

ECOTOXICOLOGICAL IMPACT OF GULF WAR CRISIS

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ABSTRACT

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Mankind today is in an unprecedented position. In the span of a single human generation, the Earth's life sustaining environment is expected to change more rapidly than it has over any comparable period of human history. Much of this change will be of our own making.

One of the best example of man making problem is the Gulf war and its Environment crisis.

INTRODUCTION

The Environment Crisis:

The ecotoxicological impact of pollutants produced by Gulf war on the environment can be divided in three unbelievable crisis.

The first environmental crisis is Gulf water pollution by crude oil:

For the first time in the Global history crude oil was used as destructive weapon to pollute air and water sources.

The first use of crude oil in Gulf war was when Iraq injected in the Gulf water 2.1 million metric tons of Kuwait crude oil. This quantity covered 120 square miles. The chemistry and biological activity of this water source was hardly affected.

The marine environment in Gulf is very sensitive to pollution owing to the low renewal of water and generally limited depth. This water was rich with flora and fauna which is hardly affected with this high quantity of crude oil which will eradicate life in this closed area for several years, and may be for more than 100 years.

It is estimated that the total quantities of oil which annually reach all the water sources all over the world are 1.6 million tons, about 1.1 million tons are non-accidental in origin and are the result of the regular discharge of oil by ships at global water (contaminated ballast water and water used for flushing out tanks).

The remainder about 500,000 tons is the result of tanker accidents.

One can not imagine the ecotoxicological impact of 2.1 million metric tons of oils which polluted this small area specially when this quantity compared

with the quantities of oil which polluted all the water sources all over the world annually (1.6 million tons).

The second crisis is air pollution by unbelievable quantities of toxic materials produced from burning crude oil:

The fire is burnt now in most of the oil sources in Kuwait. Available data indicate that about 6 million barrels of oil were burned each day (400000 metric tons).

The number of burned oil wells were 700. The total quantities of oil which will be burnt is 10,000 million metric tons of oil. These quantities of oil produce 11 million tons of aldehydes, 440 thousands tons of benzoperine and 66 million tons of carbon monoxide, 200 million tons of hydrocarbons, 244 million tons of nitrogen oxides 44.4 million tons of sulphur dioxide, 33.3 million tons of acids and 122 million tons of solid particles.

About 5-10% of the oil burned is emitted as smoke. 70% of the smoke emitted is in the form of carbon.

One can calculate a smoke emission of about 20,000 - 40,000 metric tons of smoke/day.

Assuming that 80% of the smoke emitted over one year is deposited in the eastern territories of the greater Gulf region within a semicircle whose radius is 2000 km around the source area, the average smoke deposition per unit area would be $0.5 - 1 \text{ gm}^{-2} \text{ year}$. The smoke will not be equally distributed over the deposition area, of course.

The burning oil contains about 2.5% S. and about 0.2% N.

It is estimated that the annual global emissions of common air pollutants into the atmosphere as a result of human activities consists of about 110 million tons of sulphur oxides, 59 million tons of particulate matter, 69 millions tons of nitrogen oxides, 194 million tons of carbon monoxides and 53 million tons of hydrocarbons. It is clear that what will be emitted from oil pollutants are more than the annual global emissions of common air pollutants. It is well known that air can transport pollutants from Gulf centres to thousands of miles and deposit them in unpolluted areas. To take one example, the chemical analysis of the rain water was clearly different from 1990 to 1991. While the pH of the rain water in Cairo was 6.1 at February 1990, it was 5.2 in the same month of 1991. The quantity of calculated acid (as H_2SO_4) was at the same month 0, 12 and 1.12 ton/Km^2 at the year 1990 and 1991 respectively.

Photochemical oxidation should be largely suppressed in the denser parts of the smoke cloud, so major acid deposition is likely to occur at some distance from the source area probably as far away as 2000 km. The same should be expected for the photochemical formation of ozone and other photooxidants. Serious photooxidant episodes may occur as far away as Turkey, Afghanistan or Ethiopia.

