

FREQUENCY OF VIOLENCE MAPPING OF AIR POLLUTION USING MATHEMATICAL MODEL AND GEOGRAPHIC INFORMATION SYSTEM

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Abstract: Protection of human health from traffic pollutants is the primary goal of all air pollution control programs. The source of air pollution caused by traffic is considered as line-source emission. The frequency of violence of air pollution reflects environmental impact to people as exposure assessment. The purpose of the study was to generate traffic air pollution severity map in term of frequency of violence using mathematical model and geographic information system (GIS). The pollutants analyzed were CO, PM10 and NOx which can be harmful to people who live in the study area which is Nakhon Ratchasima municipality. The 3 steps of mapping process were performed in GIS environment using the vehicle emission and pollutant dispersion models. First, pollutant concentrations were calculated using Caline4, a tool with Gaussian dispersion model. The model parameters include emission rate, wind directions and speeds, ambient concentrations and temperatures, and atmospheric stability. This resulted in pollution concentrations of 504 receptors located along links of the road network. Second, the distribution of pollution concentrations was generated by means of the spatial interpolation of concentrations at those receptors. The results were raster-based maps of pollutions distribution varied with wind directions and time periods. Third, they were then used to determine the cell based severity defined by counting the frequency of pollution intensity that was higher than its own mean plus the standard deviation of every time period in each cell. The frequency of violence map of each pollutant achieved could be used as helpful basic data for efficient traffic and transportation planning.