# Soundscape planning as a complement to environmental noise management

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## ABSTRACT

The role and application of the concepts of soundscape planning, *vis-à-vis* those of environmental noise management, need elaboration. In noise control, sound is a waste product managed to reduce the immision of sounds that cause human discomfort. The soundscape approach, by contrast, considers the acoustic environment as a resource, focussing on sounds people want, or prefer. *Quiet* is not a core condition for acoustic preference in the outdoor acoustic environment, but congruence of soundscape and landscape is. So too is that sounds that are wanted are heard above, not masked by, sounds that are unwanted in that particular place and context. Advancement of the soundscape approach will be facilitated by distinguishing it, both conceptually and in practice, from the management of environmental noise. Dimensions of complementarity and difference between the two approaches include: different sound sources of interest in any acoustic environment; human responses to these sounds and outcomes that arise from these responses; measurement techniques and mapping; and appropriate objectives for management, planning and design. Soundscape planning and management augments environmental noise management, expanding the scope for application of the tools of acoustic specialists.

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## 1. INTRODUCTION

The relationship between the newer field of soundscapes and the well-established field of environmental noise management, or community noise management, remains, at best, not widely understood and, at worst, little more than the application of new terminology to old ideas—a community noise survey, for example, becoming a soundscape survey; a map of urban noise being described as a soundscape map; and a classical community noise annoyance study relabeled as a soundscape study. The term *soundscape* can also encompass: the recording of the sounds of nature; the creation of compositions based on, or of, natural sounds; studies of the sounds heard in villages and rural environments; documentation of disappearing sounds; analysis of the way acoustic environments have been described in history and in literature; analysis and description of all types of acoustic environments; and the creation of artistic sound installations (1).

This paper sets out to demonstrate that environmental noise management and soundscape planning and management approaches in the outdoor environment are distinct, but complementary. Both are concerned with the study and/or management of the same phenomenon, the acoustic environment, and human responses to this environment. Truax (2) has identified that noise management and soundscape approaches rely respectively on the traditional objective energy-based model of the acoustic environment (environmental noise management) and the subjective listener-centred model (soundscapes). Soundscapes puts emphasis on the way the acoustic environment is perceived and understood by the individual (3) and for many authors the soundscape exists as a human perceptual construct of the acoustic environment of a place. However there is not universal agreement on this, and some authors prefer to use the term soundscape as a synonym for the physical acoustic environment. Pijanowski et al. (4), for example, refer to the soundscape as "…all sounds…emanating from a given landscape to create unique acoustical patterns across a variety of spatial and temporal scales". Their focus, while still including human generated sounds, tends primarily to be on the acoustical patterns

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created by biological systems, and they refer to this as *soundscape ecology*.

There is a major conceptual difference between soundscape approaches and noise management. In the environmental noise field, sound is conceived as a waste product and, as with all wastes, the sound is to be reduced and managed. By contrast, the soundscape concept regards sound primarily as a resource. As with other scarce resources such as water, air and soil, the management intent is rational utilization and protection and enhancement where appropriate. Resource management has a particular focus on the usefulness of a resource to humans and its contribution to the quality of life for both present and future generations. One example of the concept of the acoustic environment as resource is in national park management (5).

