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1. Introduction

Noise is defined as any disturbing or unwanted sound that influences or deteriorates human or wildlife [1]. Although noise constantly surrounds us, noise pollution generally receives less attention than other environmental pollutants (e.g., water pollution, soil pollution, air pollution, etc.) [2]. This can be explained with the fact that noise exposure has an accumulating character which means that the negative impact of noise can be detected after a long period of time. Long exposure to noise pollution can cause bad mood, fatigue, insomnia, headache, loss of concentration, reduced work ability and finally the worst possible case-scenario permanent hearing impairment [3–5]. In addition, recent research studies unfortunately show that environmental noise has an impact on several cardiovascular (e.g., increased blood pressure) and metabolic effects, cognitive impairment among children, annoyance, stress-related mental health risks and tinnitus [6–8].

When discussing noise in general, one also needs to keep in mind that a certain sound perceived as desired or wanted by one person can be perceived as noise for someone else. This can be a devious task when analysing noise and implementing solutions for noise reduction.

Human ear can hear a relatively large ratio of the effective maximum and minimum values of the sound pressure which are expressed then in decibels (dB). Sound level is expressed in decibels in relation to the reference sound pressure level (Pa) which corresponds to the threshold of audibility of the average person at 1 kHz (Figure 1) [9].

In addition, noise can be described with noise perception parameters such as loudness (son), sharpness (acum), roughness (asper), fluctuation strength (vacil) and psychoacoustic annoyance (son) [10].

When dealing with the management of noise pollution, i.e., reduction of noise pollution, it has been proven that an interdisciplinary approach is required. From acoustical point of view, a traditional approach to reduction of noise pollution is noise barriers, while a more modern and propulsive approach is the soundscape concept. Noise barrier is a sound “obstacle” between the sound source and the observer. Noise barrier efficiency depends principally on their design, i.e., favourable noise barriers have a diffuse element on the top (e.g., circular, Y- or T-shaped). Most important parameters which are used to describe the noise barriers are insertion loss (IL), transmission losses (TL) and barrier absorption coefficient. Usually, noise barriers can be divided into several types: Ground-mounted noise barriers (made from natural earth materials), structure-mounted noise barriers and the combination of the first two [11].
When considering certain limitations of noise barriers in general, noise barriers can best serve as a solution if they are planned before the actual building (which is today a quite rare case-scenario). In addition, when incorporating a noise barrier into an existing urban environment, researchers should take into account the “visual pleasantness” and economic feasibility of the noise barrier [12, 13].

As previously mentioned, a more modern approach to noise management would be the soundscape concept. The soundscape concept modifies and complements the assessment of noise and its effects on humans [14]. Soundscape includes all the...
sounds from a certain acoustic environment received by human ear. These sounds can be divided into three major groups: biophony, geophony and anthrophony [14]. Soundscapes can be classified. The most common classification is the one with respect to the related environment, i.e., we can differentiate: natural soundscapes

Figure 3.
Typical equipment for the soundwalk method.

Figure 4.
Mind map of noise pollution management.
Management of Noise Pollution

(e.g., marine, forest soundscape, etc.), rural soundscapes and urban soundscapes (Figure 2) [14].

Soundscapes are usually recorded using the soundwalk method which was introduced by an urban planner Kevin Lynch. The usual recording of a soundscape has the duration of 30 min. Recording takes place several times a day, for several days, however, always at a nice and dry weather. The soundwalk method uses a recorder, and a pair of binaural microphones places in the ears of the person who is performing the soundwalks, i.e., soundwalker (Figure 3) [15, 16].

Soundscapes are analysed in most cases using several types of questionnaires which are fulfilled by listeners or participants in studies. Possible questionnaire designs can include direct questions to listeners about the soundscape, requirements for a more detailed descriptions of the soundscape and attributes that may or may not be related to mathematical scales and adjective pairs [17–20].

Nowadays soundscape studies are oriented toward human health, well-being and overall quality of life [21–24].

Bearing in mind everything written, it can be concluded that noise pollution and its management is a very complex problem which needs an interdisciplinary approach. Experts such as urban planners, architects, doctors, biologists, psychologists as well as acoustic engineers should all collaborate and benefit from each other’s work with a common cause to improve the overall quality of life. By working together, it is achievable to manage and reduce noise pollution and moreover recuperate the human health and well-being of the residents, especially the ones living and working in urban areas (Figure 4).

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