

# Environmental and Health Impacts of Aggression on Iraq

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## Introduction

Iraq was among the first countries in the region who recognized the importance of environment and its relation to human health and development. This fact is only a natural outcome of the history of civilization in Iraq.

The Environmental activities in Iraq had followed an extensive program of protecting and improving the quality of the environment. This can be so clearly seen in all development projects, among which are the drinking water, sanitation, and industrial pollution control projects.

In 1991, the U. S. led aggression caused a severe damage to the environment quality and to the infrastructure of environment protection and improvement. After that, the damage was not stopped but it was continued due to the effect of the unjust UN sanctions imposed on Iraq preventing the efforts to overcome the deterioration in the quality of the environment caused by the aggression. These sanctions are meant to impair the development process as a whole, and as mentioned earlier, the environmental programs are an integrated part of this process.

A UNEP mission, asked to assess the impact of the aggression on the terrestrial ecosystem in Iraq and to draft an environmental rehabilitation program, concluded the following major remarks;

- 1- The bombing and shelling from air raids and rockets dealt complete destruction of the infrastructure; power stations, water installations, oil refineries and oil storage depots as well as 6 oil wells. A direct consequence of this was putting irrigation pumps out of service.
- 2- Some toxic chemicals were spilled into soil and into running streams when several industrial factories were bombarded.
- 3- Destruction of fertilizers and other factories left the country without these important agricultural inputs. These factories could not be restored to a functioning state because no spare parts could be obtained under embargo conditions.
- 4- Agricultural production. Both crop and livestock were very adversely affected. Main crops were attacked by pests which reduced their total production as no pesticides were available, while livestock were devastated by serious epidemics, e.g., rinder pest. Sheep herds were either subjected to overslaughtering or pastoralists fled with them to neighboring countries for the sake of higher prices. The rangelands of Iraq, especially of the west desert is drastically affected and degraded.
- 5- Mine fields in Muthanna Governorate poses grave danger to nomads.
- 6- The destruction of Iraq's infrastructure had a lot of consequences on flora and fauna and the food chain in the desert. There has been tremendous effects on the soil and soil productivity.
- 7- In the war zone, the large mammals, especially the gazelle population would be more adversely affected. The darcas gazelle may already be extinct, but small numbers of the mountains and Arabian gazelles may survive.

8- After this extensive destruction the components of the ecosystem are changed. As a result, there might be a chance for the increase of population of certain animal groups such as rodents and scorpions.

The following paragraphs briefly explain some examples of the damage caused by the aggression and UN sanctions on the environment in Iraq;

### **Water Supply System**

The facilities suffered severe damage in the course of military activities during the aggression. The precarious status of all water supply facilities was highlighted by a number of inter-agency missions that visited the country after the war. They noted that it resulted in the destruction or damage to many water treatment plants, pumping stations, laboratories and other related equipment, particularly in the southern governorates.

The inter-agency missions identified the rehabilitation of the water supply and sewerage facilities as a priority area for humanitarian assistance. Faced with the critical status of water supply facilities and the sanitation schemes and with an outbreak of waterborne diseases the Iraqi authorities did their utmost to put the facilities back into operation. Owing to resourcefulness and dedication of national engineers, it proved possible to rehabilitate the water treatment plants to about 50-60% of their pre-war capacity. However their status remains precarious and in fact is deteriorating in view of the continued lack of spare parts and the difficulty to import necessary spares and materials due to UN sanctions. As a result, large numbers of people in the rural areas are without access to safe drinking water or receive it in insufficient quantities. The situation is further aggravated by a severely limited availability of purification chemicals and poor maintenance of purifying equipment. This renders the water quality in most of the governorates and rural areas poor and contaminated.

Drinking water quality monitoring program clearly shows the deterioration of bacteriological quality all over Iraq. The percentage of bacteriological inadequacy for drinking water samples was so high; and in many cases went well above 50% as in the case of Thi-Qar, Basra and Najaf Governorates.

Supplies of chlorine and aluminum sulfate are inadequate. Chlorinators and dosing equipment required for the proper measurement and dispensing of chlorine into water supplies are either missing or broken.

