

INTRODUCING SOUNDSCAPE

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Abstract

Soundscape – the acoustic equivalent of *Landscape* – is a relatively new area to many. It concerns the acoustic environment as perceived, experienced or understood by people, in context. Current development in soundscape research is directed towards urban planning and design in promotion of sustainable development, health, well-being, and quality of life. Above all, soundscape is about what sounds are appropriate to, or belonging to, a place. There is no one ideal soundscape. To determine which soundscapes are good, we must consider which activities the soundscape may enable at a place. Furthermore, soundscape creates a sense of place, and it is an important aspect of our cultural heritage. For instance, what soundscapes will our generation transfer to the next, and how will this affect sustainability and quality of life in the future? To incorporate soundscape into urban planning and design, we must understand the relationship between sound and human activities in the urban environment. What sounds and human activities are compatible, and which are not? For example, what sounds are compatible with urban street-life, or with a young children's playground? What sounds promote or impede social interaction in urban open spaces, or what sounds promote or impede tranquillity? In order to advance soundscape research, a coordinated, cooperative and interdisciplinary effort is needed.

1. Introduction

The present paper is a brief introduction to current soundscape research in Europe, relevant to urban planning and design. It is not exhaustive, but provides an overview of some central research activities and their results.

2. Soundscape

Soundscape is best understood as the acoustic equivalent to *Landscape*. Probably, it was first defined in *Handbook for Acoustic Ecology* (Truax, 1978, 1999):

Soundscape – “An environment of sound (or sonic environment) with emphasis on the way it is perceived and understood by the individual, or by a society.”

Since then, many new definitions have occurred, and as of yet there is no consensus on how the term should be defined. Nevertheless, most soundscape researchers seem to agree that *Soundscape* denotes the acoustic environment as perceived, distin-

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guished from the acoustic environment itself. Presently the working group ISO/TC 43/SC 1/WG 54 *Perceptual assessment of soundscape quality* of the *International Organization for Standardization* (ISO) is working on the first part of the first International Standard on soundscape, ISO 12913-1 *Acoustics — Soundscape — Definition and conceptual framework* (Axelsson, 2011a, 2012). The working group aims at international consensus among soundscape researchers and practitioners on a definition. At present (May 2012) the proposed definition reads:

Soundscape – “Acoustic environment as perceived and experienced and understood by people, in context.”

This definition was inspired by the European Landscape Convention (Council of Europe, 2000) that defines *Landscape* as “an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors”.

3. Some European soundscape research

The Canadian composer Murray Schafer is widely recognised for having made the term *Soundscape* popular through the *World Soundscape Project* in the 1970s (Schafer, 1994). In 1998, Schafer visited Stockholm in Sweden to present his ideas about acoustic ecology at the conference *Stockholm, Hey Listen!* (Karlsson, 1998). The conference inspired some noise-and-health researchers, like Professor Birgitta Berglund from Stockholm University, to adopt the term *Soundscape*. Together with Professor Tor Kihlman at Chalmers University of Technology, Professor Berglund took the initiative and developed the first European soundscape research programme *Soundscape support to health*, 1999–2007 (Gidlöf Gunnarsson, 2008). A similarly large and interdisciplinary research programme, named the *Positive Soundscape Project*, was conducted in United Kingdom 2006–2009 (Davies *et al.*, 2009).

Both programmes found that soundscapes may be described by a two-dimensional model of emotional responses: *Pleasantness–Eventfulness* (Axelsson, Nilsson & Berglund, 2010), or *Calmness–Vibrancy* (Cain, 2009). The latter model represents a 45° rotation of the *Pleasantness–Eventfulness* space (Figure 1). Moreover, there is a meaningful relationship between emotional responses and perceived sound sources. Technological sounds (e.g., road traffic) are typically judged unpleasant, natural sounds (e.g., singing birds) pleasant, whereas human sounds (e.g., voices) are eventful, regardless of the sound-pressure levels (Axelsson, Nilsson & Berglund, 2010). This is important to urban planning and design, because it provides us an idea of how to actively design soundscapes. To create a calm soundscape it seems necessary to abate both technological and human sounds, and to promote natural sounds, whereas to create a vibrant soundscape it seems necessary to promote human sounds and to abate technological sounds.

