

Assessment of Air Pollution caused by Oil Investments in Basra Province-Iraq

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ABSTRACT: The paper's aim is to analyze the concentrations of air pollution in Al-Basra province, in twelve different places where most of the places exist in oil fields, in different climate states in term of air speed, humidity and temperature. Also, concentration mean and range have been used to produce a general rate for gases concentrations through a period of time from November 2012 to July 2013.

It is important to notice that finding specific rates for highest and lowest concentrations of gases can be beneficial for gas treatment solutions, and that is because of the lack of information to propose successful treatment solution in comparison with one measurement method. The reason of choosing this subject is the negative effect of air pollution on the state and citizens, which causes economical and health issues. It is important to solve air pollution problem and eliminate those economical and health concerns to provide a helpful solutions to the problem. This study contains important information for Basrah province and oil production cities.

Keywords: Assessment, Air, Pollution, Oil, Province-Iraq.

INTRODUCTION

The Air pollution causes a huge amount of problems which leads to global negative effects, such as global warming and its effects on the climate and general health. In addition, the effect on environment in general; causing political struggles and all of these problems are affected from air pollution, and can be summarized as follows (Al-Ajmi, 2008; Al-Jurani, 2012; Al-Nasser, 2003; Kazem, 2012):

1. Most of countries that produce a high percent of greenhouse gases are industrial countries (Northern countries) and, USA is in the lead; where every citizen produces about 5000 tons of air pollutant gases annually, where the acceptable amount globally is 0.5 tons annually per person. This is because of the atmospheres ability to absorb 2 billion tons annually of greenhouse gases, where the French Refineries produces about 13 million tons of greenhouse gases annually (Al-Asadi, 2010).

2. Most of energy producing countries that produce greenhouse gases are the "developing countries" especially the oil and gas producing countries, which demands a Financial compensation for turning down production or for using alternative energy sources (Al-Asadi, 2013; Alwaeli, 2014).

3. Countries that destroys forests, especially the tropical forests; destroying about 2.4 % of forests in the world, through the nineteenth century. The forests absorbs an amount of carbon dioxide from the atmosphere that is equal to the amount of gas emissions in USA, and its financial amount is equal to the amount of financial help giving to the developing countries, based on current carbon prices (Abbas, 2008).

4. Value Countries: which are the countries that do not produce greenhouse gases or destroy the environment, and they are classified into two types (Tal, 2008):

A. Countries that are affected by dryness and floods such as Mozambique; where it was affected by the great flood in the year 2000, while 40% of the world's population struggle with the lake of rain and shortage of drinking water, where a decrease in pouring of rain over the Syrian land of about 97% from the rate in a period from 1997 to 2001 (TUN, 2007).

These countries (value countries) experience different issues, where 800 million people suffers from Malnutrition and 3.2 million person suffer from infectious diseases which is about 6% of the deaths annually.

B. Countries that collect air pollutants from neighboring countries and the number of its victims can be estimated to be 3 million people annually.

All of this affected on global warming globally, where Figures 1 and 2 shows that the temperature and carbon dioxide has increased dramatically to cause massive environmental issues.

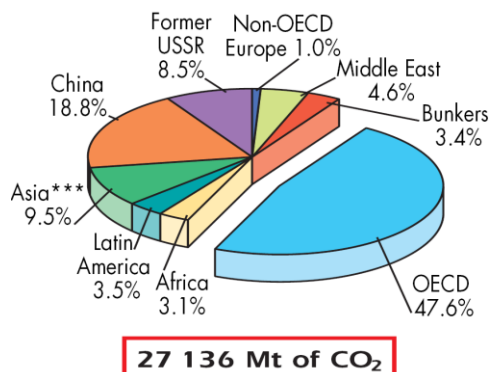


Figure 1. Global carbon dioxide emission in 2005 (Kazem, 2013)

MATERIALS AND METHODS

Twelve weather stations has been chosen in oil wells areas and areas that contains high population, agriculture and trading properties to examine and measure the gas concentration of Carbon Monoxide (CO), Carbon Dioxide (CO₂) and Sulfur Dioxide (SO₄) in different city within the state of Al-Basra. The measurements have been taken in five cities, which are AlQarna, AlZubair, AlBasra, Aby Alkhaseeb, and Alfaw, for about eight months. Also, though every month a measurement is taken with the best rates (Highest and lowest) in different wind speeds to know its effect to specify these pollutant concentrations, where using Aspirating Pump-OS 50, which uses certain pieces of glass to measure air pollution for every element or compound in the air and it measures a part of million parts (ppm).

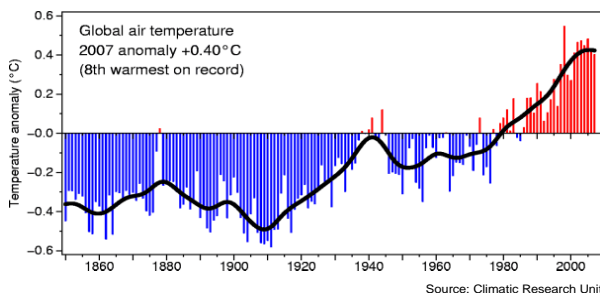


Figure 2. Global air temperatuer

The spatial distribution of productive oil wells in Basra province:

Table (1) shows that the biggest productive oil field currently is the south of Romaila field with 345 oil well and then the west of Qarna with 260 oil well with addition to the ongoing wells which are (AlSeeba with 2 wells, Sabba with 17 wells, Abu Al-Khaima with 1 well, Raggi with 1 well and grishan with 1 well).

