Spatio-Temporal Variability of Air Quality in the Sub-Urban Areas and Satellite-Town Connected by Commuter Zone, Case in Yogyakarta City Indonesia

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ABSTRACT

Improving air quality is one of the environmental issues that are of global concern and agenda. This study aims to evaluate the Spatio-temporal variability of air quality in the Yogyakarta sub-urban area as well as several satellite cities connected by commuter lines. This study has two more specific objectives, namely to evaluate (1) highway ambient air quality on commuter lines, and (2) spatial and temporal patterns of air quality. To answer various problems in research, a descriptive-explorative research design was used with a geographical approach, namely the regional complex approach. Data collection is done by observation, remote sensing image interpretation, literature study, and documentation. Locations for observation were determined purposively, namely in suburban areas where there are commuter lines, certain points on out-of-town commuter lines, and the outskirts of satellite cities. The data that has been obtained is then analyzed using matching analysis, GIS analysis, and statistical analysis, supported by descriptive analysis. The results of PM2.5, PM10, CO2, and TVOC contrast measurements at 20 locations in the study area which are highways on commuter lines show variations in values. This variation is caused by local emission sources that vary in each region. Spatially, Sub-urban areas have worse air quality than satellite city areas. Sub-urban with heavy vehicle traffic also adds to the poor air quality. Temporally, poor air quality was found during busy road times at 07.00-09.00 and 16.00-18.00. Meanwhile, if it is studied using a weekly scale, some pollutant concentrations have decreased in various regions because commuters tend not to work or do activities on weekends. The highest PM2.5, PM10, CO2, and TVOC concentration values occurred in the Monjali crossroad. A bad score at the Monjali intersection shows an indication that many commuters drive private vehicles for specific purposes, such as work or education. Meanwhile, the lowest PM2.5, PM10, CO2, and TVOC concentration values were found on the Wonosari City Center. This good value indicates that the area is not crowded with commuter vehicles.

Kata Kunci: *Air quality, sub urban, satellite town, Yogyakarta*