One should expect sever environmental consequences of the Kuwaiti oil

field fires for the territory of Kuwait and for many parts of countries around it.

The Dirty and Black Sky:

The sky in the Gulf areas can be considered as dirty or black sky in which several millions tons of carbon, aldehydes, gases, hydrocarbons were dumped in the Sky to be transported to several miles to any part of the world.

Now the black rain water is familiar in Iran, Kuwait, Iraq, Syria, Jordan, Yemen, Saudi Arabian, and Emirate.

Dark atmosphere is also well known in some Gulf countries.

The third crisis: is the environmental pollution by nitrogen oxides produced by weapons and bombs.

The mean daily use of bombs in the last forty two days, was 18000 metric tons of explosive materials mainly T.N.T.

It is well known that every gram of T.N.T. produces 22.4 litre of NO₂.

The total quantity of nitrogen oxides which were produced in only 42 days were 16926 million cubic meter of nitrogen oxides.

All these nitrogen oxides will be transformed in the atmosphere to produce nitric acids.

This will raise the problem of acid rains as an international problem. Knowledge of the effects of acidic deposition on the environment varies from certain to speculative but there is a considerable body of evidence to show that acidic deposition poses or threat to various economic resources, fisheries, forestry, Agriculture and wild life. Recently concern has been expressed over the impact of acidic deposition on drinking water quality.

Acidic deposition can affect plantation either directly by acting on the foliage or indirectly by changing the properties of the soil supporting forest growth. Visible injuries are clear now in the new reclaimed area specially after rain fall in Egypt.

From the view of human health, the data available indicate a minimal risk to healthy individuals associated with inhalation of sulphuric acid aerosols at ambient concentration.

In sensitive groups (e.g., asthmatics, children, and adults with a hypersensitive respiratory system) the possibility of diverse pulmonary effects from short term exposures to 0.1 mg/m³ of sulphuric acid aerosols can not be excluded. There are, however two main ways in which human health may be affected indirectly, acid deposition may reduce the quality of drinking water, and may cause changes in the human intake of certain trace elements as the trace elements content of fish meat and agricultural crops are increased.

Effect of the produced gases and heat on the regional and global climate.

The pollutants which were injected in the environment were estimated to

be 2.1 million tons of crude oil, 11 million tons of aldehydes, 440 thousands tons of carbon monooxide, 200 million tons of hydrocarbons, 244 tons of nitrogen oxides, 44.4 million tons of sulfur dioxides and 122 million tons of solid materials plus 16531 million cubic meter of nitrogen oxides.

Carbon dioxide, along with water vapour, ozone, nitrous oxide and other trace gases is a key factor in determining the thermal structure of the atmosphere. These "green house gases" are fairly transparent to incoming solar radiation but relatively opaque to longer wave thermal radiation from the Earth's surface. Thus the theory holds that as the concentration of these gases increases in the air, the solar radiation received at ground level will not be markedly reduced, whereas the loss of the thermal radiation from land and water surfaces to space will drop significantly with the result that there will be a surplus of energy available at ground level, and surface air temperature will rise.

Five percent of the crude oil which polluted Gulf water can be considered as volatile oils. This quantity of volatile oils (105000 metric tons) now pollute the regional air.

The very high temperature emitted from this part of the world encourages the movement of winds and air. For that the climate condition in Gulf area is not stable. A regional change in the climate is very clear for the people in these countries in Gulf areas.

This regional change in climate may be followed by a global change in climate, in the near future.

In Egypt as country close to the Gulf area, the agriculture climate is hardly changed. The temperature in winter was increased to introduce a suitable weather for many insects which infested the winter crops for the first time.

For example all the wheat, broad been and citrus plantation all over Delta was hardly infested by aphids.

These changes in Agriculture climate will have a very bad effect on the economics of many countries in this area.

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