Data in Brief 19 (2018) 1131–1141

Contents lists available at ScienceDirect

Data in Brief

journal homepage: www.elsevier.com/locate/dib

Data article

Zoning of air quality index (PM_{10} and $PM_{2.5}$) by Arc-GIS for Khorramabad city, Iran

Maryam Kianisadr [a], Mansour Ghaderpoori [b,c], Ali Jafari [b,c], Bahram kamarehie [b,c,*], Mohammadamin Karami [b,c]

[a] Department of Environment, College of Basic Sciences, Hamedan Branch, Islamic Azad University, Hamedan, Iran
[b] Nutritional Health Research Center and Department of environmental health engineering, School of Health and Nutrition, Lorestan University of medical sciences, Khorramabad, Iran
[c] Department of environmental health engineering, School of Health and Nutrition, Lorestan University of medical sciences, Khorramabad, Iran

ARTICLE INFO

Article history:
Received 5 December 2017
Received in revised form
7 May 2018
Accepted 15 May 2018
Available online 19 May 2018

Keywords:
Air quality index
PM_{10}
$PM_{2.5}$
Khorramabad
GIS

ABSTRACT

Nowadays in many countries, air pollution is one of the major issues affecting human health. Among the various air pollutants particulate matters are mainly present in ambient air pollution. The purpose of this study was to measure the concentration of particulate matter (PM) (namely $PM_{2.5}$ and PM_{10}) and to conduct zoning via GIS software in Khorramabad city (Summer – 2017). According to the findings, the average concentrations of $PM_{2.5}$ in July, August and September were 100.1, 116.3, and 199.8 $\mu g/m^3$, respectively. Furthermore, the average concentrations of PM_{10} in July, August and September were 199.8, 215.7, and 190.8 $\mu g/m^3$, respectively. The findings of this study also indicated that due to continuous dust storms,particularly in recent years, the air pollution status in Khorramabad was not suitable that can adversely affect public health.

* Corresponding author at: Nutritional Health Research Center and Department of environmental health engineering, School of Health and Nutrition, Lorestan University of medical sciences, Khorramabad, Iran.
E-mail addresses: mkianysadr@gmail.com (M. Kianisadr), ghaderpoori.m@lums.ac.ir (M. Ghaderpoori), jafari_a99@yahoo.com (A. Jafari), B.kamarehie@gmail.com (B. kamarehie), karami.mohammadamin@yahoo.com (M. Karami).

https://doi.org/10.1016/j.dib.2018.05.063

Specifications Table

Subject area	*Chemistry, biology*
More specific subject area	*Air pollution monitoring and quality*
Type of data	*Table, figure*
How data was acquired	*Sampling (by Environmental Dust Monitor, model: Envirocheck 107) and measuring the concentration of PM_{10} and $PM_{2.5}$ in of Khorramabad city. After determining the concentration, AQI were calculated. Finally, the collected and analyzed data entered the GIS software*
Data format	*Raw, analyzed,*
Experimental features	*According to the city map, 45 stations of air pollution were selected as sampling stations. Until concentration measurement, all samples were stored in standard conditions and were analyzed for thePM_{10} and $PM_{2.5}$*
Data source location	*Khorramabad city Iran (33° 48′ N, 48° 35′ E), Lorestan province, west of Iran*
Data accessibility	*Data are included in this research and supplemented excel file*

Value of the data

- In recent years, dust storms, in Iran and especially in west of the country, have increased significantly. As a result, the continuous monitoring and presenting the major pollutants is important.
- According to previous studies, particulates ($PM_{2.5}$ and PM_{10}) are the main sources of airborne diseases for public health.
- Particulate mattes can carry toxic pollutants such as heavy metals and organic compounds. Therefore, their continuous monitoring is very necessary.
- AQI shows the impact of air pollution on health. This index is provided by United States Environmental Protection Agency 2003.

1. Data

This study measured the concentration of particulate matters ($PM_{2.5}$ and PM_{10}) in Khorramabad city and conducted its zoning via GIS software and IDW method.

2. Experimental design, materials, and methods

In order to determine the number of measurement stations in the study area, we used the equation of $n = (var^2 * z^2)/d^2$. According to this equation, the number of sampling stations was 30. In addition to the 30 stations mentioned above, 8 stations in traffic and crowded areas of the city were also selected for air pollutants measurement. The location of the stations are shown in Fig. 1. Also, due to the fact that IDW method was used to prepare zoning maps of air pollution in GIS, so to increase the accuracy of calculations, 7 stations were added to study stations. As a result, a total of 45 stations were selected. The whole sample was taken in summer season. In this study, PM_{10} and $PM_{2.5}$ were