The other fundamental distinction between soundscape approaches and noise management lies in the human outcomes that are of interest. Almost exclusively, the environmental noise field deals with acoustic environments where there are adverse outcomes for people (or perhaps wildlife). That is, it deals with sounds of discomfort (6): sleep disturbance, annoyance, adverse physiological effects, interruption to communication or cognitive processes etc. By contrast, soundscape approaches often concern the acoustic environment where the sounds produce outcomes that enhance, enable, or facilitate, human enjoyment, health, well-being or activity. The focus in soundscape studies is more likely to be on sounds of preference—though not exclusively so. Interest in sounds of preference in environmental acoustics have previously been restricted largely to building acoustics (say preferred ambient levels for rooms, or preferred reverberation time in halls for speech and music) and to the sound quality of products. Example of soundscape outcomes of interest might include place attachment, a sense of harmony, restoration of well-being, or perhaps appreciation of nature through bird calls or sounds of other species heard in a natural area. In different places and in different contexts, a human preference in terms of response to the acoustic environment, or outcomes attributable to it, may differ markedly, or be multidimensional. For example, the soundscape of a place might be preferred on the basis that it is peaceful, or tranquil, or promotes well-being. Equally, in a different place or context, a soundscape might be preferred because it is lively, or varied, or creates a sense of excitement. Or preference may be for a soundscape that provides information, clarity, or conveys safety. In yet another place or context, preference for a soundscape may relate to its unique cultural or natural characteristics—a place that has what Schafer (7) terms a soundmark. Given diversity in contexts in which acoustic environments of particular places may be experienced, and diversity in potential responses and outcomes from this experience, more research is required to identify all the sets of responses and outcomes that could be of interest in soundscape studies, to develop a typology of these, and to search for underlying structures. Assessment of soundscape preference should recognize the existence of both *direct outcomes* and *indirect* or e*nabled outcomes.* Direct outcomes are where people are aware of the acoustic environment and consciously attribute the outcome directly to the perceived soundscape. However the acoustic environment of a place may also enable certain responses/outcomes without people consciously dissecting why it is that the environment of a place provides so well for that activity. They seek to achieve particular positive outcomes in places—facilitated by the acoustic environment, along with other dimensions of the place—but not necessarily with conscious attention to the acoustic environment itself

The centrality of human perception in soundscape studies has sometimes been described as a fundamental contrast between it and the environmental noise field. However, this is not the case as much work in environmental noise is also perceptually based—as in the measurement of noise annoyance for example. The real distinction between the two fields is the different human outcomes of interest.

The complementarity of soundscape approaches and environmental noise management in the outdoors is examined further below on the following dimensions:

- sound sources of interest in the acoustic environment
- sound as a waste product or as a resource
- measurement
- mapping
- planning, management and design.

## 2. THE ACOUSTIC ENVIRONMENT

Sound surrounds and envelops us, whether we are indoors or out, at work or play, in cities or in the country. We hear voices, vehicles, birds, wind in trees, machinery, footsteps, raindrops, telephones, the hum and beeps of our electronics and dogs barking. Sound, through speech, is still the medium of much

of our communication with others despite the ubiquity of message texts and emails. Sound is always present, and our ears are always switched on. We share an acoustic environment with any who occupy the same indoor or outdoor space that we do. The emphasis in this paper is outdoor space, but the observations and principles will also apply to hybrid indoor-outdoor spaces – malls and markets, transport stations, sports stadia, museums etc.

The *acoustic environment* of a place or space is the sound from all sources that could be heard by someone in that place. This acoustic environment is shaped by the sources present and also by modification of the sounds as they propagate along their paths from the sources to the receiver. All these may vary from instant to instant, from day to night, and from season to season. The *acoustic environment* (8) of a place has also been called the *sonic environment* (7) or the *sound environment* (9) and people have been described as being in an *environment of sound* (10) or in *aural space* (11). Others might consider the acoustic environment to be the *ambient sound* of a place.

These acoustic environments of different places are of interest to many different fields of study and practice. Environmental noise management is primarily concerned where levels of the sound are high and, by definition, unwanted. Much of the unwanted sound that is the focus of environmental noise management approaches is from transport sources, from stationary machinery or electronic amplification, or from domestic sources. But beyond environmental noise management, the acoustic environment of urban areas is of interest in urban planning and housing design and in landscape planning and management of parks and other open spaces. The acoustic environment of natural areas is of interest in wilderness management, and in the planning, design and management of wildlife parks and recreation such as described by Newman, Manning and Trevino (12). All such acoustic environments are of interest too to specialists in sound quality, human acoustic comfort, and music.

