Environmental issues caused by the increasing number of vehicles in Iraq

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Abstract

Iraq has witnessed a big challenge in the environmental issues due to the big increase in the production of various types of pollutants.

We will try in this research to shed light on the pollutants produced by the increasing number of registered and used vehicles in Iraq.

We have depended on extensive statistics published by the Ministry of Planning on the increasing numbers of registered and used vehicles (both gasoline and diesel types) classified according to each governorate in Iraq between 2007 and 2013. Studies of the environmental effects of such increase have been made, whereby statistics of the polluting gases (CO, CO_2, NO_x, and HC) and mass particulates were prepared, analysed and represented graphically in a comparable manner.

The results of this research revealed the following results: An increase in the number of vehicles by 437% from 2007 to 2013. This was accompanied by an increase in the amount of daily pollutants (NOx, CO, HC and particulate mass) excluding CO_2 from 441 tons/day in 2007 to 1913 tons/day in 2013 and an increase of CO_2 from 6068 tons/day in 2007 to 27382 tons/day in 2013.

Keywords: air pollution, carbon dioxide, carbon monoxide, contaminant, environmental issues, hazardous, mass particulate, nitrogen oxides, pollutant.

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1 Introduction

Iraq has a strategic location in the Middle East. Due to the continental climate and the normal elevation, Iraq has hot summer and cold winters [1]. A lot of sites in Iraq can be regarded as high density traffic sites especially in the capital Baghdad. An excess of pollution and high levels of emission of various pollutants due various reasons are produced. One of the major reasons is pollution due to automobile fuel consumption which led to a negative impact on the economy and environment [2–4].

An overview of the conditions of all Iraqi governorates and comparing them with the conditions years before will indicate vast development, especially in the fields of transportation. We also noticed that the population has grown dramatically in addition to a huge increase of the numbers of vehicles as well as the big increase in gasoline and diesel consumption with accompanying pollutants emissions as being the sources of air pollution in these cities.

We believe that understanding the impact of environmental issues is still not fully recognized in Iraq in addition to the shortcomings of doing enough research dealing with the environment and environmental protection.

2 Rate of growth of automobiles

The automobiles market in Iraq has witnessed a large increase in the numbers of automobiles which are registered and used during the past few years [5]. This will be reflected on the amount of pollution connected with such increase [6], as shown in table 1 below. The authors published two papers on pollution issues of automobiles in Erbil City [7] and in Kurdistan Region [8].

Table 1: Accumulated automobile profile in Iraq through the period from 2007–2013.

Year	Nineveh	Kirkuk	Diala	Anbar	Baghdad	Babylon
2007	88260	32099	43722	53891	374875	49895
2008	94903	34516	47013	57947	403092	53651
2009	102046	37114	50552	62309	433432	57689
2010	109727	39907	54357	66999	466056	62031
2011	270725	98461	134113	165304	1149880	153046
2012	290412	105621	143866	177325	1233501	164176
2013	311531	113302	154328	190220	1323202	176115

Table 1 Continued.

Year	Karbala	Wasit	Salah Al-Deen	Najaf	Qadisiya	Muthana
2007	24680	23289	36330	25038	14940	11734
2008	26538	25041	39064	26923	16065	12617
2009	28535	26926	42004	28949	17274	13567
2010	30683	28953	45166	31128	18574	14588
2011	75703	71435	111436	76801	45827	35992
2012	81208	76629	119540	82386	49159	38610
2013	87114	82202	128233	88377	52734	41417
	Thi-Qar	Maysan	Basrah	Dohouk	Sulaimaniya	Erbil
2007	24091	15193	56514	17545	13947	86536
2008	25905	16337	60768	28919	21794	142044
2009	27854	17567	65342	41758	34092	199248
2010	29951	18889	70260	72478	86982	286077
2011	73897	46604	173350	100121	138055	448687
2012	79271	49993	185956	145175	220887	605727
2013	85035	53629	199478	210504	353420	817732

Table 2: Accumulated Automobile Profile classified according to fuel type.