Table 1. Numbers of productive oil wells in Basra province 2010

N	Field	Number of productive wells	N	Field	Number of Productive wells
1	West of Qarna	260	6	AlTooba	6
2	Magnoon	17	7	Artawi	6
3	Bin Omar	17	8	North of Romaila	345
4	Allahees	17	9	South of Romaila	227
5	Al-Zubair	106		Total	991

The oil reserver of AlBasra in 2009 reached about (40,464,305) million barrel, and 28 Gas separation station. The oil wells in table 1 which goes through processess such as extracting pure oil and natural gas that leads to producing massive quantities of air pollutants in Basra province with small amount of factors that absorbs these pollutants.

RESULTS AND DISCUSSION

1- Carbon Monoxide (CO)

Table 2 shows that pollutant concentration rates in the studied sites with air speed (less than meter per second) exceeded the allowed limits internationally in most sites (west of Qarna, north of Romaila, South of Romaila, noth of Zubbar city, Burjisia and Shaieeba). The highest and lowest rates were found to be between 310-450 ppm, and it is a result mostly because of oil extracting bussiness in the oil fields. In addition, the increased concentration in Alseeba between 315-380 ppm, and it was a result of oil industry, while the highest rate were found in Safwan, Khour, Zubbar and Jist Alzabeeb cities, and was less than the allowed rates with 230-275 ppm.

Table 2. Monoxide concentration measurements in Basra province

N	Location	Air Speed: calm to 1 m/s	Air Speed: 2 to 4 m/s	Distance from source: 5000 m
1	West of AlQarna	3 – 0.8	1.2 – 0.5	1 – 0.2
2	North of Romaila	3.3 – 1	1.3 – 0.5	0.8 – 0.2
3	South of Romaila	4.2 – 2	2 – 0.3	0.9 – 0.2
4	North of Zubbar city	2 – 0.6	1.6 – 0.2	0.9 – 0.3
5	Safwan city	0.8 – 0.2	0.6 – 0.1	0.4 – 0.2
6	Khour AlZubbar city	0.9 – 0.4	0.7 – 0.2	0.4 – 0.2
7	Jist AlZubbar	1.2 – 0.5	0.8 – 0.3	0.6 – 0.3
8	Basra city	1.3 – 0.4	1 – 0.4	0.6 – 0.2
9	AlBurjisia	1.6 – 0.6	1.2 – 0.3	0.8 – 0.3
10	AlShabia	1.1 – 0.7	0.7 – 0.4	0.7 – 0.3
11	AlSeeba	1.3 – 0.4	0.8 – 0.2	0.4 – 0.2
12	AlFaw	0.8 – 0.2	0.5 – 0.1	0.3 – 0.2

The raise in wind speed is between (2-4 m/s) lead to decreasing the lowest concentration rates lower than the allowed boundries in all areas of AlBurjisia, while some sites stayed above the allowed rate of concentration; West of Qarna (300 ppm), Noth of Romaila (320 ppm), South of Romaila (305 ppm) also the distance from original source of pollution, with the exeption of transport ways, is about 5000 meters. Carbon Monoxide concentration rates have decreased to below (200 ppm) in all areas, which is within the exceptable limits.

2- Carbon Dioxide (CO₂)

Table 3 shows that when gas concentration rates with air speed less than 1 m/s are between (0.2-4.2 ppm) and it is less then the international acceptable limits. Lowest gas concentration rates were found in AlFaw (0.2-0.8 ppm) and highest rates in South of Romaila (2-4.4 ppm), while when air speed increase to (2-4 m/s) Carbon Dioxide concentrations tend to decrease. Lowest CO₂ rates between (0.5-1) in AlFaw, and highest rates of CO₂ were found in South of Romaila with (0.2-1 ppm), these quantities above shows that concentration rates of CO₂ are much less.

Table 3. Carbon Dioxide gas concentration measurements

N	Location	Air Speed: Calm to 1m/s	Air Speed: 2-4 m/s	Distance from source: 5000 meter
1	West of AlQarna	400 – 350	300 – 210	200 – 105
2	North of Romaila	380 – 360	320 – 215	130 – 110
3	South of Romaila	450 – 365	305 – 210	145 – 115
4	North of Alzubbar city	340 – 310	290 – 220	130 – 120
5	Safwan city	305 – 250	210 – 180	115 – 105
6	Khour Alzubbar city	330 – 275	260 – 230	165 – 140
7	Jist AlZubbar	310 – 260	285 – 215	140 – 110
8	AlBasra city	275 – 230	255 – 225	-
9	Albujisia	370 – 310	280 – 225	175 – 130
10	AlShaiba	360 – 315	270 – 210	160 – 135
11	AlSaiba	380 – 320	285 – 220	170 – 110
12	AlFaw	295 – 230	160 – 110	-

3- Sulfure Dioxide (SO₂)

Table 4 shows that Sulfur Dioxide concentrations have exceeded the international limits of SO₂, when Air speed is less than 1 m/s with around (0.01 ppm). All locations and sites with lowest rates exceeded (0.01 ppm) except for AlFaw which was not measured. Highest SO₂ concentrations were recorded in South of Romaila with (0.1-0.7 ppm), while when air speed increased to (2-4 m/s) the SO₂ concentration went down to about (0.1-0.3 ppm), and the highest rates of SO₂ were in AlRomaila.