Much of the distinctiveness of any acoustic environment lies in the presence or absence of particular sound sources, and it can be useful to identify each of the sources present, and to classify them. One proposed system has been to categorize all sounds as being *biophonic*, *geophonic* or *anthrophonic* in origin (13). Biophonic sources are biological, such as insects and birds sources. Geophonic sources have non-biological origins, being generated by physical processes such as wind, rain and thunder, earth quakes and volcanic activities, flowing water, ice movement or ocean waves. Sources of sound induced by human activities are classified as anthrophonic. While some authors have used this system in non-urban areas (e.g. 4), the classification has insufficient resolution to be useful in urban areas given the very wide range of sources associated with human activity. More differentiation is required, and Brown, Kang and Gjestland (3) developed a schema that covers all sound sources in any acoustic environment. Their purpose was to provide a basis for standardization in the reporting of sources across different studies. The two systems can be integrated with the anthrophonic category including a large and comprehensive list of sound sources associated with human activity.

Brown, Kang and Gjestland (3), after first dividing places as outdoors or indoors, categorized outdoor places as belonging to urban, rural, wilderness or underwater domains. While human experience of the underwater acoustic environment may be limited, its sounds are increasingly being revealed through underwater recordings or, in real-time using transducers, for whale-watching activities for example. One can thus refer, for example, to the *acoustic environment of a wilderness place*, or the *acoustic environment of an urban place*. Within each domain, *categories* of sound sources that *could* be present in a place are identified, then the sound sources themselves,. For simplicity and comprehensiveness, the categories are the same for each domain, though some sources would be unlikely to be found within particular domains. This categorization can be regarded as a practical taxonomy of sound sources that can be used as a conceptual framework for reporting and analysis, to facilitate information retrieval and valid comparison of sound sources across different places and different studies. It is intended to be universal – able to be applied in all types of acoustic environments and places and thus portable across different studies. To the extent possible, it sets out to identify categories of sound sources that are mutually exclusive, unambiguous, and comprehensively inclusive of all possible sources. For example, a wilderness acoustic environment will consist largely of sounds not generated by human activity—the sounds of nature—but there could also be some human-generated sounds: aircraft, the speech or laughter of recreationists, and perhaps the amplified speech from a ranger's radio. In the courtyard of a housing estate, sounds generated by nature may be incidental, and those generated by human activity will be present. In some places, certain sounds of human activity, say footsteps, may be present, with only infrequent sound from roadway traffic, but in another, roadway traffic may constitute the only sound source that can be heard. In each of these examples, a systematic taxonomy of sources encourages unambiguous and value-free description of

them, and provides a common terminology.

The nomenclature of the categories and sound sources was carefully chosen by Brown, Kang and Gjestland (3) to avoid imprecise, or polysemic, labels and descriptors – often these have not been applied in a uniform way to the sources of sound in different acoustic environments. They have also been chosen to avoid imputing value judgments to the source within any specific context. This circumvents, for example, a particular sound source being described as a *background* sound in one place but a *foreground* sound in another; *intrusive* in one place but *acceptable* in another.

Beyond *classification* of sources of sounds, many authors have also considered the complexities of measurement of the acoustic properties of the individual sources that constitute the acoustical environment of any place, including parameters such as sound level, spectrum, and temporal pattern, and more complex measures such as sharpness, roughness and fluctuation strength (See Section 4 below) and procedures for the measurement and description of the overall acoustic environment (14, 15).