Types of Automobiles	2007	2008	2009	2010	2011	2012	2013
Gasoline Automobiles	873410	995654	1127133	1334866	2931605	3342315	3870077
Gasoil Automobiles	119170	137482	159125	197941	437831	507127	598496

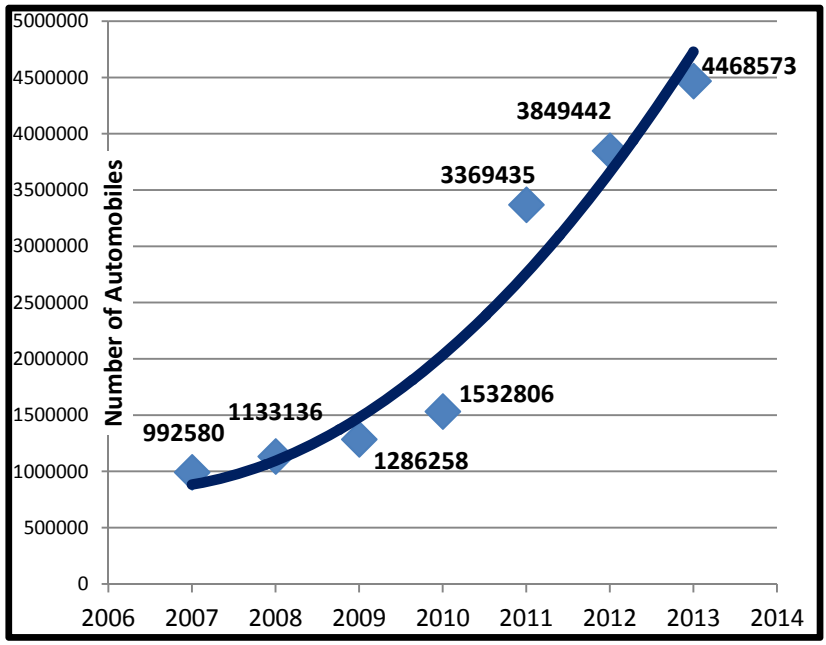
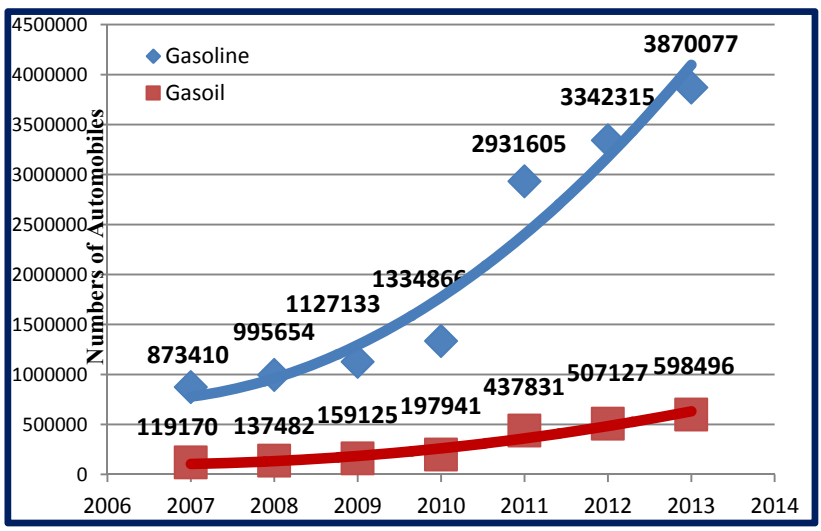


Figure 1: Accumulated automobiles profile through the period from 2007–2013.



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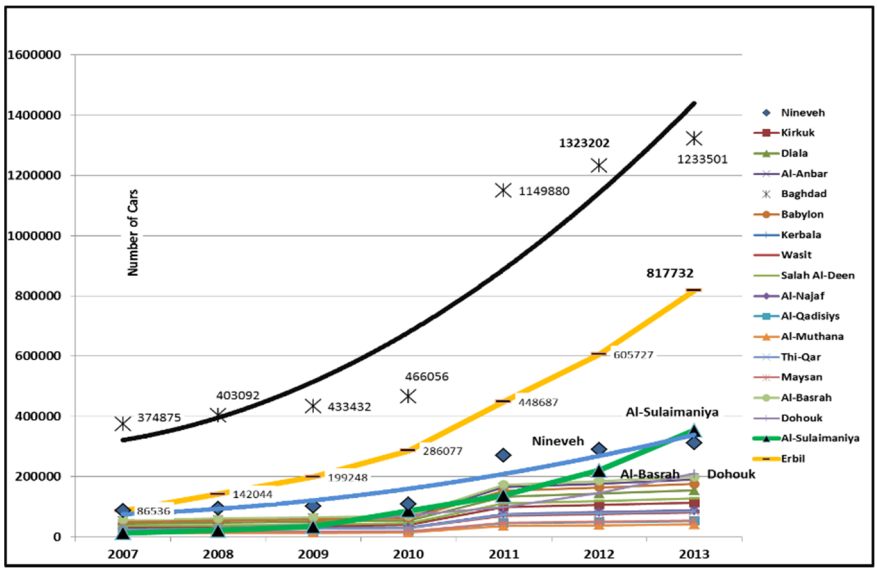

