Soundscape: The Concept and Its Significance in Acoustics

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Abstract
This paper presents the definition and the basis of soundscape concept and discusses why, when and how the concept can be significant in the field of acoustic studies. It also deals with some applications of soundscape concept and achievement found in noise control policies.

1. Introduction
Issues on acoustic environment are intrinsically interdisciplinary involving technical, psychological, social and aesthetic learning. Soundscape study, or it might better be called acoustic ecology, gives us a way, not a method, to think about acoustic environment, particularly from the point of views of subjective acoustic environment and of interaction between objective acoustic environment and individuals and/or society. The concept of soundscape is indispensable, though not perfectly sufficient, to discuss about acoustic environment and it has already been used, with or without being recognised by researchers, in some themes of acoustic environmental study.

This paper presents the concept of soundscape with the basis where it comes out, and tries to show an overview of the significance of soundscape concept to acoustics.

2. The Concept of Soundscape

2.1. Definition of soundscape
The word “soundscape” was coined by a Canadian composer R. M. Schafer [1] nearly 35 years ago. It had been polished up by him and his colleagues through their activities of fieldworks conducted in Canada and Europe by the time of 1978 when “Handbook for Acoustic Ecology” [2] was published. In the book “soundscape” is defined and explained as follows; “An environment of sound (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.” As can easily be understood, soundscape is basically defined as subjective acoustic environment and it casts light over the relationship and interaction between the individual and sounds around him/her.

The word “soundscape,” its definition being over a quarter of century old, has become a technical term, probably more clearly defined than “noise,” in the community of soundscape researchers. The author would suggest to base arguments on soundscape to begin with on the definition in the acoustic community as well.

2.2. Basis of soundscape concept
According to Torigoe [3], Schafer based his idea of soundscape on three foundations. One is his philosophy of music. Schafer, having been influenced by J. Cage who declared “Music is sounds, sounds around us, whether we’re in or out of concert halls [1],” used the word ‘soundscape’ to express the total acoustic environment as a macrocosmic musical composition. Thus the concept of soundscape has in it at least in part a sense of aesthetics. But our world is covered with noise. Schafer says this is because our environment has lost the balance it should have.

The second is the ecological consciousness, which flourished in North America in the 1960’s and had inherited the philosophy of American naturalists and environmentalists. Schafer, living in Vancouver, Canada in the late 1960s and early 1970s and being bothered by city’s noise, got involved in public movement against pollution [4] He gave students and citizens lectures on noise problems, coined the phrase ‘noise pollution’, wrote “The Book of Noise” [5] He organised the World Soundscape Project (WSP) and carried out field surveys in Canada and Europe about the acoustic environment in such a way as ecologists do. He called his area ‘acoustic ecology’; defined as “the study of the effects of the acoustic environment or SOUNDSCAPE on the physical responses or behavioural characteristics of creatures living within it. Its particular aim is to draw attention to imbalances which may have unhealthy or inimical effects [1]” It should be noted that although he has strong sympathy to the ecology movement he never says industrial civilisation is bad and wild nature is good [6]

The third foundation is the philosophy of McLuhan, who says modern civilization leans too much on the
visual perception and advocates reinstatement of all perceptions [7] Schafer frequently refers to McLuhan in his books emphasizing the importance of aural culture. As a consequence, the idea of soundscape aims at a total understanding of the acoustic environment. As described by Schulte-Fortkamp and Lercher [8] “In the original soundscape approach Schafer (1977) was worried about the dominance of the ‘visual culture’ and the parallel loss of ‘sonological competence’ in the modern societies. This concern let him develop a series of hearing exercises which aimed at maintaining a high level of sonic awareness. The interaction of people and sound, the way how people consciously perceive their environment, were therefore central in his approach. He understood the acoustic environment as a musical composition for which we own the responsibility.”