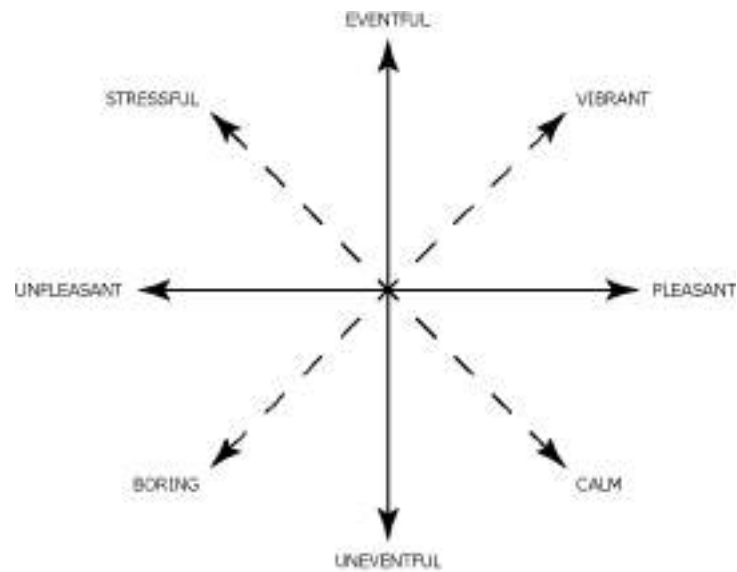


Figure 1. Conceptual model of emotional responses to soundscapes

3.1 Soundscape and water

The environmental planner, Professor Lex Brown, Griffith University in Brisbane, Australia, has proposed a 4-step model for acoustic design of outdoor space (Brown, 2011; Brown & Muhar, 2004), according to which wanted sounds may be used to mask unwanted sounds. In particular Professor Brown has proposed to use water sounds to mask road-traffic noise (Brown & Rutherford, 1994). Inspired by this notion, soundscape researchers have begun to investigate this empirically.

There are several different qualities of water sounds. For example, a purling stream is superior to splashing and hissing sounds from a fountain (e.g., Jang & Kook, 2005; Jeon, Lee, You & Kang, 2010; Rådsten-Ekman, Axelsson & Nilsson, 2012). Unfortunately, it seems that it is easier to use road-traffic noise to mask water sounds than the other way around (Nilsson, Alvarsson, Rådsten-Ekman & Bolin, 2010). In addition, there is a risk that water sounds do not only mask the unwanted sounds, but also wanted sounds, like singing birds (Axelsson, Nilsson, Hellström, & Lundén, 2012). Therefore, it is important to think carefully before erecting a fountain in the urban environment. More research is needed, to find out how fountains must be designed in terms of sound.

3.2 Soundscape auralisation

Another research area that is relevant to urban planning and design is soundscape auralisation (i.e., the rendering of digital virtual reality soundscapes) (e.g., Forssén *et al.*, 2009; Maffei *et al.*, 2010). It aims at creating tools for architects and urban planners for simulating future soundscapes for design purposes.

3.3 Soundscape mapping

A new, emerging area in soundscape research is soundscape mapping. This means to use Geographic Information Systems (GIS), or similar, for analysing and describing current soundscapes, and to plan future soundscapes (e.g., Hällgren, 2011). However, as of yet, no applicable methods or tools have been presented.

4. ISO and soundscape

The Swedish research programme *Soundscape Support to Health* resulted, among other things, in a method for measuring soundscape quality, known as the *Swedish Soundscape-Quality Protocol* (Axelsson, Nilsson & Berglund, 2009, 2010; see also Berglund & Nilsson, 2006; Nilsson & Berglund, 2006; Axelsson, Berglund & Nilsson, 2010). When the research programme ended in 2008, the research team approached ISO, through the *Swedish Standards Institute* (SIS), to propose a Preliminary Work Item to develop the first International Standard on soundscape.

The scope of the Preliminary Work Item Proposal was to provide specifications for questionnaire studies, as well as minimum reporting requirements in soundscape research. The proposed International Standard was intended for researchers or public users who are interested in measuring soundscape quality. Examples of intended applications are questionnaire studies in residential areas, or among visitors in urban open spaces. Based on the *Swedish Soundscape-Quality Protocol*, the International Standard was proposed to cover questions on sound source identification, overall soundscape quality, and attribute profiling. The latter would be used to measure affective qualities of soundscapes by attributes scales like ‘pleasant’, ‘exciting’, ‘eventful’, and ‘calm’ (cf. Figure 1).