Figure 3: Accumulated automobile profile in Iraqi governorates through the period from 2007–2013.

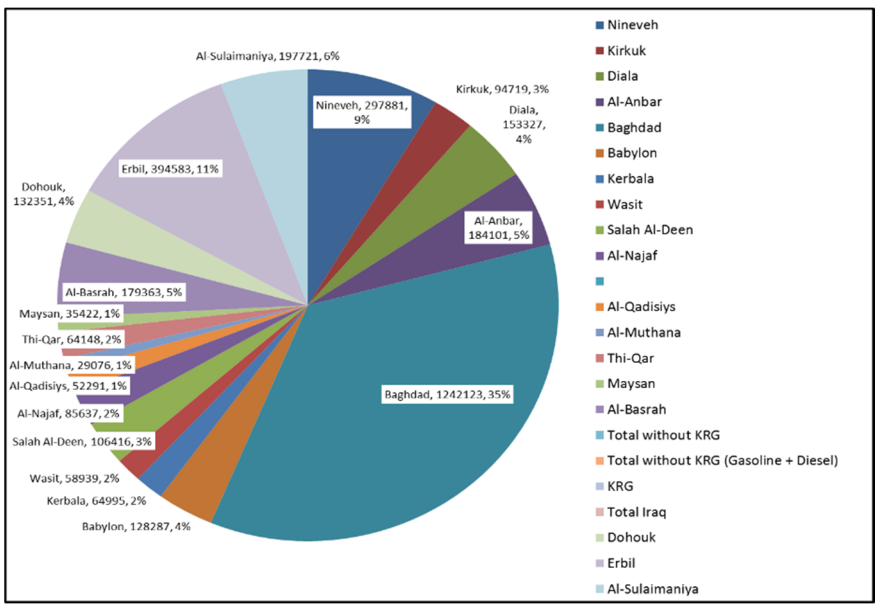

Figure 4: Automobile distribution profile in Iraqi governorates in 2013.

3 Rate of increasing pollutants from automobiles:

The emission standards of different pollutants from different vehicles are as follows:

Table 3: Standard Emission (mg/km) from gasoline and gasoil fuelled vehicles [6].

Types of automobiles	CO	HC	NOx	CO2	Mass Particulate MP (Pm) (PPM)
Gasoline cars	27.7	3.24	2.04	399	0
Diesel passenger cars	0.83	0.27	0.9	403	2.46
Diesel light	0.94	0.39	1.01	537	2.46
Average diesel cars	0.885	0.330	0.955	470	2.460

Table 4: Total Automobile Gas Emissions in Iraq (2007–2013) in tons/day.

Year	CO	CO_2	HC	NO_x	MP (PPM)
2007	364	6068	43	28	5
2008	414	6928	49	32	6
2009	468	7868	56	37	7
2010	553	9385	66	44	8
2011	1187	20632	145	96	18
2012	1355	23579	165	110	21
2013	1571	27382	191	127	24