## 3. THE ACOUSTIC ENVIRONMENT AS RESOURCE

### 3.1 Beneficial Use of the Acoustic Environment

To develop further the concept of managing the acoustic environment as a resource, it is useful to borrow from experience in the management of another resource—water. Water resource management uses the concept of *beneficial use*. Whereas water quality management previously focused on limits to discharges (in the same way environmental noise control currently specifies noise emission limits, say for aircraft, or construction machinery, or domestic appliances), the US Clean Water Act now requires standards be set for overall quality of water bodies, based on the designated beneficial use(s) of that water body, identifying maximum concentrations of pollutants which would not interfere with the designated use (16). The idea is that water has many different uses, and that it does not have to be of the same quality for each use. Different management criteria apply, for example, depending on whether that water is used for, say, water supply, aquaculture, wildlife habitat, recreation (primary contact recreation, sport fishing, boating), commerce and navigation, industry, or even aesthetic appreciation.

A similar approach is appropriate for managing the acoustic environment. However, under current noise management approaches, the range of beneficial uses considered is very limited. For example, *occupational settings* where the intent is to prevent hearing damage to workers is one major "beneficial use" to be addressed. But apart from this, noise management approaches in urban areas appear to recognize just one other beneficial use—namely that of *residential use of dwellings*. For example, noise management of road, rail and air transport sources tends to be based on setting façade-level acoustic criteria that should not be exceeded at residential dwellings. These limits to protect the beneficial use of residency do so through limiting annoyance, sleep disturbance, or other human effects, within dwellings.

The soundscape perspective recognizes a much broader range of users/uses that potentially draw benefit from the outdoor acoustic environment. For example, as well as the particular beneficial use associated with living in a dwelling, users of other places may draw benefit from the acoustic environment in terms of, for example:

- wilderness experience
- restoration of health and well-being
- respite, relaxation
- enjoyment or excitement
- enhancement of culture
- safety, security
- wildlife habitat protection.

This list of beneficial uses could be extended further, but it is sufficient to demonstrate that there are many ways that people may draw benefit from the acoustic environment, other than through being able to live in a dwelling that is not impacted by high levels of unwanted sound. While the acoustic field does have criteria suitable to achieve "beneficial uses" in indoor spaces (eg for learning in classrooms, for listening to speech or music in auditoria) there is much work still required to set criteria applicable to achieve the beneficial uses of outdoor space listed above. Different standards, and quite likely different ways of measuring achievement of these standards (physical noise limits for some; suitability of the sound in that particular context for others) will be required to benefit different uses.

Current water resource management practice thus provides a precedent for a parallel approach to management of the acoustic environment, with soundscape concepts extending, and complementing the existing environmental noise control approach. The concept of beneficial uses can assist in explaining to decision-makers the relevance of soundscape approaches, and the inadequacy of applying a single criterion (based on extent of human annoyance inside dwellings) in the management of the outdoor acoustic environment. Different places and contexts require different criteria to maintain different beneficial uses.

### 3.2 Diversity in the Outdoor Acoustic Environment

Another concept pertinent to considering the acoustic environment as a resource is that of diversity. Diversity in genes, species and ecosystems underpins the management of systems of biological resources. Maintenance of natural diversity (and equally cultural diversity) is also often a principle adopted in the planning of regions, natural areas, the countryside and urban areas. The same principle has relevance to management of the acoustic environment. For example, the Dutch Fifth Spatial Planning Policy Memorandum (17) initially included the acoustic environment in part of its discussion of diversity and sustainability, suggesting that matters such as the characteristic of local sounds, and tranquility, were important elements of the spatial quality of rural and urban areas. But in general the acoustic environment, let alone its diversity, receives little attention in most spatial planning exercises. Current noise management approaches may be aimed at preventing excessive exposure of the community to noise, but have little to say about the grey blurring that is occurring in terms of transport noise sources becoming the dominant background in many communities, masking natural sounds or local community sounds. Managing diversity in the acoustic environment of urban and rural areas can be an important part of preserving diversity of human experience, and soundscapes studies have the potential to articulate and describe this diversity and contribute to its management.