The proposal was well received, and a new working group, ISO/TC 43/SC 1/WG 54 *Perceptual assessment of soundscape quality*, was formed (Axelsson, 2011a, 2012). As mentioned above, the working group is presently developing the first part of the first International Standard on soundscape, ISO 12913-1. Within 2012, the working group intends to begin to develop a second part on the minimum requirements for reporting the results of soundscape studies. The working group consists of 32 experts from 16 countries distributed across four continents: Asia, Australia, Europe, and North America.

5. The COST Action TD0804 on soundscape

The same year as the ISO working group was formed, European soundscape researchers and practitioners joined to form the COST Action TD0804 *Soundscape of European Cities and Landscapes*. It will operate until June 2013, and is funded by the COST programme (European Cooperation in Science and Technology), which is supported by the EU RTD Framework Programme. Out of the 36 COST countries, 24 participate in this Action.

The Action is motivated, because reducing sound levels – the focus of EU environmental noise policy (EC, 2002) – does not necessarily lead to improved quality of life. A new multidisciplinary approach is essential. Soundscape research represents this paradigm shift as it involves not only physical measurements but also the cooperation of human/social sciences (e.g., psychology, sociology, architecture, anthropology, medicine) to account for the diversity of soundscapes across countries and cultures. The soundscape approach considers environmental sounds as a ‘resource’ rather than a ‘waste’.

The main aim of the Action is to provide the underpinning science for soundscape research and make the field go significantly beyond the current state-of-the-art, through coordinated international and interdisciplinary efforts. The Action will promote soundscape into current legislations, policies and practice, aiming at improving/preserving our acoustic environment. The Action does this by workshops, seminars, conferences, short term scientific missions, and summer schools.

6. Soundscape and cultural heritage

Soundscape is also an important, but neglected aspect of cultural heritage. The COST Action drew attention to this at its think tank *Soundscape as a part of Culture Heritage* on Capri, Italy, in October 2011. On the one hand, soundscape is important to cultural heritage sites, as well as to cultural festivals and ceremonies. On the other hand, soundscape is an intangible aspect of the cultural landscape, and an expression of human presence and activity. It is transferred from generation to generation, while society is constantly reshaping the soundscape as a reaction to the contemporary environment. Because the soundscape contributes to our well-being and is central to sustainable development, a central question is: what soundscapes would our generation transfer to the next?

7. Designing Soundscape for Sustainable Urban Development

In September 2010, the year Stockholm was the first European Green Capital, the COST Action organised the international conference *Designing Soundscape for Sustainable Urban Development*, on soundscape and urban planning, in Stockholm. It was organised in cooperation with the City of Stockholm, EUROCITIES’ working group on noise policy, Swedish Association of Architects, and the Swedish Society for Town and Country Planning. The purpose of the conference was to assemble practitioners and researchers in architecture, urban planning, acoustics, noise, and related disciplines, to discuss how the soundscape approach may be implemented in urban planning and design in Europe (Axelsson, 2011b).

In the presentations at the conference a number of central themes emerged. The soundscape is an environmental resource that must be creatively planned and designed, not considered in retrospect. It concerns the meaning of sounds, which is fundamental in establishing a sense of place. Soundscape is not a question of how loud sounds are, but what sounds are appropriate to a place. It is an important aspect

of quality of life and may promote or impede psychological restoration, as well as daily activities, like speech, sleep, and recreation. At the same time there is no one ideal soundscape. In order to decide which soundscapes are good, we must consider which activities the soundscape may enable at a place.

The conference highlighted that there is a need for case-study research, where soundscape design measures are evaluated from acoustical, architectural, perceptual, and health points of view. The hitherto low number of large-scale case studies was cited as one reason why soundscape design has not yet reached the urban planners. Architects and urban planners continue to request more concrete cases that inspire and provide a basis for new approaches. Thus far, case studies have been limited to individual residential and recreation areas, as illustrated by the presentations in the conference.

The main conclusion of the conference was that soundscape planning should not be implemented through legislation and directives. Rather, the path to implementation is via applied research in urban planning, in close cooperation with municipalities and other stakeholders, and with the support of basic research and other scientific disciplines such as acoustics, human geography, psychology, and sociology. The strategy is further international and interdisciplinary research collaboration, and exchange of experiences at conferences in urban planning and architecture. Progress will be based on learning from each other by continuing to develop, present and discuss concrete and successful cases of soundscape planning. The special session on soundscape in AESOP 2012 is organised to continue this discussion, and to promote further development.

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