3. Acoustic Environment

3.1. Characteristics of acoustic environment
As an environmental issue, acoustic environment which in most cases appear as noise problem is characterized in some features besides physical acoustic aspect. The first point is that it has strong psychological aspect, which acoustics has taken into account nearly from the beginning. The second point is that sound conveys meanings, or meanings come out, when we hear sounds. Acoustics also has been involved in this matter as voice recognition, but not in the area of acoustic environment. Meanings add acoustic environment more social and cultural factors than any other environmental issues. The third one is aesthetic aspect. Environment is an object of aesthetic evaluation, which clearly displays in the field of landscape architecture and town planning. There should be more than a good reason for acoustic environment to be evaluated according to aesthetic value.

The characteristics of acoustic environment necessarily require interdisciplinary learning, thus expand the border of interdisciplinary learning studies beyond the domain of ‘science of sound.’

3.2. Frame of reference
Acoustics has long contributed to noise control engineering. One cannot talk about acoustic environment without acoustics properly. Neither, however, can it fully be discussed within the range of acoustics as long as it remains a ‘science of sound’ taking the characteristics of acoustic environment into account. Thing is that noise control engineering’s frame of reference is to take ‘noise’ as ‘poison’ or ‘weed’ which is to be expelled out of, or controlled in, our acoustic environment.

As has been mentioned above, acoustic environment has variety of modalities other than physical and psychological. It requires more attention to be paid to the interaction between acoustic environment and individuals. Phenomenological view is said to be inevitable [8] on the acoustic environment which may be called as ‘sonic life-world’ or ‘lived sonic environment.’

3.3. Contribution of soundscape concept to acoustic environment
As has been discussed above, the soundscape concept was presented as a kind of new frame of reference to understand and describe acoustic environment. Understanding and description of environment are tasks of fieldwork studies. As referred to as ethnography in the area of anthropology, description of soundscape is referred to as sonography [1] and/or soundscapeography [9]

Another contribution is soundscape design which will be comparable to noise control. It is a design based on the concept of soundscape, not designing soundscape itself as the object of designing, as is often mistaken. It is like industrial design. Moreover the term design also requires expanded implication containing management. Soundscape design is explained as “a new interdiscipline combining the talents of scientists, social scientists and artists (particularly musician). Soundscape design attempts to discover principles and to develop techniques by which the social, psychological and aesthetic quality of the acoustic environment or SOUNDSCAPE may be improved.” Technical soundscape design “include the elimination or restriction of certain sounds (noise abatement), the evaluation of new sounds before they are introduced indiscriminately into the environment, as well as the preservation of certain sounds (SOUNDMARKs), and above all imaginative combination and balancing of sounds to create attractive and stimulating acoustic environments.” “To the extent that it attempts to understand individual, community and cultural behaviour, soundscape design takes the broad perspective of a COMMUNICATIONal discipline, and touches such other areas as sociology, anthropology, psychology and geography [2]”

4. Soundscape in acoustics

4.1. Noise measurement
Physical measurement of noise level is a way of understanding soundscape. But noise measurement is not enough to understand soundscape even of physical modality. A soundscape researcher would make measurements of different sound sources in different
occasions, while noise measurement aims to find the representative noise level in the ordinary condition. Identification of sound sources in the measurement is the way of soundscape researchers.

4.2. Noise mapping

EU member countries are to file up noise maps for the purpose of the assessment and management of environmental noise according to Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 - relating to the assessment and management of environmental noise. ‘Noise mapping’ is defined as follows; “no noise mapping’ shall mean the presentation of data on an existing or predicted noise situation in terms of a noise indicator, indicating breaches of any relevant limit value in force, the number of people affected in a certain area, or the number of dwellings exposed to certain values of a noise indicator in a certain area.” This is a kind of most simple version of sound map called ‘isobel map’ by soundscape researchers. Sound maps drawn by soundscape researchers contain more sophisticated information about acoustic environment like sound sources and sound events. ‘Strategic noise map’ is more like sound map in the sense it “shall mean a map designed for the global assessment of noise exposure in a given area due to different noise sources or for overall predictions for such an area.” Strategic noise map aims to identify different sound sources in an area and this is what soundscape researchers have been doing in field surveys.

