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VECTORS OF SCIENTIFIC PROGRESS: INTERNATIONAL EXPERIENCE AND STRATEGIC PRIORITIES

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STUDY OF NOISE POLLUTION LEVELS FROM VARIOUS SOURCES

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In today's world, characterized by rapid scientific and technological progress [1–9], noise is recognized as a form of physical stress on the environment. Noise encompasses all unpleasant or unwanted sounds—or a combination thereof—that interfere with productive activity, the perception of important auditory information, and rest. Adaptation to such an impact is nearly impossible [1–4].

Essentially, noise consists of particle vibrations of varying frequency, intensity, pitch, and duration, which are perceived by the human ear as unwanted signals. If noise includes all sound frequencies, it is defined as white noise. When high-frequency sound vibrations predominate, such noise is called violet noise by analogy with light vibrations; when low-frequency sound vibrations predominate, it is called pink noise [1–6].

The main sources are transportation, industry, construction, and household appliances [1].

In light of the above, the objective of our study was to examine the level of noise pollution from various sources.

The results of the analytical study show that prolonged exposure to man-made noise negatively affects the human nervous system, causing fatigue, reducing concentration, and gradually damaging hearing. Under its influence, plants slow their growth and excessively release moisture through their leaves, which often leads to their

death. In animals, noise causes disorientation, interferes with the communication signals of birds and mammals, and forces them to abandon their usual habitats. Among domestic animals, there is a decrease in milk production in cows, reduced weight gain in pigs, and a decline in egg production in chickens [1–4].

Research conducted at the Bila Tserkva National Agrarian University revealed a significant difference in noise levels between natural recreational areas and urbanized areas with active economic activity. In particular, in the university's Recreational Eco-Garden, background noise did not exceed a safe level of 40 dB, which meets comfortable health standards for recreational areas. This level promotes human well-being and the preservation of local biodiversity. In contrast, near roads, noise levels reached 80 dB, which significantly exceeds the limits recommended by the World Health Organization for daytime hours. This indicates a significant impact of traffic noise on suburban and urban ecosystems.

Local sources of high noise levels, as recorded during monitoring, pose a particular danger to the acoustic environment. Specifically, the noise level of a gasoline-powered generator reached 100.7 dB, dogs barking reached 103 dB, and the operation of a chainsaw exceeded the critical threshold of 116 dB. From an ecological and physiological standpoint, these levels significantly exceed not only the safe threshold for human hearing but also the pain threshold. According to occupational standards, the maximum permissible level for prolonged exposure is limited to 85 dB (Fig.1).



Figure 1. Measurement of noise exposure
Source of the figure: photo taken by the author

Such high levels of noise pollution pose serious risks both for occupational hearing loss and for the development of systemic disorders in the nervous, cardiovascular, and endocrine systems among people in the affected area. In addition, intense sound pressure negatively affects urban wildlife by disrupting their communication networks. This forces birds and animals to leave their usual habitats or causes them chronic stress, which further complicates their adaptation to the environment.

Conclusion. To protect against urban noise, it is recommended to use earplugs or active noise-canceling headphones, take regular “quiet breaks” in parks, and choose routes away from busy roads. In addition, planting greenery around buildings effectively helps reduce noise levels.

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