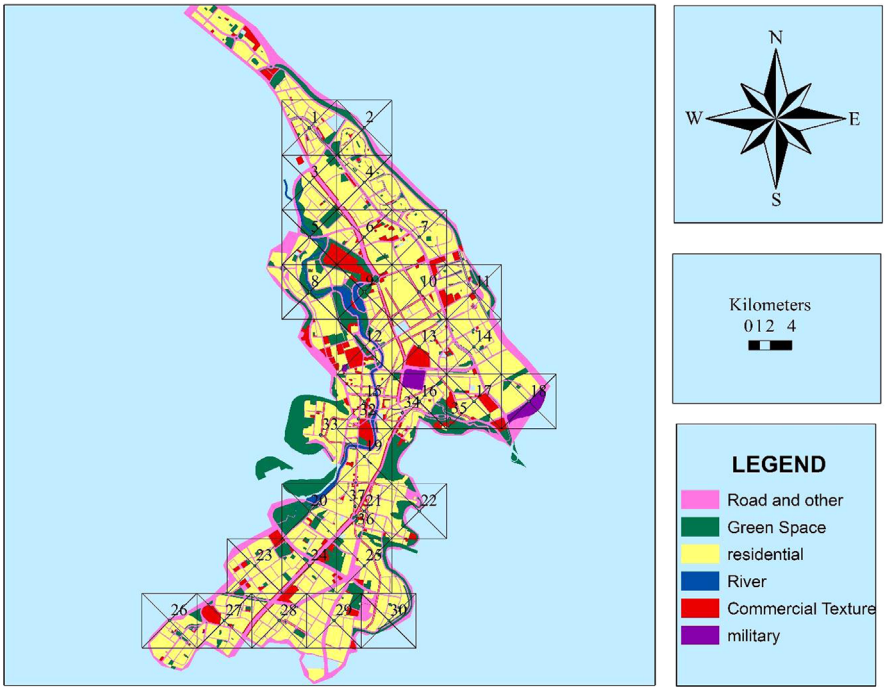

Fig. 1. The location of the air pollutant measurement stations in Khorramabad city, Iran.

measured by Environmental Dust Monitor. After the measurement, the AQI index was calculated according to Eq. (1):

$$I_p = \frac{I_{Hi} - I_{Lo}}{BP_{Hi} - BP_{Lo}}(C_p - BP_{Lo}) + I_{Lo} \quad (1)$$

The measured concentrations of $PM_{2.5}$ and PM_{10} are shown in Table 1. Also, Figs. 2–7 show the results of the zoning of PMs data using the GIS. The average concentrations of $PM_{2.5}$ in July, August, and September were 100.1, 116.3, and 199.8 μg/m^3, respectively. The minimum and maximum concentrations of $PM_{2.5}$ in this period were 9.7 and 273.3 μg/m^3, respectively. The average concentrations of PM_{10} in July, August and September were 199.8, 215.7, and 190.8 μg/m^3, respectively. The minimum and maximum concentrations of PM_{10} in this period were 83.2 and 526.8 μg/m^3, respectively. According to the US Environmental Protection Agency, the standard concentrations of $PM_{2.5}$ and PM_{10} are 150 and 65 μg/m^3, respectively. Unfortunately, the study results showed that the concentration of $PM_{2.5}$ and PM_{10} in the city is worrying [1–15].

Table 1
The measured concentrations of $PM_{2.5}$ and PM_{10} in Khorramabad in summer 2016.

station		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	July	9.7	45.1	48.8	50.0	51.1	51.7	52.9	53.2	55.1	56.2	56.6	56.8	57.8	64.0	64.8	69.1	72.1	72.9	74.2
$PM_{2.5}$	**August**	25.9	61.4	65.0	66.3	67.3	67.9	69.1	69.4	71.3	72.4	72.8	73.0	74.1	80.2	81.0	85.3	88.3	89.2	90.4
	September	2.1	37.5	41.2	42.4	43.5	44.1	45.3	45.6	47.5	48.6	49.0	49.2	50.2	56.4	57.2	61.5	64.5	65.3	66.6
	July	92.2	94.3	98.9	99.2	101.2	107.1	107.4	108.2	109.2	109.8	110.9	111.8	112.1	112.7	141.1	143.2	146.2	148.1	154.2
PM_{10}	**August**	108.1	110.2	114.8	115.1	117.1	123.0	123.3	124.1	125.1	125.7	126.8	127.7	128.0	128.6	157.0	159.1	162.1	164.0	170.1
	September	83.2	85.3	89.9	90.3	92.2	98.1	98.5	99.2	100.3	100.8	101.9	102.9	103.1	103.7	132.1	134.2	137.3	139.1	145.3
Sation		**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**
	July	76.2	88.0	89.2	100.1	103.1	103.9	105.6	107.3	108.2	109.9	111.2	156.9	159.8	187.2	200.1	204.8	223.0	250.1	257.1
$PM_{2.5}$	**August**	92.5	104.2	105.5	116.4	119.4	120.1	121.8	123.6	124.4	126.1	127.5	173.1	176.0	203.4	216.3	221.0	239.2	266.4	273.3
	September	68.6	80.4	81.6	92.5	95.5	96.3	98.0	99.7	100.6	102.3	103.6	149.3	152.2	179.6	192.5	197.2	215.4	242.5	249.5
	July	159.1	168.1	178.2	191.2	201.1	201.1	207.2	208.1	209.0	210.2	214.9	301.2	308.2	370.1	400.1	410.0	456.1	480.3	511.0
PM_{10}	**August**	175.0	184.0	194.1	207.1	217.0	217.0	223.1	224.0	224.8	226.1	230.8	317.1	324.1	386.0	416.0	425.9	472.0	496.2	526.9
	September	150.1	159.1	169.2	182.3	192.1	192.1	198.2	199.1	200.0	201.3	205.9	292.2	299.2	361.2	391.1	401.0	447.1	471.3	502.0

