Prediction of Noise Pollution in Omu-Aran Township Using Artificial Neural Network

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Abstract:
Human health is unprotected upon constant exposure to impermissible noise. In Nigeria, several studies have suggested different models to validate noise pollution, but there is none carried out on noise levels in Omu-Aran, therefore this study, was aimed at validating noise levels in Omu-Aran Township using Artificial Neural Network. Data was collected from 21 selected locations in the morning, afternoon, and evening during the school and holiday periods for 3-weeks with a sound level meter model SL4010. ANN architecture was designed to incorporate 19 noise-determinant factors as the input, which were collected using the descriptive field investigation method. A total of 1134 data was loaded to the model, by random sampling, 70% of the data was used to train the network, and 30% being used for testing. Importation of algorithms and selection of epoch value is based on two hidden layers chosen. ArcGIS was adopted for mapping the noise level of all locations. The average mean noise levels in the mornings, afternoons and evenings were 67.82± 2.1, 68.7± 1.87, and 69.53± 2.24 dB respectively. There was a significant difference in noise levels during the working hours at the most concentrated locations, which were all above the permissible noise level given by OSHA and WHO. The ANN validation gives one of the best results with an increase in input data when compared to other publications with a prediction accuracy of 97.84%, and the root means a square error were given to be (RMSE =0.1096). Population and human activities are not the only determinant factors of noise pollution, but also biological factors have impact on the noise levels at the different locations in Omu-Aran Township. Hence, there is a need for proper urban planning and law enforcement at the local level to regulate noise pollution to permissible limits.

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