Air Quality Index in Iasi City

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ABSTRACT

Air quality index represents an innovative methods to present the air quality to wide public, that have not scientific knowledges concerning air quality. The aim of study is to presents the methods and the results concerning air quality index for Iasi city.

Keywords: *air, Iasi city, index.*

INTRODUCTION

The analysis of the air quality parameters indicates a series of multiannual, seasonal and monthly variations in the period under discussion (2006 - 2011), in agreement with the nature of the city main activities, being influenced by a number of natural factors (relief, vegetation, etc) as well as by anthropogenic factors. The spatial variation of air pollutants was highlighted by the analysis of the observations in 5 monitoring sites; being relevant, because the Iasi city is one of the largest cities of Romania, so that the impacted population by air pollution is larger

AIMS AND OBJECTIVES

The aim of current study is to presents the air pollution in an accessible manner for population, no matter the education level, that will be able to understand the danger after seeing a coloured table.

MATERIALS AND METHODS

The database was elaborated from the annual reports for the environmental status issued by APM Iasi, for the monthly and annual average values, as well as the daily average values for the six pollutants under analysis. The database was analyzed and processed statistically and the annual and monthly average values were determined, and

Air pollution index was computed according to the formula:

$$I_p = (-1) \times 100 \times \frac{(C - CMA)}{(C + CMA)}$$

where:

C= Registered concentration of a pollutant

CMA= Maximum average concentration

The results were divided between several classes according the limits from the methodology:

PP = -15 (danger limit)

PI = 0 (intervention limit)

PA = 15 (alert limit)

PM = 70 (limit of starting monitoring)

RESULTS AND DISCUSSION

Air quality in the town of Iasi has been monitored through five different stations since 2005, and it provides information on annual, seasonal, monthly, daily and hourly variation of the main categories of air pollutants: inorganic pollutants (compounds of sulphur, nitrogen, carbon, secondary pollutants of which the most important is the tropospheric O₃), organic pollutants (C₆H₆) and particulate matter pollutants.

The average values of air pollutants for the period 2006 – 2011 are: 5.76 ±0.7 µg/cm³ SO₂,

Tab 1: Air quality index results

		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
SO ₂	IS 1	87.2	87.3	90.2	91.3	92.9	92.4	92.8	92.7	91.8	89.9	89.2	88.7
	IS 2	88.6	87.9	90.8	92.8	93.8	94.0	93.9	93.1	92.5	90.9	90.5	89.8
	IS 3	89.5	85.8	89.1	92.5	93.4	93.5	93.1	93.8	92.4	92.2	91.4	90.1
	IS 4	87.4	87.3	92.3	93.5	94.2	93.8	93.0	93.6	92.6	91.8	91.5	88.5
	IS 5	84.6	87.5	90.8	92.2	93.5	92.8	92.8	92.4	92.3	92.2	91.4	89.8
	Average	87.4	87.1	90.6	92.5	93.5	93.3	93.1	93.1	92.3	91.4	90.8	89.4
NO _x	IS 1	-46.3	-42.7	-41.1	-33.8	-27.3	-22.9	-25.5	-28.1	-41.3	-51.7	-49.6	-52.5
	IS 2	-15.1	-9.0	-1.2	7.8	20.3	23.3	26.4	18.4	0.0	-20.4	-23.1	-15.1
	IS 3	9.3	13.8	22.9	31.3	44.4	45.6	42.8	37.4	22.1	9.0	2.2	10.1
	IS 4	51.1	58.2	63.2	69.0	73.6	70.4	70.3	66.9	64.3	57.1	49.2	47.8
	IS 5	4.4	4.1	19.1	37.2	48.3	54.5	51.4	53.4	36.8	20.8	4.4	-3.7
	Average	-10.3	-5.9	0.5	10.6	20.5	24.1	22.5	18.7	2.8	-12.4	-15.1	-15.4
CO	IS 1	82.1	85.3	88.4	91.8	94.0	94.9	94.4	93.5	91.4	85.6	85.1	83.0
	IS 4	93.7	96.7	97.6	98.6	99.0	98.9	99.0	98.7	99.1	98.6	97.4	96.2
	IS 5	91.7	93.9	95.7	97.6	98.5	98.7	98.5	98.3	98.1	95.9	95.0	92.6
	Average	89.0	91.8	93.8	95.9	97.1	97.5	97.3	96.8	96.1	93.2	92.3	90.4
Particulate matter	IS 1	-31.4	-17.4	-14.7	-13.2	3.4	5.3	1.8	-7.4	-14.0	-34.9	-34.4	-23.3
	IS 3	-13.1	-2.4	5.5	13.2	31.7	31.5	22.7	7.1	18.4	1.0	-1.1	3.5
	Average	-22.3	-10.5	-5.7	-1.8	15.9	16.9	11.3	-0.7	-0.4	-20.8	-21.1	-11.9
Benzen	IS 1	7.0	11.4	11.8	27.5	39.0	42.9	46.8	35.3	27.5	11.3	6.7	8.8
	IS 2	8.2	20.1	39.7	45.5	57.8	60.8	62.0	54.4	42.3	21.4	19.5	14.7
	Average	7.6	15.6	24.2	35.9	47.8	51.3	54.1	44.2	34.5	16.1	12.7	11.7
Ozone	IS 3	59.4	49.9	39.2	35.2	35.4	39.4	39.1	42.5	55.7	64.4	69.0	68.5
	IS 4	44.0	38.7	26.4	21.0	23.8	27.4	28.4	27.9	34.5	43.2	46.2	53.5
	IS 5	53.4	47.6	35.3	33.4	31.0	33.8	32.7	39.7	52.7	61.6	63.1	67.5
	Average	52.0	45.2	33.4	29.5	29.9	33.3	33.3	36.4	47.0	55.8	58.8	62.9
		PP		PI		PA		PM		> PM			

40.9 ± 2.4 µg/cm³ NO_x, 0.29 ± 0.09 µg/cm³ CO, 49.2 ± 2.9 µg/cm³ O₃, 2.87 ± 0.72 µg/cm³ C₆H₆, 42.31 ± 13.04 µg/cm³ PM₁₀. Correlations have been established between the variation of the main air pollutants and the main climate factors, highlighting the purifying role of rainfall. The index was calculated for Bucharest city, revealing similarities for particulate matters and for N_{ox}.

CONCLUSIONS

The air pollution index indicates, in a synthetic way, the monitoring stations of air quality which recorded monthly values over the alert threshold for certain pollutants, namely: nitrogen oxides, sediment particles and benzene from the Podu de Piatra area (Iasi 1 station).

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