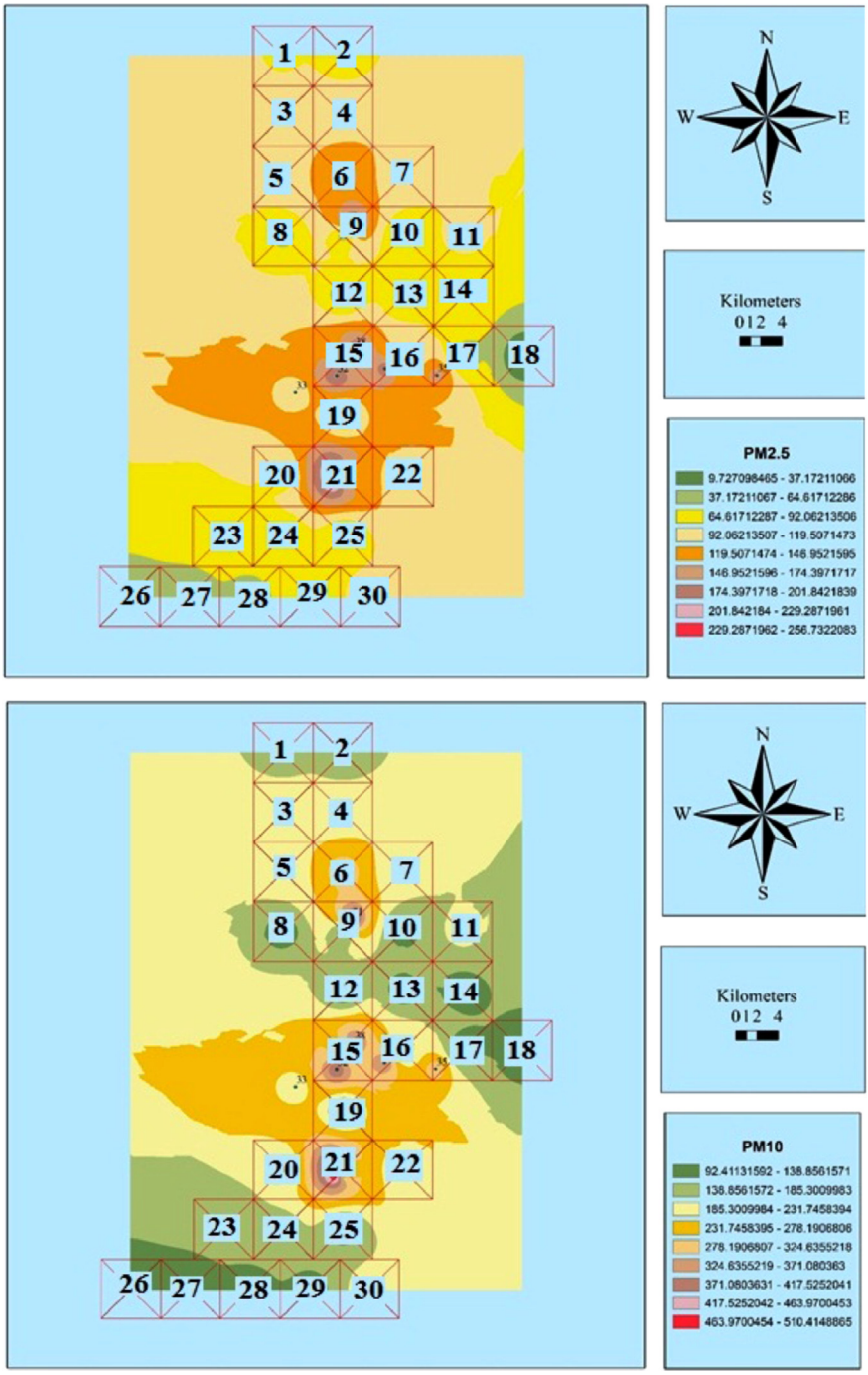

Fig. 2. Zoning the distribution of the average concentration of $PM_{2.5}$ and PM_{10} in July using GIS.