4.3. Social survey

Social survey of acoustic environment can have diverse kinds of methods from extensive survey by means of questionnaire to intensive survey of recoding narrative life-history. But noise survey seems to have leaned too much upon questionnaire survey as social survey of acoustic environment. It is probably because noise is taken as poison existing in the environment and the model of epidemiology has been applied without paying attention to the cultural factor that might be dominating the phenomena.

Soundscape survey, called as acoustic ecology, has been conducted in such ways as ecologists, sociologists, anthropologists and geographers use. Since it is impossible to reach perfect understanding of and make complete description of soundscape, and any observation and report of acoustic environment is theory- and method-laden as the author [10] once discussed, fertile understanding and description of acoustic environment will be achieved by applying as many ways of survey as available. However, it takes long period to conduct satisfactory soundscape survey, usually for years, practical description of acoustic environment would drop on the position somehow between sound level measurement and soundscape survey.

4.4. Soundscape perceived by minorities

Foreigners [11], aurally/visually handicapped people including the aged [12], elderly people suffering from dementia [13], infants and children are minorities in acoustic environment. The acoustic environments they perceive are more or less different from those majority people do. They are best described based on the idea of soundscape, because soundscape puts emphasis on subjective aspect of acoustic environment.

Since it is nearly impossible for the researcher to know acoustic environments perceived by minorities, he/she needs to grope for what are their problems, how and when they perceive sounds around them and interact with the sounds. This research attitude is that applied by field-researchers. After finding where the problem is, he/she would be able to apply conventional methods acousticians have long developed.

4.5. Comparison of acoustic environment

Comparison is a basis of rating. Existing noise rating indices aim to line noise immission on a one-dimensional scale, which implicitly means that acoustic environments are primarily expressed and can be compared on the physical basis of noise exposure. Since acoustic environment is multi-dimensional and cannot be fully rated by a single quantitative measure, multi-dimensional comparison should be done by means of physical, psychological and social features [14]

4.6. Environmental impact assessment

Environmental impact assessment conducted in Japan has items which can hardly be quantified by numerical figures such as landscape, ecological system/nature conservation, cultural valuables and so on. Acoustic environment, however, is only assessed whether sound level exceeds environmental quality standard. As a result, impact of noise intruding a certain area, such as recreational area, where there is no dwelling is not included in the object of assessment. This is because the environmental impact assessment concerning acoustic environment is still based on the idea of noise control.

Quantitative assessment of acoustic environment would require aesthetic judgement based on the attitude toward the change of acoustic environment of people residing in or visiting the area. This is what the concept of soundscape aims as Schafer advocates “The final question will be: is the soundscape of the world an indeterminate composition over which we have no control, or are we its composers and performers, responsible for giving it form and beauty?”
5. Soundscape for acoustics

If acoustics is a crossroad science as Hunt [15] pointed out, environmental studies might be compared to battlefield sciences/studies in the sense they require and utilise anything available to tackle at enemy, i.e. environmental problems. One might say soundscape adds no theory or method to acoustics. That probably is true because soundscape was not born in acoustics as a part of physics. Soundscape rather uses acoustics when necessary and requiresmodification of the basic concept of acoustics when applied to the field of acoustic environment than introduces a novel method or new devices to noise control or acoustic measurements.

Soundscape might be considered as ‘rhizome’ in the sense as Dereuze and Guattari use the word [16] It does not construct a tree with root, trunk, boughs or branches. It stimulates a variety of workers from noise control engineers to anthropologists in their works relevant to sounds in the environment. Soundscape, therefore, will not be a target of research to be tackled at but may be compared to an enzyme to compound chemistry. It might add a novel taste to garden designing, reconstruct noise policy, or modify music acoustics.

If acoustics means ‘science of hearing’ as it etymologically implies, not only physics of sound, soundscape offers acoustics a new horizon in the field of acoustic environment.

6. Acknowledgements

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7. References