## 4. MEASUREMENT IN NOISE MANAGEMENT AND IN SOUNDSCAPES

Environmental noise management is rooted in physical measurement. Even in psycho-acoustic studies of human perception of sound and response to noise, emphasis has been on a search for physical descriptors that correlate with human response based on acoustical parameters of exposure: level, frequency and temporal dimensions of environmental noise. Environmental noise management then uses these physical descriptions of sound to set limit criteria for human exposure and consequently for noise management and design of noise mitigation. A significant proportion of professionals involved in noise policy, management and control have been trained as engineers for whom objective physical measurement, or modeling, is fundamental.

However, from the soundscapes field, there is growing understanding and acceptance that outdoor sound quality (quality in terms of human appreciation or preference) cannot be determined by physical measurement (18, 19). Matters such as context, the information in the sound, and individual attitudes and expectations, all play an important role in judgments of outdoor sound quality, either more important than level of sound, or even to the exclusion of level. Davies et al. (20) observe...*soundscape assessment relies upon the identification of the sounds, the prominence of the sounds, and potentially the ratio of certain sound types to other sound types within the soundscape.*

In particular, the energy-integrative approaches to sound measurement that have become the norm in environmental noise appear particularly unsuitable in assessing soundscapes. Human assessment of soundscapes depends critically on distinguishing between different sound sources: mechanical sounds from natural sources; human voices and footsteps from the sounds of transport, etc. Integrating sound may be intuitive in noise measurement, but counter to the way people experience much of the outdoor acoustic environment. Evidence through psycho-linguistic studies (21), shows that meanings attributed to sounds act as determinants for sound quality evaluations. People categorize urban soundscapes by source when specific sound sources can be isolated, and by the presence or absence of human sounds where many sources contribute to the background. The conclusion of DuBois et al. (21) is that soundscapes need to be conceived and investigated by first identifying relevant semantic features, and only then by correlating them with quantifiable (acoustic) parameters. A similar notion is that areas of high acoustic quality are identified by whether sounds are *wanted* or *unwanted* in particular contexts, not just by the levels of sound (22). Lavandier and Defréville (23) provide experimental evidence that explained variance of hedonic judgments of sound in Paris streets and other locations is increased by including source identification.

Despite the growing evidence that measurements based on level or loudness are unable to account

for much of human preference for outdoor soundscapes, the search for physical acoustical correlates continues. Genuit and Fiebig (24), amongst others, propose that hearing-related physical parameters, other than the averaged intensity of the acoustic stimulus, will be necessary to characterize environmental sounds. Measures such as sharpness, roughness and fluctuation strength of sound have been suggested (25, 26), as has music-likeness (27, 28), with emphasis on the spectral and temporal properties of sound—though there is little evidence to date that these explain human preference in outdoor sound environments.

These observations demonstrate a strong divergence between soundscape and noise control in their approaches to measurement. In summary, while further empirical evidence is required, in the noise control field sounds are measured by integrating them, generally independent of source. In the soundscape approach, the information content of the sound is critical and identification of sounds of different sources is required. Methods of integration of energy (irrespective of sound source) that we predominantly use in noise control (the Leq), are likely to be found wanting as a way to measure sound related to human preference. Further, management of noise is most often achieved by reducing these integrated levels of exposure. Management in soundscape approaches may need to utilize level reduction, but its objectives are not necessarily lower levels of sound, rather in ensuring that wanted sounds are not masked by unwanted sounds (29). This raises interesting technical questions for acousticians regarding how to define, measure and control sound where human preference is the criterion.

One observation using objective measurement may prove useful in soundscape appraisal in specific situations. The time ratio of sound source presence (23) was found to be a better predictor than source sound level in typical urban settings such as markets and parks. A model based on this principle is already in use in the management of soundscapes by the US National Park Service (30), with indicators including ‘percent time above natural ambient’, and ‘percent time audible’. Similar indices have also been trialed for describing aircraft noise (31). While these are objective predictors, they are firmly based in soundscape approaches, requiring rejection of integration of sound energy measurement. They replace it with discrimination between sound sources - some sounds are wanted in particular contexts (natural, or other wanted sounds, setting the ambient) and some unwanted, and with time limits on the intrusion of the unwanted sounds above the wanted sounds.