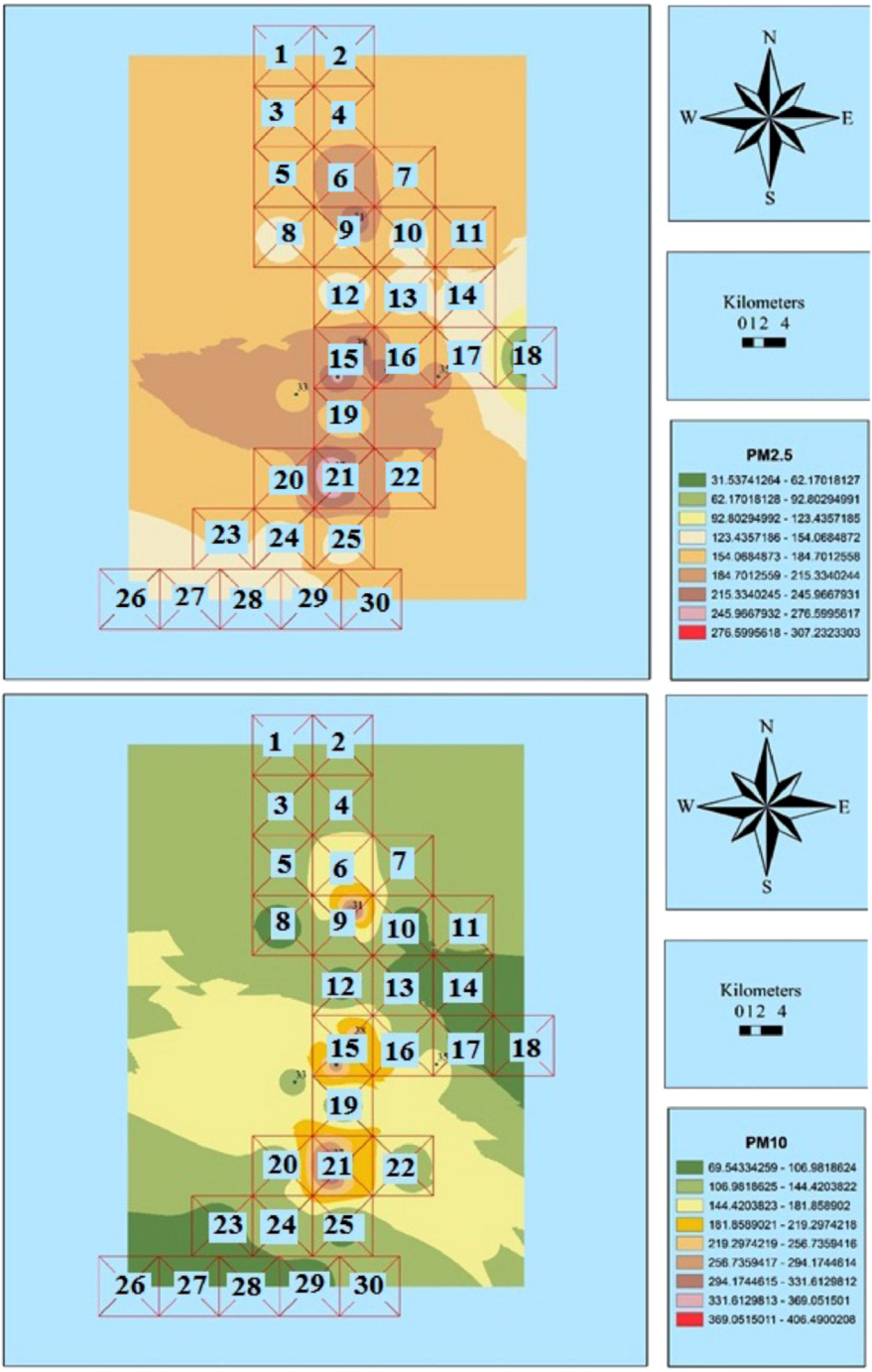

Fig. 3. Zoning the AQI distribution for $PM_{2.5}$ and PM_{10} in July using GIS.

