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Effect of urban morphology on road noise distribution.

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Abstract

The present research conducted in the city of Biskra focuses on the relationship that can exist between urban morphology and road noise distribution. Ten community-housing areas have been investigated in order to evaluate their noisescapes, using noise-mapping method. The connection between the morphological characteristics and road noise distribution using Pearson correlation tests, showed a strong relationship between the two. The results of this research indicate that the urban morphology has a significant impact on the noisescapes. Acoustic environment at urban scale represents therefore an important challenge for the urban designers and planners at early design stage for a sustainable and healthy urban environment.

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Keywords: Urban morphology; noise pollution; road traffic; noise mapping; Collective residential area.

1. Introduction :

Noise is the set of sounds that can cause a sense of discomfort and stress [1], it has become among the characteristics of modern life especially in urban areas. Because of its detrimental effects on our planet, our quality of life and our acoustic comfort, it has been classified since the seventies as an environmental pollutant [2] by the United States environmental protection agency.

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This problem has become more evident in recent years, according to the WHO. More than 44% of European population are regularly exposed to noise levels that exceed 55 dB, a level that threatens human health [3] because it can cause sleep disturbances and cardiovascular and even mental pathologies.[3,4,5].

The field of urban acoustics consists of three essential parameters [6], which are the source, the receiver and the urban morphology that represents the place of transition where the sound waves propagate from the transmitter to the receiver. The importance of urban morphology in the prospects of sustainable development has become more evident in recent years; according to the results of several studies, it has a direct effect on the thermal [7], light [8] and sound environments. The objective of this research carried out in the city of Biskra, is to determine the effect of urban morphology on noise pollution, in particular the road noise distribution as the most important source of noise pollution in urban areas [9].

2. Methodology :

This work is structured into three parts: the first concerns the selection and analysis of urban morphologies. Then a primary evaluation of each configuration is set up in the second part using noise prediction software. In the last part Pearson correlations Testes were performed using SPSS statistical software to define the relation may exist between the noisescap and the urban fabric.

3. Cases study

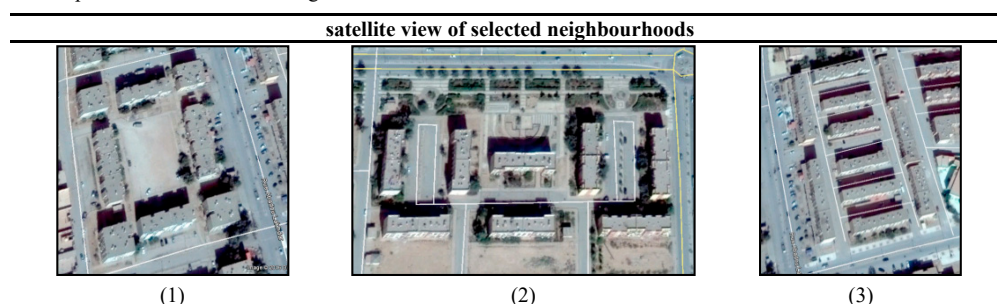
Existing urban configurations (collective residential area) were selected in this study according to morphological criteria such as height of the buildings, width of the streets, urban geometry and building fabric composition. The majorities of the chosen morphologies were built in the 1980s, with two main representative layouts; linear configurations (700 district, HLM city, 200 district) and centralized configurations (748 district, Saada city, belaiat1). The configurations chosen are shown in FIG. 1 and Table 1.



Fig.1.Location of the selected samples (source internet: Google earth)

Ten urban areas was chosen, based on satellite images, in situ visits, morphological and traffic criteria

Table 1: presentation of selected neighborhoods.



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