsummer (called *Summer Solstice*, in 1974). Compared with the often unbalanced soundscape of the city, the recordings of this largely natural environment showed the intricate and functional balance of what Bernie Krause would later conceptualize as an acoustic habitat. Krause further established a scientific basis for the WSP's qualitative assessment by identifying acoustic 'niches' in the non-overlapping frequency ranges of its sounding species. The lack of significant masking between the various sonic components, accompanied by ever-evolving temporal patterns on various time scales from micro to macro, seemed to be fundamental to a model of an acoustically balanced and well functioning soundscape.

Therefore, the European study sought to identify a human-oriented model of a similarly healthy soundscape that constituted what Schafer and Barry Truax have called an 'acoustic community' where sound plays a formative and largely positive role in the definition of the community and the lives of its inhabitants. In terms of the longitudinal theme referred to with Vancouver, these five villages, and one in Finland, were re-visited by a group of Finnish researchers 25 years later and the results published in *Acoustic Environments in Change*, along with a re-print of the original WSP study, and four CD's of sound examples. The Finnish researchers took a specifically cultural and anthropological approach to their study, thereby emphasizing the qualitative aspects of the soundscape, and sometimes relying on the 'memory walk' as an extension of the original 'soundwalk' technique of the WSP combined with earwitness interviews, a practice the WSP had only been able to use in the study of the Scottish village. Taken together, these studies identified the wide variety of sounds heard in the community, the complexity of interpretation of the information conveyed by those sounds with locals, the balancing forces (spatial, spectral, temporal, and cultural) that kept the soundscape in a dynamic equilibrium, the vulnerabilities of each soundscape to change (usually propelled by economic and technological forces), and the need for proactive strategies of preservation and functional design. In short, the concepts and principles of environmental ecology were applied at a community level to define a positively functioning soundscape that can serve as a model for urban acoustic design today.

With today's increasing concerns about environmental issues, questions about sustainability frequently occur, and to this list we may add 'acoustic sustainability', as introduced above, to the discussion about health and wellbeing, particularly in cities. Therefore, it is important to have a model of a positively functioning soundscape on which to base design decisions. Acoustic communities, when regarded on a macro level according to the WSP model, seem to have evolved according to several balancing factors related to physical space, spectral energy, time (e.g., rhythms and cycles) and social practice. In many cases, economic, social and cultural factors have determined the physical design and layout of a village, town or city, but each decision has an acoustic impact, and so it might be more accurate to say that there is a co-evolution between acoustic and cultural developments. This type of co-evolution tends to produce a well functioning soundscape, but it is also one that is vulnerable to change when the balancing forces are disrupted. Noise issues can arise locally or on a larger scale, which along with other environmental stressors can necessitate coping or adaptive strategies by individuals, based on personal factors such as salience, information load, the sense of personal control, as well as prevailing social, economic and political conditions. One of the difficulties of the subjective soundscape model is that, while changes in individual listening habits as advocated by the WSP may trigger the desire for change and a sense of empowerment, it will likely be difficult to reach a broad social consensus, particularly given the human ability to adapt to and ignore even what are negative influences. Therefore, both top-down and bottom-up strategies for acoustic design need to be developed, just as with other environmental risks that society faces today. The lesson one learns from the ecological perspective is that all elements are deeply intertwined and act as an integrated system closely tied to cultural contexts.

One major advantage of the acoustic community model is that it appears to be scalable in size within certain limits, most obviously the distance that acoustic sound can travel. The WSP's concept of the 'acoustic profile' (the area over which a sound can be heard) and the 'acoustic horizon' (the most distant sounds that can be heard at any location) help to establish the range of scales that may be cited. On

the smaller end of possible scales, we can refer to living quarters, workspaces, or teaching, recreation and healthcare spaces, for instance, where the physical boundaries of the space usually determine what sounds are perceived as 'belonging' to the acoustic space as distinct from what are intrusions from areas outside of it. In an urban area, neighbourhoods, districts and other types of self-defined areas may relate to what the WSP found in actual European villages. That is, such areas may function, and/or be designed to function on a human auditory scale, that is, where they are populated by sounds in a similar frequency, loudness, spectral and temporal range as those produced by humans and human actions. Such soundscapes have the potential of encouraging a sense of belonging, identity and social relatedness – a key property of sound in general that is often overlooked, but which can strongly be related to 'quality of life' issues in the city. In fact, areas that function on this human scale are often extremely popular with both residents and visitors, even if seldom described from an aural perspective.