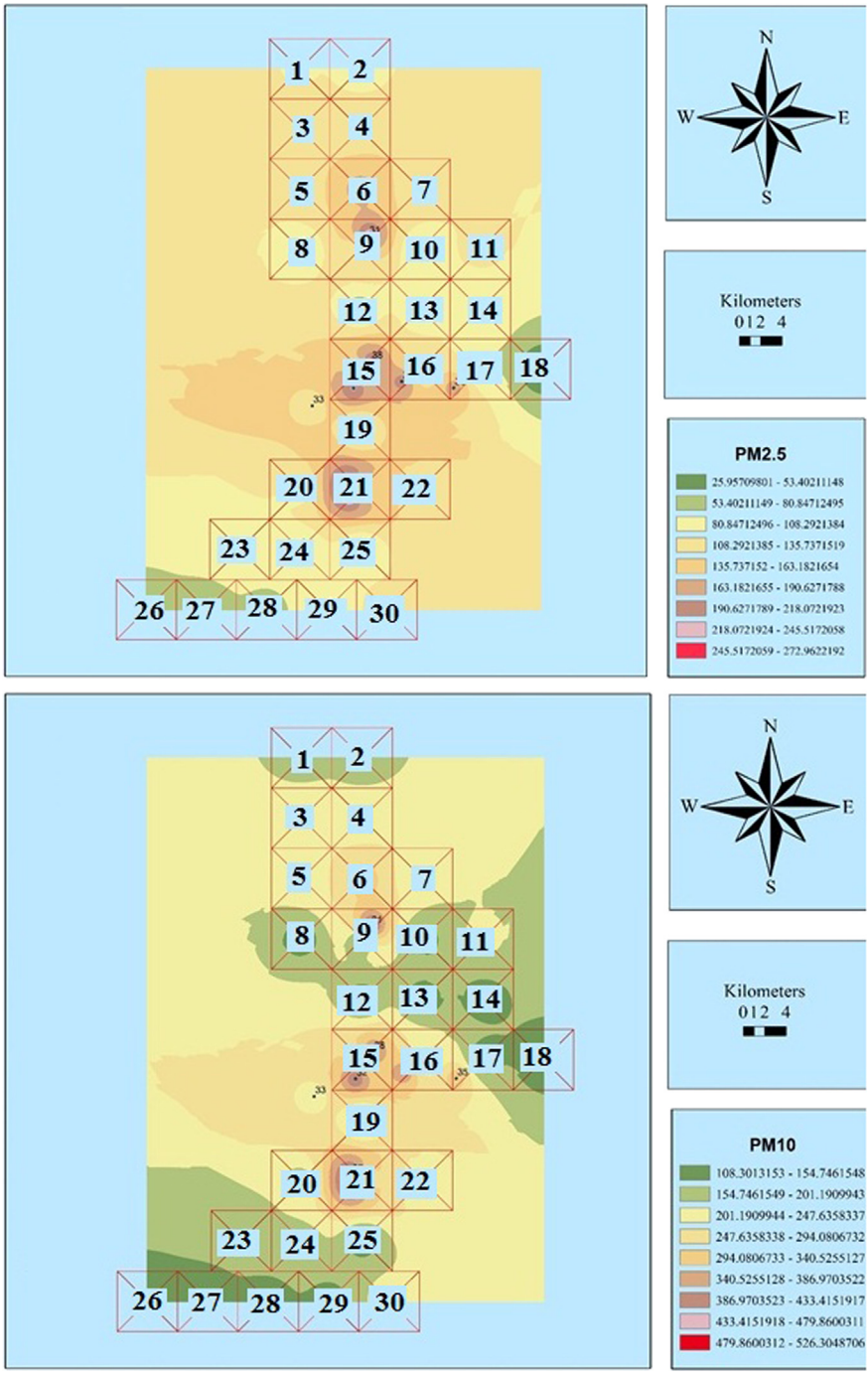

Fig. 4. Zoning the distribution of the average concentration of $PM_{2.5}$ and PM_{10} in August using GIS.

