Examination of Air Quality Indexes (AQIs) role in urban air quality assessment

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ABSTRACT
Air pollution is a major environmental problem that started when humans began to use fossil fuels as a source of energy. It has a range of negative impacts including human health, damage to ecosystems, food crops and the built environment. Public awareness of air pollution dangers has raised noticeably the need for a concept like air quality index (AQI) as a timely information about the possible changes in air quality. The study area is Veszprém city, one of the oldest urban areas in the West of Hungary, lies approximately 15 km of Balaton Lake. The aim of this work was to highlight the importance of air quality indexes (AQIs), in air quality assessment. Therefore, three different long-term AQIs - Long-term Air Quality Index (LAQx), Aggregated Air Quality Index (AAQI), Oak Ridge Air Quality Index (ORAQI) - were calculated and compared, using data between 2007 and 2016. The results proved that air quality in the city can be classified from satisfying to good, with a slight fluctuation in the emissions caused by the meteorological conditions, the demographic growth, the industrial transition, and the public awareness.

WHAT IS AQI?

• Overall scheme that transforms weighted values of individual air pollution related parameters into a single number
• To translate the complex scientific and medical information into a simple and precise number
• To communicate with the public in the historical, current and predictive sense.
• Short term = Long-term indexes

RESULTS AND DISCUSSION

• A change in the overall meteorological conditions.
• Consecutive extremely hot summer days (Notably in 2010 and 2012, extreme heat waves in Europe)
• 2010 and 2011: Increase in PM2.5 concentration.
• Air pollution: a decreasing tendency and not representing any risk.
• General review about air pollution levels and the priority to improve environmental policies.

• AAQI and ORAQI: Similar variation (including same pollutants)
• LAQx; in more feasible in air quality evaluation as it's including Benzene
• Air quality in Veszprém is classified from satisfying to good between 2007 and 2016.

Figure 1: Scheme to determine LAQx [3]

METHODS AND MATERIALS

• Data were taken from the Hungarian Air Quality Monitoring Network.
• Three different long-term AQIs - Long-term Air Quality Index (LAQx), Aggregated Air Quality Index (AAQI), Oak Ridge Air Quality Index (ORAQI) - were calculated and compared, using daily averages of SO2, NO2, Benzene and PM2.5 concentrations between 2007 and 2016. (See Table 1)

Table 1. AQIs Description

Table 3. Categories of AAQI [4]

CONCLUSION

• Limitation of the examined AQIs in three or four pollutants
• Exclusion of external parameters such as meteorological conditions that can influence the dispersion of pollutants
• AAQI concept is a useful tool to support governmental policies, especially in the preventive health care system and to raise public awareness about environmental issues
• More careful considerations of combined multiple pollutants impact, low level exposure and with more timely transfer of information to the public.

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REFERENCES