Despite the profound alteration of the behaviour of sound through electroacoustic production, reproduction and transmission, the acoustic community model can be extended to the analysis of what can be called the 'electroacoustic community' whose boundaries are not primarily geographical and whose participants do not necessarily share the same degree of access based on economic differences. In addition, electroacoustic communities are often linked to consumer markets whose implications lie beyond the scope of this article. Media in particular (from radio through to iPods) have created surrogate acoustic environments and allowed them to become imbedded within everyday soundscapes. With digitally based communities, sound may even be an arbitrary component of the community, risking at times in its absence the communicational values it normally incorporates. Despite, or perhaps because of, the prevalence and sheer variety of electroacoustic technology experienced in daily life, current research does not seem to have reached a clear consensus as to whether it constitutes a net benefit to the urban soundscape, acoustic sustainability or public health. However, digitally based audio techniques do create significant possibilities for soundscape composition, as will be touched on briefly later, including the creation of virtual soundscapes.

At the 1998 World Forum for Acoustic Ecology (WFAE) conference in Stockholm, I presented a paper called 'Models and Strategies for Acoustic Design' (available on the WSP Database) where I outlined three acoustic models (the traditional objective, energy transfer model, the subjective soundscape model, and the information-based communicational model) in terms of their basic conceptual framework, their methodological approach, their concept of the role of noise, and their typical design criteria and strategies. The intent was not to prioritize any one model over the other, but to understand and even exploit the limitations and applicability of each model to problems of acoustic design in the environment. In the intervening 20 years, it has been encouraging to see a progression from the first model, the traditional preserve of the acoustical engineer, to the second, the subjective, qualitative soundscape model, as well as a few glimpses along the road to incorporating the third one. For instance, the ISO's Working Group 54 has reached a consensus on the definition of soundscape as an acoustic environment as perceived, experienced and/or understood by people, in context, as distinct from the objective definition of the acoustic environment as sound from all sources as modified by the environment. Current research on the qualitative aspects of soundscape perception – and its impact on listener acceptability, desirability and preferences – is very active in Europe, though less so in North America at this point. What still remains to be explored with this research includes the informational aspect of community based sound, and how it contributes, positively or negatively, to the community's sense of place.

In order to contribute to this ongoing discussion, I would like to propose some guiding principles, based on the foundational work of the WSP, which may be useful in urban acoustic design.

(1) The soundscape (as defined in the WSP's *Handbook for Acoustic Ecology* as 'An environment of sound (or sonic environment) with emphasis on the way it is perceived and understood by the individual, or by a society') needs to be treated as a whole, not merely its component elements; this is a recognition that sound creates relationships and meaning, not just effects.
(2) Listening as the embodied interface between the individual and the acoustic environment needs to be a central concern (with clear implications for education, urban design and policy planning, among other areas). It is encouraging, for instance, to see Schafer's practice of the soundwalk (and by extension, the memory walk) being adopted and extended through a variety of research and pedagogical projects today. What still needs to be developed are methodologies for documenting how information and meaning are created for residents, not merely the affective qualities of the soundscape.

(3) Soundscape design can respond to and create 'quality of life' improvements and 'acoustic sustainability' issues that go beyond traditional risk assessment and legislation (as necessary as those will continue to be); these benefits affect everyone, not just those with particular sensitivities to sound, as valuable as such people's experiences are in order to focus attention on particular issues. Given the vulnerability of soundscapes to changes that threaten the balance of elements that comprise them, careful consideration needs to be given to maintaining soundscapes on a human scale, as argued above, in order to preserve their role in encouraging a sense of belonging, identity and social relatedness, as well as to minimize the risks to physiological and psychological health.

(4) Soundscape design inherently deals with interdisciplinary issues, and can benefit from a wide range of expertise across the sciences, healthcare, the social sciences, the arts, and many related professions. As described below, a broad range of practices generally known as soundscape composition can provide positive experiences and examples of acoustic design with experiential validity.

(5) Acoustic ecology needs to be integrated within other environmental concerns that have a high public profile today, both because of the importance of the soundscape as an 'acoustic habitat' and for the positive, listener-centred approaches and examples it has created; its practices can deepen our understanding and experience of both acoustic and technologically mediated environments, as well as providing alternative sonic worlds we may find inspiring and possibly therapeutic.