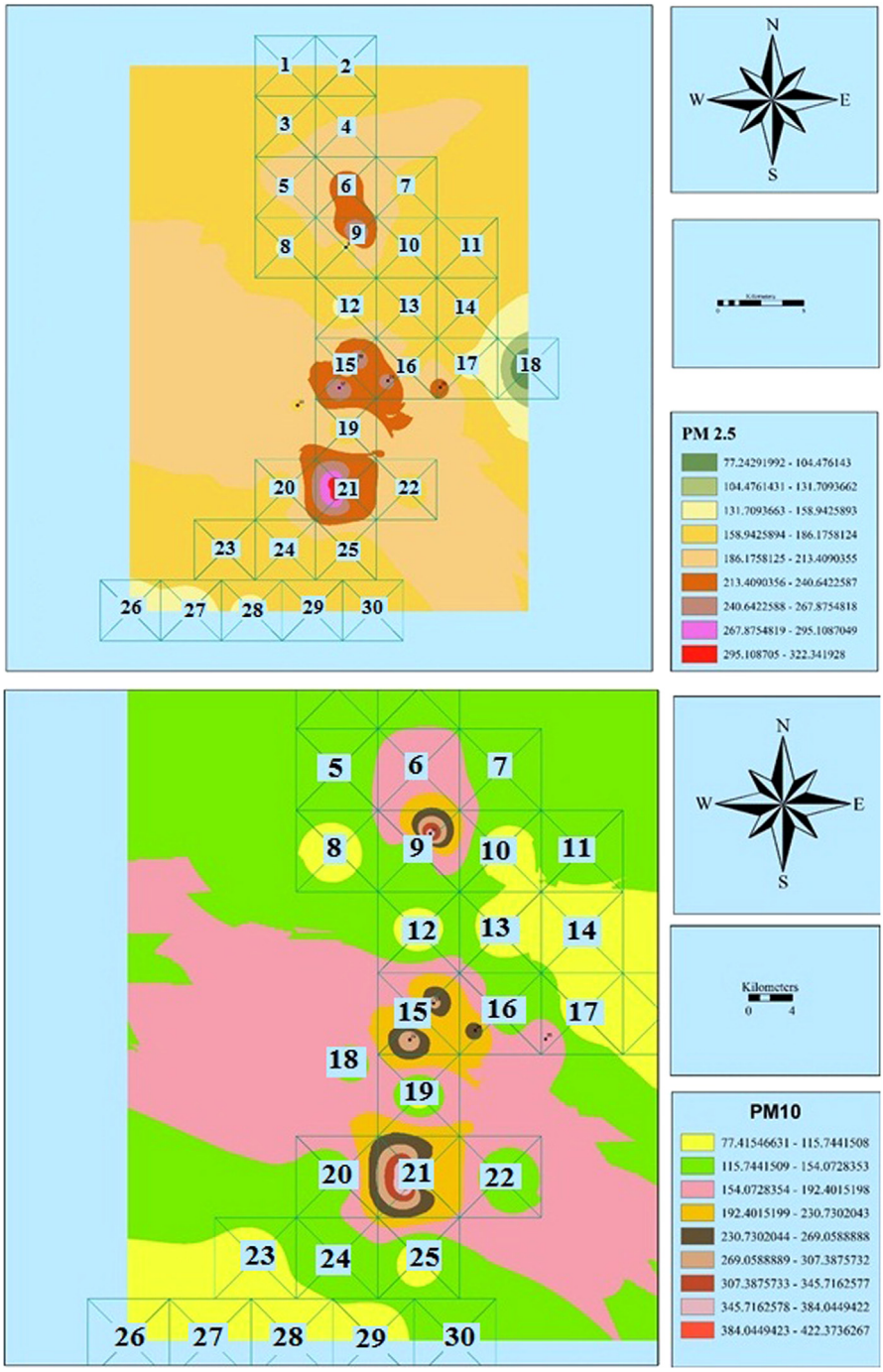

Fig. 5. Zoning the AQI distribution for $PM_{2.5}$ and PM_{10} in August using GIS.

