Discovering Trees as Noise Reducers: Exploring City Soundscapes

Introduction, lesson plan, methodological and didactic notes for teachers

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Target: secondary| tertiary

Technologies: mobile, noisemeter app, digital map

Introduction

Noise is often perceived as a significant burden in cities, as it can affect the well-being and health of residents. Noise sources such as traffic, construction, industry, and human activities contribute to increased noise pollution. By measuring, mapping, and analyzing noise, students can explore the causes of noise and potential countermeasures.

Definition and effects of noise

Noise is typically defined as unwanted or disruptive sound. Since the evaluation of sounds is subjective and depends on preferences, moods, health, or activities being performed, there is no fixed measurement for noise. The subjectively perceived noise pollution can be determined through surveys. Objectively, the intensity of sounds in the environment can be measured by recording the sound level. Smartphones can be used for simple measurements. The sound level is indicated in decibels, abbreviated as dB. The hearing threshold is at 0 dB, and the limit for health damage is around 90 dB (see M2). Increased noise pollution can lead to stress, sleep disturbances, cardiovascular diseases, and other health problems.

Noise Protection Measures

Measures to reduce noise are of great importance for city residents. Traffic calming, the expansion of public transportation, and the use of quieter vehicles can reduce traffic noise. Soundproof windows, doors, and walls also contribute to noise reduction. Regulations such as noise protection ordinances and the restriction of operating hours for loud machinery support these efforts.

A significant contribution to noise reduction can be made through trees and greenery. The structure of trees with many leaves and branched twigs absorbs and disperses sound waves, thereby reducing the perceived volume. Dense planting and green walls act as physical barriers that block or redirect

sound. Additionally, trees and plants have a calming effect and can reduce the perception of noise. Through thoughtful planning and the targeted use of trees and greenery, cities can not only reduce noise pollution but also significantly improve the quality of life for their residents.

Lesson Plan (4 lessons):

To introduce the topic, students will reflect on their own perception of sounds. This will clarify the subjective perception of noise and the methods for measuring noise (Task 1 + 2).

The development phase follows a classic research process (M3). Students will formulate hypotheses about different locations on the route and explore the noise issues in the immediate vicinity of the school.

For data collection, students will plan a route in the city, selecting locations for sound measurements, determining the type and frequency of measurements, and noting impressions of the sounds and their sources in a noise protocol. Subsequently, each group will visualize their measurement data using a simple map. These maps will be presented and discussed in the context of the research question(s).

During the discussion, similarities and differences between the group results will be highlighted. Additionally, there can be a reflection on the methodological approach, discussing its pros and cons (e.g., point measurements providing quick initial results; "Were the locations well-chosen to detect differences?", non-representative measurements due to short time frames, etc.). Following this, students should research and discuss measures to address specific noise problems. The discussion will also cover the role of urban trees and green spaces in noise reduction.