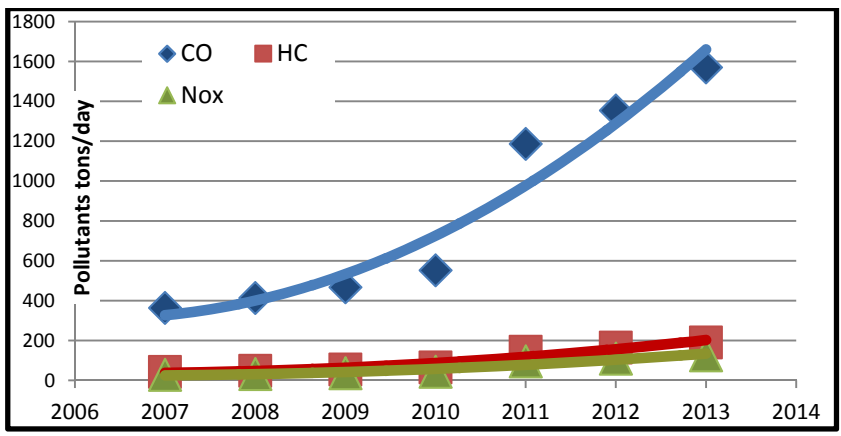

Figure 5: Rate of Pollutants emitted from different types of automobiles excluding CO2 from 2007–2013.

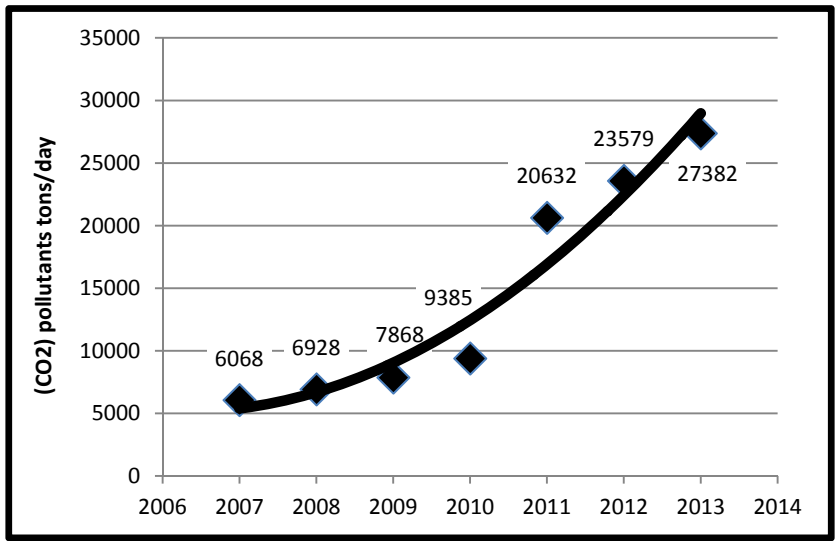

Figure 6: Rate of carbon dioxide (CO_2) pollutant emitted from different automobile types from 2007–2013.

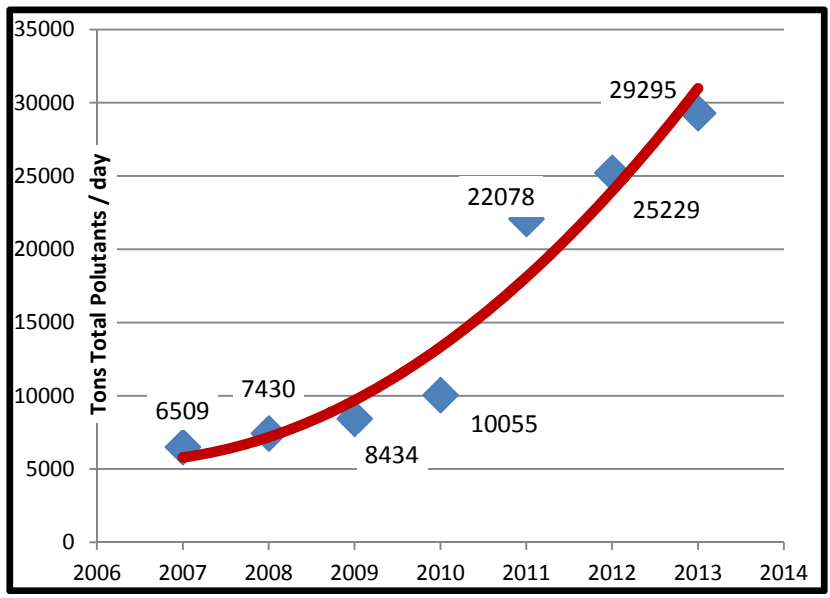

Figure 7: Rate of total pollutants emitted (tons/day) from different automobiles from 2007–2013.