Table 4. Sulfur Dioxide gas concentration measurements

N	Location	Air Speed: Calm to 1 m/s	Air Speed: 2-4 m/s	N	Location	Air Speed: Calm to 1 m/s	Air Speed: 2-4 m/s
1	West of Qarna	0.2 – 0.1	0.1	7	Jisr AlZubbair	0.1	-
2	North of Romaila	0.2 – 0.1	0.1	8	AlBasra city	0.2 – 0.1	0.1
3	South of Romaila	0.7 – 0.1	0.3	9	AlBurjisia	0.2 – 0.1	0.1
4	North of Zubbair city	0.2 – 0.1	0.1	10	AlShaiba	0.4 – 0.1	0.1
5	AlSafwan city	0.1	0.1	11	AlSaiba	0.1	-
6	Khour AlZubbair City	0.1	-	12	AlFaw	-	-

Most of the measured values are due to the high temperature and on its way to further increasing as shown in figure 3, and the decrease of humidity rates is relatively huge as shown in maps (1) and (2), which causes negative effects on human health,agricultral production, water resources and dust phenomenas etc.

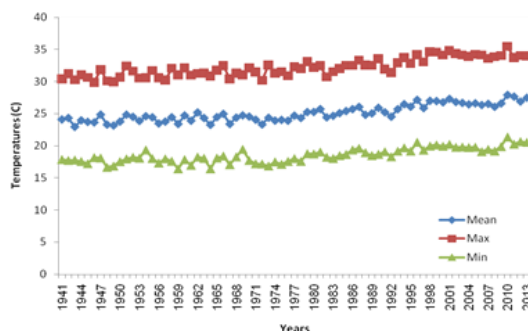


Figure 3. Bearings in high and low temperatures.

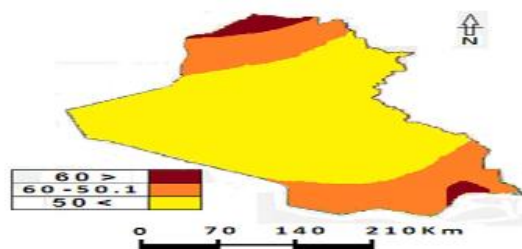


Figure 4. Geographical distribution of humidity concentration percentages of the climate oscillation 1941-1970

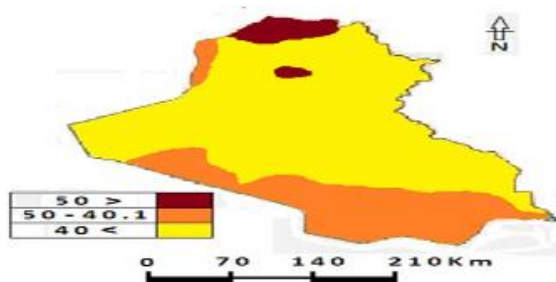


Figure 5. Geographical distribution of humidity concentration percentages of the climate oscillation 1977-2007

Conclusions and Recommendations:

In this study measurements of pollutions due to oil wells have been taken from November 2012 to July 2013 in Basrah province. The measurements shows that some of the pollutants in different areas are over the international levels, which is serious problem to the people and lives. The authors suggested the following to solve oil pollution in Basrah province:

1. Investing in natural gas rather than burning it to reduce pollution gase emission.
2. Based on the authors survey it is found that some types used filters in oil industry are not proper so that it is important to use proper and decent filters in oil industry.
3. Oil companies must agree to afforestating around oil wells and fields with areas that is not less than the area of the oil field.
4. Oil companies must participate in afforestation campaigns around and inside the cities and streets of Basra province.
5. Ministry of oil must support the department of agriculture in Basra province to compensate for the agriculuring areas lost due to oil investments with another areas to be invested in agriculuter, and not componsate the farmers for other puposes.
6. Choosing certain types of trees that have high capability of evaporation procees, which will lead to increasing the air humidity and so increasing the plants ability to live.
7. Oil companies must commit to participation of creating green belt around the cities of Basra province.
8. Obligate the farm owners of tomato farms to afforestating their farms with tree fences instead of earthen dams and canes.
9. Oil incentive (taking a dollar from each oil barell that is produced in Basra province) to be used to fund environmental solutions, espaccially afforestating.
10. Proposing plicy and procedure that obligate projects investrors in Basra province to afforestating an area that is at least equal to the area of the project.

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