Perception and implementation of quiet areas - Soundscape assets for environmental goodwill in Sweden

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Summary

This article will give a short introductory presentation of the Sound Environment Center, an interdisciplinary soundscape research center at Lund university in Sweden. Some departures in time and theory will outline a background in which ideas behind the creation and the scope of the center are sketched. As an example of the center's research activities, a preliminary report will be given from a recent project dealing with the reception and implementation of Quiet Areas in Sweden. The article will touch upon complexities in the perception of noise and sound and building an interdisciplinary research construct around noise and soundscape. The center at Lund University is coordinating interdisciplinary research on sound environments, promoting exchanges of ideas between researchers of different affinities through research projects, interdisciplinary symposia and publications.

1. Introduction

Since the infusion of the soundscape concept into the research field of acoustics, noise and health, interdisciplinarity has grown to be an integrated feature of this field. General acoustics is more often than not relating to, and collaborating with other fields, and has done so for a long time, like environmental medicine, audiology, social sciences, musicology, construction science, design and many others. Still a holistic concept that includes the width of sound environment research in itself is difficult to find, a concept that could in terms of research offer a framework to encapsule the complexities hidden within so many issues of noise and sound and its effects on people.

In later years the soundscape approach has been said to have shifted the focus of environmental acoustics to a more human-focused paradigm, as manifested in the recently finished COST-Soundscape project (Cost td804) [1]. It has also been stated in the memorandum of understanding of the COST Soundscape project that environmental sound should not be treated as a waste. This is an important factor behind the concept of Quiet Areas as will be discussed in the present paper. Sound is one of many sensations in a "sensescape" and an important resource for promoting wellbeing and health.

2 The Sound Environment Center

As a response to the complexity in sound environ–ment issues, Lund University in Sweden has inaugurated an interdisciplinary academic center for research, the Sound Environment Center. Founded in 2005, the center has been up and running since 2006. The basic functions of the center have been financed in three year cycles by the University, whereas major research projects have received funding from external foundations and donors. The center has an interdisciplinary board, appointed by the Vice-Chancellor in consultation with the involved faculties. Ranging from; acoustics, noise abatement and soundscape understanding; to epidemiological mapping of health and biological effects; hearing and voice disorders; music and cognition; many facets of sound are covered.

The center connects to national and international research networks and partners and has access to high tech laboratories in the humanistic faculty at Lund university and projects are making use of eye-tracking technology, articulograph, VR-lab and recording studio. Current projects focuses on

health and cardiovascular issues, noise, acoustics, voice production, speech intelligibility, as well as eyetracking studies of cognitve aspects of sound exposure. An important part of the activities of the center consists of the arrangement of interdisciplinary symposia, providing platforms for exchange of information and interdisciplinary contacts within the University, as well as surrounding research environments and the public. The symposia engage the sound environment research community at national and inter-Nordic levels. A number of renowned lecturers have participated over the years, including Wolfgang Babisch, Jens Holger Rindel, Kerstin Persson Waye, Greg Watts, Tor Kihlman, Mette Sörensen, Staffan Hygge, Bridget Shield and Iren van Kamp to name a few.
Many symposia result in printed publications and a growing number are available in English: "Man, Mind & Emotion" [2], "Sounds of History" [3], "Speakers' Comfort" (Brunskog et al., 2011) [4] and the report from the "Care for Sound" symposium on health care [5] arranged together with Ecophon, Sweden. As a reaction to the recent revision of Swedish Noise Regulations regarding traffic noise and housing, the center arranged a major symposium in the fall of 2015 *Bo i Ro (Live in Peace*) in Stockholm, where many of Sweden´s most important researchers participated [6]. A follow up to *Bo i Ro* is under discussion together with KI in Stockholm, when the new and anticipated WHO report on noise has been published.
Printed reports and downloadable pdf´s contribute to the cross disciplinary research community together with the quarterly newsletter and a Facebook site. The center has also been able to offer calls for seed money to stimulate larger applications to established funders.