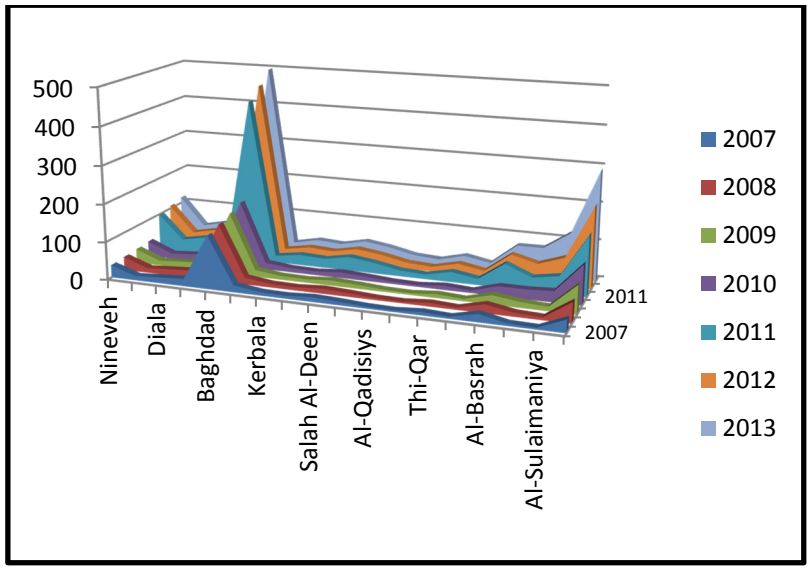

Figure 8: Rate of CO_2 pollutant emitted (tons/day) from different automobiles distributed over all Iraqi governorates from 2007–2013.

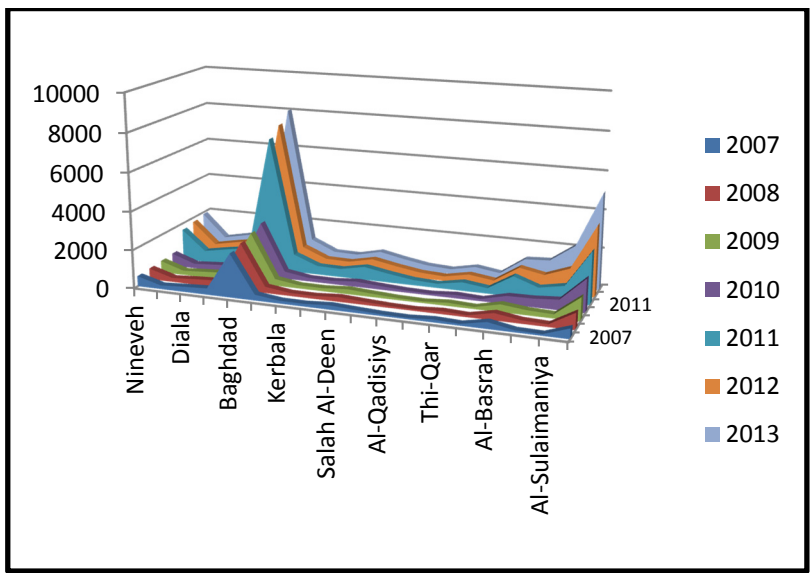

Figure 9: Rate of CO_2 pollutant emitted (tons/day) from different automobiles distributed over all Iraqi governorates from 2007–2013.