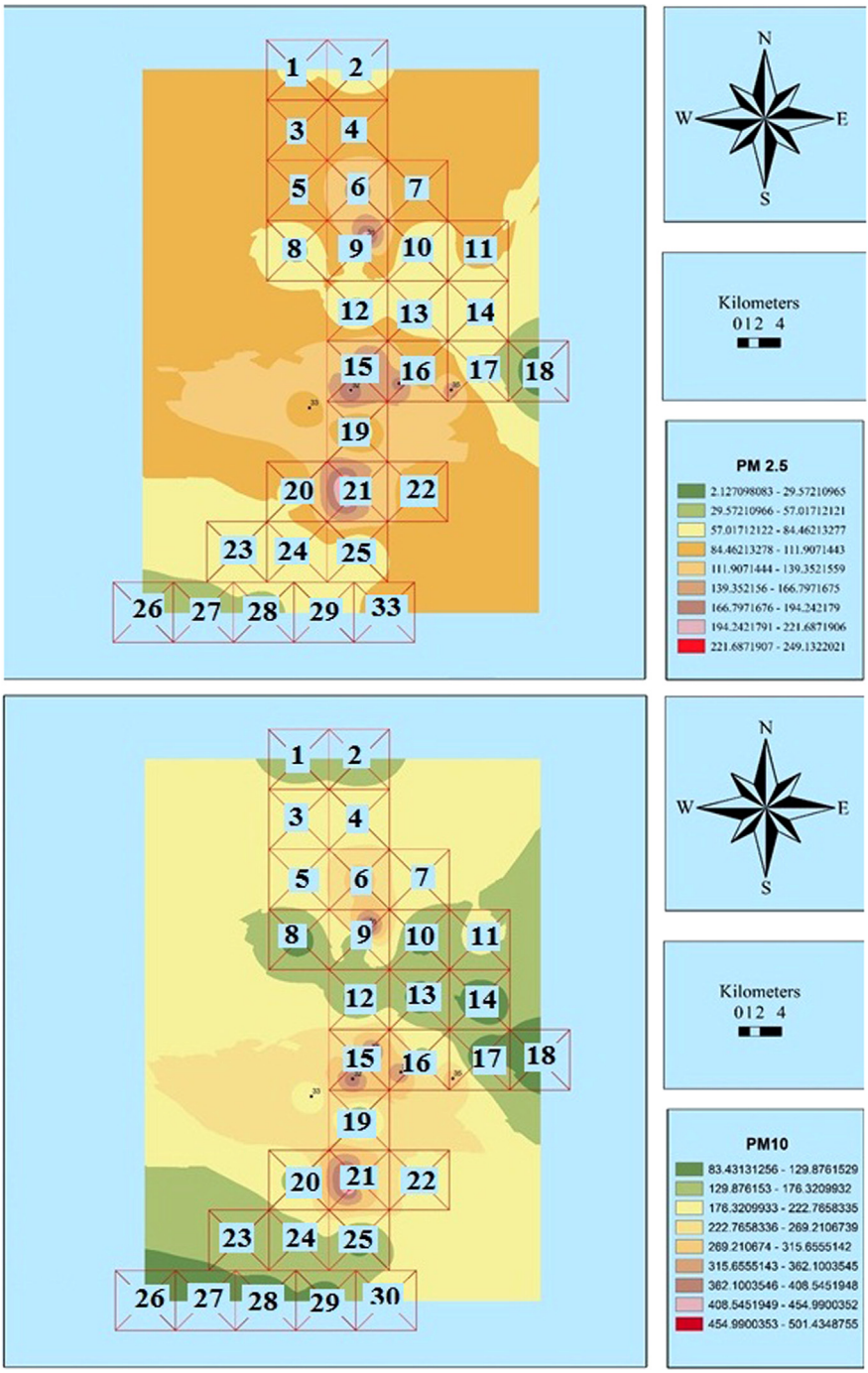

Fig. 6. Zoning the distribution of the average concentration of $PM_{2.5}$ and PM_{10} in September using GIS.