2.1 Interdisciplinary projects

In collaboration with DTU in Denmark two large interdisciplinary research projects have been started in The "Speakers' Comfort" project (funded by AFA - project leader Jonas Brunskog). investigating teachers' voices in different acoustic conditions with regard to health aspects[4]. The project has resulted in two dissertations: one in speech pathology, "Voice use in teaching environments, Speakers' comfort" by Viveka Lyberg Åhlander, (2011) [7], and one by David Pelegrín García, "The role of classroom acoustics on vocal intensity regulation and speakers' comfort" (2011) [8]. The core research group has followed up with another fully financed project investigating the early development of voice problems by using high-speed camera techniques. *Damage and healing processes for voice health; High Speed Camera and biomechanic models.* Both projects providing firmer foundations for finding, diagnosing and helping individuals in voice demanding occupations.
The center has been involved in other research projects of varying size and financial conditions coordinated through the framework of its interdisciplinary environment, including epidemiological studies Health Hazards of Noise Exposure: Cardiovascular Disease in Sweden [9]. Another research project the center was in collaboration with ergonomics and areosol technology called Particles and Noise – Combination Effects of Noise and Airborne Particles [10]. The most recent project is concerned with Quiet Areas and constitutes a study of the implementation and reception of quiet areas in Sweden as reported below.

3. Project – Quiet Areas in Sweden [11]

3.1 Background

In the EU directive from 2002 (EU, 2002, /49/EC/END) [12] the member states were asked to make an inventory of existing quiet areas and form strategies to upkeep those. The instructions in the directive were relatively vague which has opened up for different interpretations and implementations. Sweden has a tradition as one of the more active countries in Europe working with "quiet areas", including several initiatives on regional and municipal level. This could be related to the country's early implementation of the soundscape perspective in research on environmental noise, not least through the Mistra-project "Soundscape for better health" (2000 to 2007 (Gidlöf-Gunnarsson et al., 2008) [13] in which the related notion of quiet façade was introduced.

The development of quiet areas in Europe can be traced back to 1996 and the document "Green paper on Future Noise Policy" (EUC, 1996) [14], where it was mentioned how noise mapping could be used to identify quiet areas. The thoughts from the Green paper were subsequently enforced in the

END directive of 2002 (EU, 2002, and further clarified in two reports.

The Good Practice Guide on Quiet Areas (EEA, 2014) [15] followed up on the directive by mapping how the question had been dealt with by looking at existing examples and initiatives. The report provided a good overview of existing initiatives in Europe. No specific recommend-ations were given, but it was suggested that the review could be used as inspiration and a reference was made to "competent authorities" for further guidance.

In 2016, the report "Quiet areas in Europe: The environment unaffected by noise pollution" (EEA, 2016) [16] is published, in which a method to identify quiet areas called Quietness Suitability Index (QSI) is presented. QSI makes use of noise mapping data combined with land use data to predict potentially quiet areas. No applications in Sweden of the method are yet known.

3.2 Main aims and overall methodology

In order to ensure that the EU-stipulated mapping of quiet areas has the desired effect, the present study aims to investigate how the notion of quiet areas has been treated in Sweden. This includes mapping and studying of examples and initiatives in various parts of Sweden. Through this inventory we hope to contribute to the knowledge base, as well as to raise the question on the political agenda, pointing out the potential value of quiet areas in terms of life quality.

The main question behind the project is: How is the notion of quiet areas implemented in Swedish municipalities? How is it implemented in municipal versus regional levels? What are the experiences from working with quiet areas to this day, and what conclusions may be drawn? Can a coherent picture be drawn on benefits and difficulties of quiet areas, and finally; which are the main challenges for today and the future?

A central part of the methodology was a questionnaire that was sent out to all 290 municipalities in Sweden, consisting of three questions. This was done in order to provide an overview as well as to identify examples considered interesting. These were subsequently followed up in a second and more qualitative phase which included an elaborated questionnaire and studies of municipal documents.