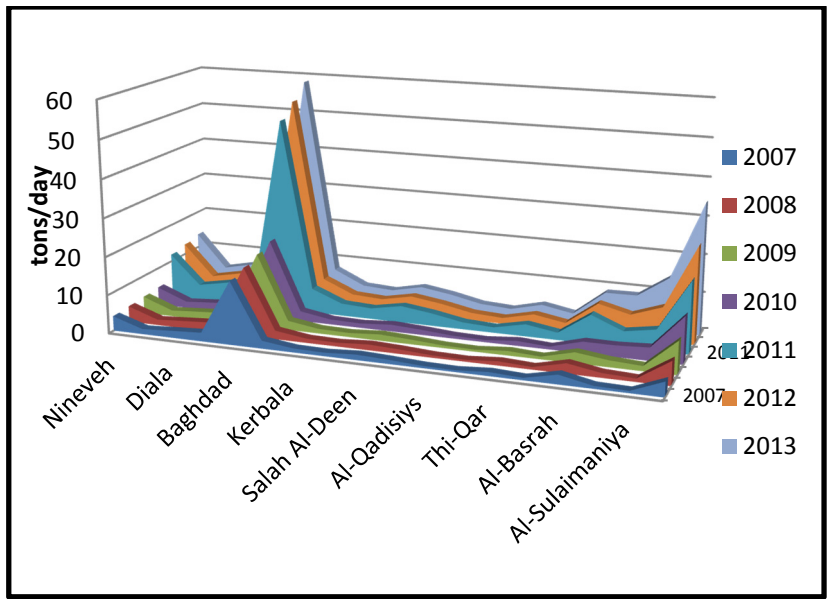

Figure 10: Rate of HC pollutants emitted (tons/day) from different automobiles distributed over all Iraqi governorates from 2007–2013.

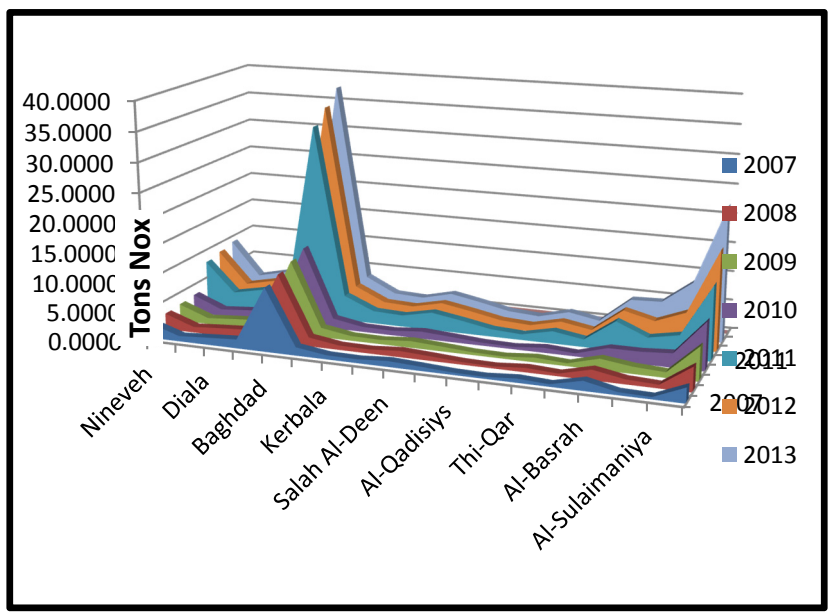

Figure 11: Rate of NOx pollutants emitted (tons/day) from different automobiles distributed over all Iraqi governorates from 2007–2013.

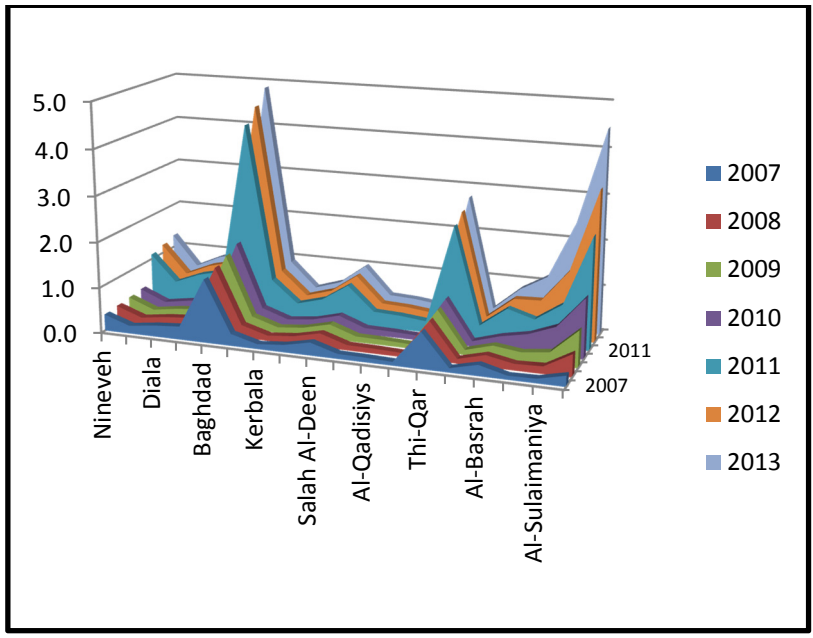

Figure 12: Rate of mass particulate pollutants emitted (tons/day) from different automobiles distributed over all Iraqi governorates from 2007–2013.