This last two points reference soundscape composition, in all of its varied and evolving forms as practiced by an increasing number of sound artists and composers, many of whom are motivated by a desire to respond creatively to current environmental issues. Although artistic sensibilities and aesthetics are valuable in this area, particularly to create attractive sensory experiences, the range of what I am also calling 'context-based creation' – where real-world contexts inform the design and composition of aurally based work at every level – can include pragmatic, applied design areas. For instance, the use of sonification mapping techniques can translate and communicate scientific data into an experiential form that can be understood by the general public, as exemplified by the work of Andrea Polli. Sound installations in galleries have become popular in the last two decades and have the potential to reach a broader audience than with concerts, and in many cases they work on a site-specific basis that draws attention to acoustic design. The current use of multi-channel sound diffusion systems (typically 8 or more, usually based on multiple stereo field recordings, whether conventional, binaural or ambisonic, combined with studio processing) allows a three-dimensional acoustic space to be created, particularly when speakers at different height are involved, in order to immerse the listener and give the impression of being *in* the imagined space, not merely listening to it. The types of acoustic spaces that can be created range from literal simulations, valuable to designers at all levels, through to ones including abstracted sonic elements. At the other end of the continuum, acoustic spaces may be created that are completely imaginary and can be termed 'virtual'. The intention of compositions designed for such spaces may be artistic or otherwise, but if well designed they may engage listeners in intensive ways through aural perception that may carry over into daily life and provide models for well designed soundscapes.

Websites

WSP Database. www.sfu.ca/sonic-studio/WSPDatabase; contact Barry Truax (truax@sfu.ca) for a guest password.
WSP print publications: www.sfu.ca/~truax/index.html#WSP
Sonic Research Studio: www.sfu.ca/sonic-studio
Handbook for Acoustic Ecology: www.sfu.ca/sonic-studio-webdav/handbook/index.html

Disclosure statement

No potential conflict of interest was reported by the author.

Notes on contributor

Barry Truax worked with the World Soundscape Project at Simon Fraser University, editing its Handbook for Acoustic Ecology, and has published a book *Acoustic Communication* dealing with sound and technology, now in its 2nd edition. He is also a composer of multi-channel electroacoustic and soundscape works. Recently he guest edited two theme issues on soundscape composition for the Cambridge journal *Organised Sound*, and is co-editor of the *Routledge Companion to Sounding Art*.

References

Drever, J.L., 2017. Field recording centered compositional practices. *In*: M. Cobussen, V. Meelberg, and B. Truax, eds. *The Routledge companion to sounding art*. New York: Routledge, 71–80.

Gilmurray, J., 2017. Ecological sound art: steps towards a new field. *Organised Sound*, 22 (1), 32–41. doi:10.1017/S1355771816000315

ISO/DIS Document 12913–1. Soundscape: definition and conceptual framework, 2014.

Järviluoma, H., *et al*., eds, 2009. *Acoustic environments in change*. Tampere: University of Joensuu.

Krause, B., 2012. *The great animal orchestra: finding the origins of music in the world's wild places*. New York: Little Brown.

Monacchi., D., 2016. A philosophy of eco-acoustics in the interdisciplinary project "Fragments of Extinction". *In*: F. Bianchi and V.J. Manzo, eds. *Environmental sound artists: in their own words*. New York: Oxford, 159–167.

Norman, K., 2012. Listening together, making place. *Organised Sound*, 17 (3), 257–267. doi:10.1017/S1355771812000143

Polli, A., 2016. Sonification of global environmental data. *In*: F. Bianchi and V.J. Manzo, eds. *Environmental sound artists: in their own words*. New York: Oxford, 3–7.

Schafer, R.M., 1977. *The tuning of the world*. New York: Knopf. reprinted as *The soundscape: our sonic environment and the tuning of the world*. Rochester, VT: Destiny Books 1994.

Schafer, R.M., 1992. *A sound education: 100 exercises in listening and sound-making*. Indian River. Ontario, Canada: Arcana Editions.

Truax, B., 1984. *Acoustic communication*. 2nd edn. Westport, CT: Ablex Publishing, 2001.

Truax, B., 2002. Techniques and genres of soundscape composition as developed at Simon Fraser University. *Organised Sound*, 7 (1), 5–14. doi:10.1017/S1355771802001024

Truax, B., 2017a. Acoustic space, community and virtual soundscapes. *In*: M. Cobussen, V. Meelberg, and B. Truax, eds. *The Routledge companion to sounding art*. New York: Routledge, 253–263.

Truax, B., 2017b. Editorial. *Organised Sound*, 22 (1), 1–3. doi:10.1017/S1355771816000285

Westerkamp, H., 2002. Linking soundscape composition and acoustic ecology. *Organised Sound*, 7 (1), 51–56. doi:10.1017/S1355771802001085