Soundscapes present conceptual and methodological challenges to conventional environmental noise measurement approaches. Policy on, and control of, the acoustic environment is traditionally anchored in physical measures of sound, yet soundscape research suggests a much less dominant role for physical parameters.

## 5. MAPPING

The EU Environmental Noise Directive has led to large acoustic mapping exercises in urban and some rural areas in Europe to allow estimates of population exposure. But apart from mapping areas of high noise exposure (the maps are, in fact, largely maps of road traffic noise because aircraft noise and industrial noise apply over relatively much smaller proportions of the areas mapped), the Directive has also encouraged identification of areas where the sound quality is good, or *quiet areas*. A *Good Practice Guide on Quiet Areas* has recently been published by the European Environment Agency (32). For the most part, identification of quiet areas has, inadequately, been based on low levels of integrated sound, with no distinction between sound sources. Whilst a low level of sound may be a characteristic of some areas that are of high acoustic quality, *quiet* is not the antithesis of *noisy* (22). Many areas that people might judge to be of high acoustic quality are not quiet, and areas that have low levels of sound may not necessarily be preferred (for example, where the sources are low levels arising from distant motorway traffic). There is increasing evidence that it is the congruence of the type of sound heard in a particular environment that determines its acoustic quality (33). A quite different approach is tranquility mapping in England, which overlays a range of visual and acoustic characteristics that people prefer (34).

To extend the noise mapping to soundscapes, it could be complemented by large scale soundscape mapping. De Coensel and Botteldooren (27) reviewed and partially tested a range of indicators for the quiet rural landscape. They attempted a multi-criteria assessment amongst which perception-based criteria were suggested to be of high importance, perhaps supplemented by perception of what they termed non-fitting sounds. However they also included a range of physical acoustic parameters in their work—part of the on-going search for physical correlates described above. Raimbault and Dubois (18) largely reject physical acoustical parameters, suggesting that mapping for urban areas should be

disaggregated according to soundscape categorization - transportation soundscapes as against soundscapes generated by people, for example.

As a first step, and without there necessarily being agreement as to how the outcomes will be used or soundscapes classified, those involved with mapping can apply the same mapping skills they currently apply, but not to total sound levels, but to levels differentiated by sound source. Current transportation noise maps could be supplemented by predicting and mapping levels generated by sources that people appear to prefer: natural sounds, the sounds of people, and iconic sounds such as church bells. The complementary mapping of sounds of preference could provide a starting point for assessing the relative presence of wanted and unwanted sounds (in terms of masking, or through measures such as percent time audible) and for progressing both research and practice in ways to link conventional noise control with soundscape planning.

## 6. SOUNDSCAPE PLANNING

Environmental noise is generally taken into account in current development planning processes, with the level of noise exposure predicted and compared to guidelines, then used in approval decisions or in specifying required mitigation conditions to protect people from the adverse effects of noise (35, 36). However, the outdoor acoustic environment, both in new developments and in public open space, is not just a problem requiring mitigation, abatement, control, or any of the other terms with which we are familiar (37, 38) in environmental noise management. Of course, given the magnitude and extent of noise problems, such approaches will continue to be a major locus of planning and management activity. But soundscape concepts open up the potential for the same expertise that is brought to the control of the adverse components of the acoustic environment to be applied to the management of those parts of the outdoor acoustic environment that are of high quality and are valued by people—by acoustic design or acoustic management of outdoor space. As Kang (39) suggests, the study of soundscapes is not only the passive understanding of human acoustic preference, but can be *…placed into the intentional design process comparable to landscape…and into the design process of urban public spaces.* Soundscape planning, by analogy with landscape planning, involves design or management to manipulate the acoustic environment of a place in a way that results in improved human perception of its environment. Soundscape planning can contribute to management of, not just urban environments (40), but rural, recreational and wilderness environments (41, 42) too.