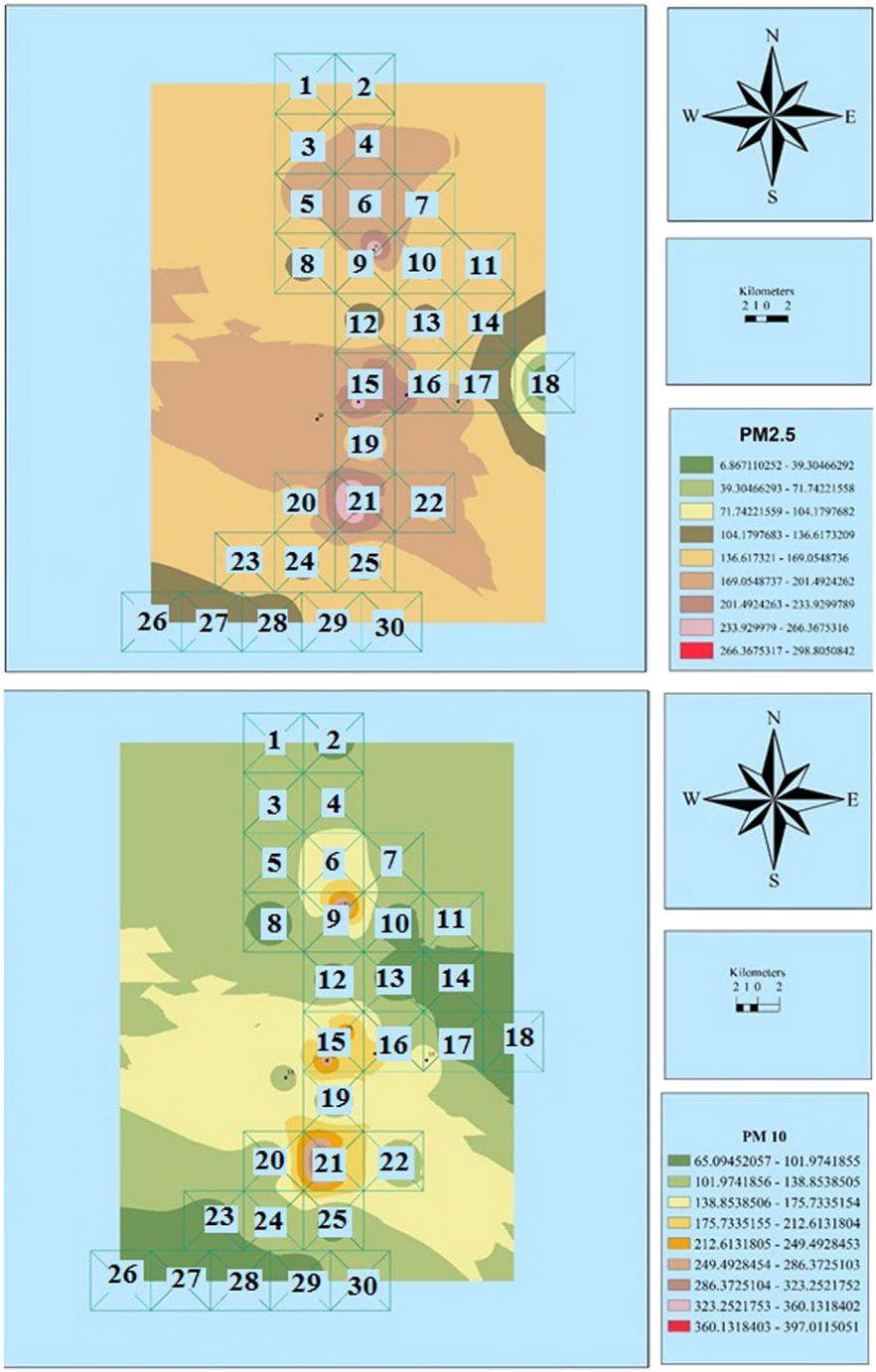

Fig. 7. Zoning the AQI distribution for $PM_{2.5}$ and PM_{10} in September using GIS.

Transparency document. Supporting information

Transparency data associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2018.05.063.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2018.05.063.

References

[1] M. Habil, D. Massey, A. Taneja, Personal and ambient $PM_{2.5}$ exposure assessment in the city of Agra, Data Brief 6 (2016) 495–502.
[2] B. Kamarehie, M. Ghaderpoori, A. Jafari, M. Karami, A. Mohammadi, K. Azarshab, A. Ghaderpoury, N. Noorizadeh, Estimation of health effects (morbidity and mortality) attributed to PM_{10} and $PM_{2.5}$ exposure using an Air Quality model in Bukan city, from 2015–2016 exposure using air quality model, Environ. Health Eng. Manag. J. 4 (2017) 137–142.
[3] Y.I. Chirino, Y. Sánchez-Pérez, Á.R. Osornio-Vargas, I. Rosas, C.M. García-Cuellar, Sampling and composition of airborne particulate matter (PM_{10}) from two locations of Mexico City, Data Brief 4 (2015) 353–356.
[4] C.M. Liu, Effect of $PM_{2.5}$ on AQI in Taiwan, Environ. Model. Softw. 17 (2002) 29–37.
[5] A. Zhang, Q. Qi, L. Jiang, F. Zhou, J. Wang, Population exposure to $PM_{2.5}$ in the urban area of Beijing, PLoS one 8 (2013) e63486.
[6] S. Chattopadhyay, S. Gupta, R.N. Saha, Spatial and temporal variation of urban air quality: a GIS approach, J. Environ. Prot. 1 (2010) 264–277.
[7] J. Amanollahi, PM_{10} distribution using remotely sensed data and GIS techniques&59; Klang Valley, Malaysia, Environ. Asia 4 (2011) 47–52.
[8] F. Pilla, B. Broderick, A GIS model for personal exposure to PM_{10} for Dublin commuters, Sustain. Cities Soc. 15 (2015) 1–10.
[9] P. Cicero-Fernandez, V. Torres, A. Rosales, H. Cesar, K. Dorland, R. Muñoz, R. Uribe, A.P. Martinez, Evaluation of human exposure to ambient PM_{10} in the metropolitan area of Mexico City using a GIS-based methodology, J. Air Waste Manag. Assoc. 51 (2001) 1586–1593.
[10] W. Shi, M.S. Wong, J. Wang, Y. Zhao, Analysis of airborne particulate matter ($PM_{2.5}$) over Hong Kong using remote sensing and GIS, Sensors 12 (2012) 6825–6836.
[11] S. Safavy, M. Mousavi, R. Dehghanzadeh Reihani, M. Shakeri, Seasonal and spatial zoning of air quality index and ambient air pollutants by Arc-GIS for Tabriz city and assessment of the current executive problem, J. Health 7 (2016) 158–177.
[12] S. Song, A GIS based approach to spatio-temporal analysis of urban air quality in chengdu plain. The international achieves of the photogrammetry, Remote Sens. Spat. Inf. Sci. 37 (2008).
[13] K.L. Yang, Spatial and seasonal variation of PM_{10} mass concentrations in Taiwan, Atmos. Environ. 36 (2002) 3403–3411.
[14] A. Matkan, A. Shakiba, S. Purali, I. Baharloo, Determination of Spatial Variation of CO and PM10 Air Pollutants, Using GIS Techniques (Case study: Tehran, Iran), 2009.
[15] R. Bahari, R. Abaspour, P. Pahlavani, Zoning of Particulate Matters (PM) pollution using local statistical models in GIS (Case Study: tehran Metropolisies), J. Geomatics Sci. Technol. 5 (2016) 165–174.