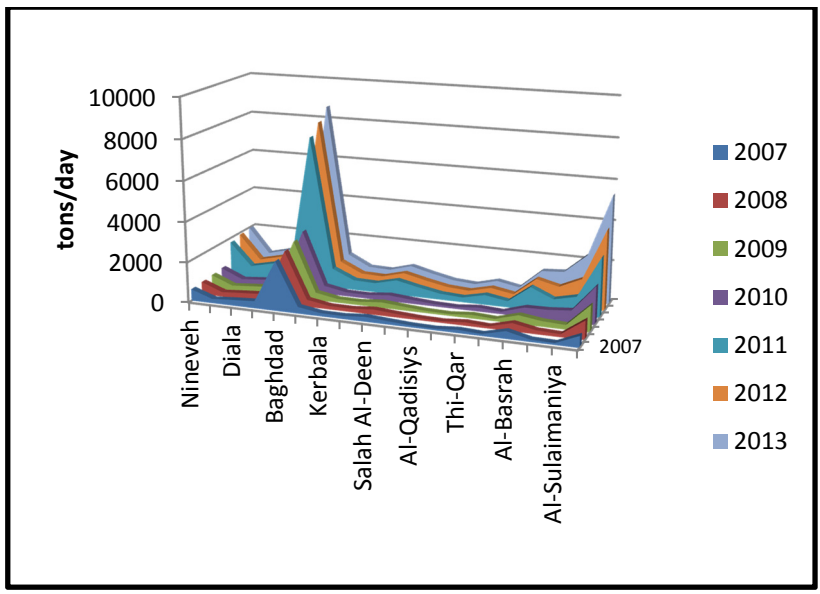

Figure 13: Rate of total pollutants emitted (tons/day) from different automobiles distributed over all Iraqi governorates from 2007–2013.

4 Conclusions

The following conclusions can be made:

1. Iraq has witnessed an explosion in the imported and used numbers of vehicles during the past few years leaving a big impact on the environment. Our research has shown an increase in the production of pollutants due to the increase in the number of vehicles by an amount of 4.5 times between the years 2007 and 2013. This overall increase in the pollution rate can be broken down into the following pollutants:
2. Carbon Monoxide (CO) quantities have increased by an amount of 4.3 times between 2007 and 2013, whereby the total daily amount produced in 2013 was 1571 tons.
3. Hydrocarbons (HC) quantities have increased by an amount of 4.44 times over the same period, whereby the total daily amount produced in 2013 was 191 tons.
4. Nitrogen Oxides (NO_x) quantities have increased by an amount of 4.54 times over the same period, whereby the total daily amount produced in 2013 was 127 tons.
5. Mass particulate quantities have increased by an amount of 4.8 times over the same period, whereby the total daily amount produced in 2013 was 24 tons.
6. Carbon Dioxide (CO_2) quantities have increased by an amount of 4.5 times over the same period, whereby the total daily amount produced in 2013 has reached a staggering figure of 27382 tons.
7. The noise produced associated with the increased numbers of automobiles will basically lead to the production of more noise hazards.

5 Recommendations

The following recommendations can be suggested:

1. Establishing an efficient cooperation between environmental organizations and the companies which are involved in the importing of automobiles looking for limited exhaust polluting gases.
2. Green belts have to be planted around the cities in Iraq with emphasis on increasing the green areas inside the cities with higher populations in order to improve the environmental conditions.
3. A close collaboration and better cooperation between the ministry of environment and other ministries, institutions, universities, research centres and hospitals has to be established for the purpose of improving the environment in Iraq.
4. Establishing a big and an efficient environmental protection programme and encouraging scientific studies and researches in the field of environmental protection and increasing the budget which is allocated for such purposes and organizing more seminars, workshops and international conferences on the environment in Iraq.

5. Taking more care of the forests which cool down and clean up the air and add moisture in addition to maintaining an ecological balance in the country.
6. Extra care must be taken regarding more research on the winds and sand storms which transfer the pollutants from desert areas to the cities and from polluted areas to residential compounds.

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