3.3 Results

This section gives an overview over how many municipalities that have been working with the concept of quiet areas in general council plans, based on results from the initial survey. In short a total of 132 (46%) of Swedish municipalities had in one way or another themselves initiated action on quiet areas. As many as 41% of the municipalities were found to have used the concept in their council plans in one way or another. These mentions could be labeled as concise (70), diffuse (32) or detailed descriptions (15). The latter gave detailed definitions and could show mapping or protection of existing areas.

Answers to the question of from where the motivation or the incitement came to the municipal initiatives, showed that local motive forces were held responsible for around 60% of the initiatives, inspiration from regional mappings stood for 28%, and inspirations from neighboring municipalities for 12%. However the END directive showed to have directly affected only one single municipality (Härjedalen).

The selection of initiatives on municipal level was made with the ambition to focus on examples that could be inspiring for future work, meaning that some initiatives might demonstrate more unusual that common ways to tackle the subject.
Starting in rural vicinities the municipality of Munkedal north of Gothenburg, separates between ”unaffected” and ”quiet areas”, but acknowledges them overlapping so that certain parts of larger unaffected areas may include quiet areas that may be require protection from noise.

Nybro, another smaller municipality in rural settings added specially handled ”noise free areas” in their general plan in 2015. In Nybro four areas were proclaimed as to be kept ”noise free” through reviewing permissions and supervision. As result exploitation of land for wind farms have been prevented.

In the municipality of Hörby the initiatives had risen out of activities from the citizens themselves,

something met with positive attitudes from the town council planning department. In their general plan now a clear account is given for how the noise free areas shall be protected. Amongst other things wind farms, shooting ranges, sawmills and similar is to be avoided.

In Stockholm, a number of noise mappings had been made, but by 2013 on a municipal level, the concept was tried out in Sollentuna, Sundbyberg och Stockholm (GTT, 2018) [17]. The project Guide to Silence included marketing on Internet and brochures and was also used in the marketing of the municipality with positive results.

In the city of Malmö noise measurements were made since 1998 and sound environment measures may be followed on the website of the city. An alternative way of affecting the sound environment may be mentioned creating a quiet space in midst of traffic noise, created in a joint project between landscape architects and acousticians, where an artificial room was constructed with noise isolating walls made of greenery where playback of nature sounds would mask the traffic noise [18]. An experiment further proving that not only noise levels where important for the soundscape experience.

3.3.1 Which municipalities were not working with quiet areas?

Although the concept seems to be fairly well spread and used in the planning society in Sweden, there are still a reasonably small number of examples of municipalities who has done advanced work or made any interventions. This motivates the question of what the main obstacles for this can be? Among reasons mentioned for lack of activity appeared in the questionnaire as "No need" (all is quiet and peaceful here…), "Lack of knowledge" (we haven´t got enough information..), "Character of local infrastructure" (highway straight through the area…) to mention a few. In addition, a total of 36 municipalities had no concrete plans at the time of the investigation, but said they had started preparing discussions on the subject.

3.4. Mapping of regional initiatives

On a regional level a total of ten main initiatives could be noted covering a total number of 121 municipalities. When counting both regional and municipal initiatives, the total number comes to 190, of which 16 were considered advanced. Interesting to note here is that of the sixteen municipalities described in the study having done more far-reaching work, all except one has been foreboded by a regional initiative, thus suggesting that regional initiatives constitute an important catalyst towards implementation of quiet areas.

Among the regional initiatives found in the study may be mentioned the county of Jönköping where the Swedish Road Administration took one of the first initiatives as early as 1998 starting from 30 dBA level equivalent from collected noise sources identified four quiet areas.

The Jönköping region published a mapping 2015 for the whole county on the methodological basis of GIS-data. The method was presented as potentially useful in other areas of Sweden as cost effective method for modeling larger areas, also including vegetation data. The mapping showed 22% of the area of Jönköping region as free from noise.
In the southernmost region of Scania, a large investigation was made in 2003 noting that noise free areas are rare in Scania, especially in the western part, suggesting that freedom from noise may be evaluated higher based on proximity to towns, connections to other quiet areas and general accessibility.