Noise abatement and control has, as much as we might wish otherwise, often failed to ignite (except in specific high-profile examples such as new infrastructure of airports or roadways) much interest amongst politicians, most city and planning officials (18), and the design professions responsible for building and infrastructure—traffic engineers, architects and urban designers. At present, outdoor sound only enters the design parameters for most of these professions where there is a problem and where there is community reaction to high levels of noise resulting from their activities. Management of waste is always a responsibility, but it does not capture imaginations. Introducing the concepts of soundscape planning, and particularly by providing approaches and tools to do so, has the prospect of spreading interest and responsibility for the urban acoustic environment in a positive way to a much wider range of professions—planning, landscape design, architecture, road engineering and housing. Potentially, this can invigorate interest in acoustic management of the outdoor environment. Locations that are candidates for the application of soundscape planning and management principles include:

- urban parks and gardens
- country parks
- national parks and wilderness
- recreational areas
- malls and pedestrian precincts—in fact any public or quasi-public city space
- the preservation and reinforcement of sound marks.

At present, environmental noise control approaches may be utilized within the planning and design of such areas, but various authors (29, 41, 43, 44) have shown how it is possible to significantly expand the inclusion of acoustic considerations beyond the adverse effects of noise to the positive elements of soundscape planning—enhancing human experience of the acoustic environment of any place. Adams et al. (35) have demonstrated where soundscape expertise and soundscape tools, including a soundscape simulator, can be incorporated in planning systems in the UK.

## 7. CONCLUSIONS

Schafer (7) described soundscape studies as … *the middle ground between science, society and the arts*, and the foundations of a new interdiscipline—acoustic design. The way in which environmental noise control approaches and soundscape approaches are complementary needs to be recognized, and utilized, by those who work with the outdoor acoustic environment.

The outdoor acoustic environment is a resource whose diversity is to be managed and enhanced, complementing the waste management approaches which are the focus of environmental noise control and management. The concept of beneficial use of this resource can assist in explaining to decision-makers the relevance of soundscape approaches, and the inadequacy of applying a single criterion (minimizing annoyance) in the management of the outdoor acoustic environment.

In noise control practice, physical descriptors of the acoustic environment are critical. However in soundscape planning and management there will need to be a broader acceptance of matters such as context and information content in the sound. Perception of the soundscape of a place and human responses and outcomes, are highly dependent on context. The person and place interact through previous experience of the place, its familiarity and identity, information about and expectations of, the place. Changing any one of the contextual elements within this *person-place-activity* model, even if all other elements remained constant, could significantly change the person's environmental experience of a place, and hence their perception of the soundscape. The experience of the *soundscape* can therefore be different even if all physical parameters, both acoustical and other, remain constant. Current acoustic mapping of urban or natural areas needs to be extended by mapping sources other than transport noise.

In the COST action "Soundscape of European Cities and Landscapes" Kang et al. (45) describe the focus as being on improving or creating the acoustic environment of places so that the soundscape enhances human enjoyment. The interest is primarily, but not exclusively, in outdoor areas such as streets and squares, city parks, gardens, natural areas or wilderness, but many of the observations, principles and approaches will also apply to hybrid outdoor-indoor spaces such as malls and markets, transport terminals, sports arenas, and similar. The immediate focus for soundscape planning/acoustic design should be on small areas as demonstration projects for the application of soundscape principles.

The essential message is that it is not a matter of choosing either a noise control or a soundscape approach, but rather noise control supplemented by soundscape planning. Genuit (46) has, for example, argued that environmental noise management should be considered as just one component of soundscape planning and management. It is suggested that a potential outcome of adopting soundscape approaches may be in capturing the imagination of politicians, policy makers, and a range of design professions with respect to the management of the outdoor acoustic environment in a way that the current sole focus on environmental noise control has not been able to do.

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