In Stockholm, finally, a number of mappings have been done on regional level (2000, 2005, 2010 and 2010). In 2005 five areas in the county were chosen on the basis that they should both be quiet and have other recreational qualities. Data was extracted from a mix of calculations, measure-ments and user interviews. In 2010 the county board published a map over quiet areas in the region (RPK, 2010) [19].

3.5 General trends, challenges and future

The final part of the study focused on tendencies and challenges especially in face of future development. First of all, there is a certain confusion about the concept “quiet areas” [Tysta områden] as such, and a couple of terms are used interchangeably to describe the phenomenon, the most common being ”noise free” or ”undisturbed” areas. There are several closely related terms, like

”unexploited areas” or ”nature reserves” and these concepts were commonly mixed up with quiet areas. It was apparent that there is a need to distinguish between sound environments as such and other environmental issues.
Questions of definitions of quiet areas are varying, mostly referring to noise level measures in decibels (often tracing back to five different classes of noise exposure (NVV, 2007) [20]. The END directive makes use of dividing between two main groups, ”open country” and ”agglomerations”, but the present study suggests that agglomerations could be subdivided in “urban areas” and areas in the ”urban proximity” corresponding a total of three subdivisions.

The study confirms that there are many different ways to handle quiet areas. This is not necessarily a problem seeing as different contexts pose different demands on how to use the concept. However the ambiguities around the concept were reported as being problematic by several municipalities, resulting in needs of clarifications. Hence, an independent evaluation of the many methods that are currently being used would be useful. The present study included a survey of current methods and approaches, a detailed report will be published in Swedish, and this could hopefully contribute to some guidance in future work. The EU report (EEA, 2014) mentions four main types of methods to identify quiet areas; noise calculations, noise measurements, evaluations from experts and from users (interviews, surveys etc.) and recommends a mix of all four. Mixes of at least two methods have been put into practice in most cases in Sweden.

4. Conclusions

If there is a multitude of methods used for identifying and mapping of quiet areas, there are fewer examples of models for protection and active maintenance. Snow scooter driving in open country, motorsports and wind farms are notably problematic activities as far as noise emissions goes. In a few cases activities like these are proposed as unwanted and undesirable in environmental strategies of single municipalities. However examples of limitations as these, affecting individual activities shows to be fairly rare in our material.

To conclude there seems to be a need to review and develop strategies for maintenance of quiet areas. Maintenance was noted in the questionnaire by 20% of the municipalities as being one of the biggest future challenges. Closely connected to maintenance is accessibility of quiet areas as recreational spaces. The study points at a potential for development here. Even in municipalities that can be described as reasonably advanced there is room for improvement as far as accessibility and marketing goes. The study showed a demand for good examples and models for successful sound environmental work. A few notable examples can however be identified as ”The Guide to Silence”, covering some parts in the Stockholm areas as well as examples from around EU as in ”Tranquility Trail” of Great Britain [21].
The Web can provide effective ways to reach citizens through websites of municipalities themselves, but marketing can also be effective through independent websites. No dedicated apps for smartphones were reported to have been developed in Sweden, yet there is an example, Hush City, from EU. Notable is that there are very few examples of public communication and PR especially considering that quiet areas can be very beneficial for both inhabitants and tourism. Quiet Areas are not only a matter of health but also cover life and societal economy. Many parts of northern Europe, including Sweden, provides rich access to quiet areas that could play a more prominent role in the marketing of the country than is currently practiced today. In addition to economic benefits from tourism this could also be a way to raise the value and awareness of quiet recreative areas so that they may stay protected and maintained in the future.

The soundscape research field is characterized by an interdisciplinary understanding where problems as well as possibilities in the sound environment are accounted for. This has been exemplified in this paper through a report on a study of Quiet Areas in Swedish municipalities. The study is consistent with the core activity of the Sound Environment Centre at Lund University where researchers from various disciplines meet and collaborate, sharing a common agenda of uncovering the role of soundscapes in environmental perception and health. The center strives to meet current societal challenges by facilitating development of environments for recreation and health, particularly highlighting the role of sound in the urban sensescapes of today.

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