The aggression seriously damaged the three plants for the production of chlorine for water and wastewater disinfection. These plants were not rehabilitated to their previous state due to lack of specialized parts and equipment. This led to shortage of chlorine supply to the treatment plants that by time led to exhaust the reserve that was available. Now, water treatment plants are in acute need for chlorine to disinfect the drinking water. The amounts that were supplied by UN agencies and humanitarian organizations helped to provide a marginal share of the need.

The same story applies to the only plant for the production of alum, which is used for coagulation. This plant was damaged during the aggression and it was never brought to its preaggression state, and the quality of alum produced now and used in

water treatment is below the required standard. This is resulting in higher turbidity of drinking water, which also reflects on the bacteriological quality of water.

Due to the UN sanctions . the construction of 18 drinking water treatment projects was halted. These projects were under construction when the aggression started and were 45-95% from being completed. The total annual capacity of these projects was 980 million m<sup>3</sup>/year representing 48% of the present total water supply capacities. On top of that, the plans for providing piped water supply all over the country were halted because of lacking the resources, equipment, pipes and other materials.

### **Sanitation Systems**

In Baghdad the system suffered heavy damage during the aggression. While some installation were directly damaged the major reason of the services discontinuation and damage to the equipment was the disruption of the electrical power supply which caused the consequent flooding of the pumping stations and treatment plants by raw sewage. Hundreds of electric motors were damaged due to flooding and the system was eventually paralyzed.

The Directorate of Sewerage was mobilized to reinstate the sewerage facilities into operation as soon as military operation ceased and managed to reoperationalize some pumping stations and plants when the electricity power supply was restored. However by December 1993 and in view of insurmountable damage, the frequent breakdowns of major parts of equipment (pumps, electrical motors, purification equipment and vacuum cleaning vehicles for sewage) and lack of materials and, in spite of extreme resourcefulness and dedication of the engineering staff the city's sewage disposal and treatment capacity is only restored to some 50% of its pre-aggression level. Lack of spare parts has significantly contributed to this situation. The calamity is also aggravated by the deficient maintenance of the equipment in view of an inadequate mechanical base in the workshops and lack of training.

A UN mission, in 1993, found that all sewage pumping stations are in a precarious condition, while the others damaged with no standby facilities. Since some of the pumping stations are still inoperative, sewage floods residential areas and streets. Some schools were forced to close because of the health hazards caused by raw sewage. In some cases. discharge of untreated sewage to the surface is practiced close to drinking water ground storage facilities. The situation is continuously deteriorating. The two presently operational sewage treatment plants in Baghdad function at only about 30 percent of their capacities, thus resulting in the release of untreated sewerage into the river.

The situation of the sanitary system in the governorates is much worse than that in Baghdad, due to the damage of many wastewater treatment plants, pumping stations and laboratories.

### **Agriculture and Desertification**

Lack of seeds, fertilizers. pesticides, animal medicine. irrigation pumps, agricultural machinery and their spare parts, animal feed, ... etc. due to sanctions, is causing plant diseases, increase in rodents population, animal epidemics, deficiency in crop production, ... etc.

Desertification control efforts are greatly impaired by the sanctions due lack of necessary equipment and facilities. The programs to increase the green areas are greatly affected due to lack of the basic requirements.

Lack of new pumps and the spare parts for the existing pumping stations is affecting the irrigation and drainage schemes in Iraq.

### **Industry**

The following are examples of the deterioration of environmental quality due to industrial activities. These all had resulted from the aggression and the UN sanctions imposed on Iraq;

- 1- Halting the implementation of the planned industrial pollution control facilities including wastewater treatment plants and air pollution control for the major factories and the discharge of effluents off the required quality.
- 2- Using crude oil instead of paraffin and gas oil as the major source of energy.
- 3- Inadequate operation, maintenance and repair of the existing pollution control plants and equipment due to lack of spare parts, chemicals, ... etc.

### **Environmental Quality Monitoring Programs**

Environmental monitoring programs are severely affected by the sanctions. The available monitoring and measuring equipment for environmental pollutants are in serious need to spare parts, operation materials. chemicals. reagents, filters, etc. The situation had resulted in impairing the routine environmental monitoring programs that used to be carried out on continuous routine basis.

A WHO consultant who visited Iraq in August 1994, to assess the current situation of air pollution monitoring program in the Ministry of Health, stated that; "If things would have been going on as previously, Iraq would be now at a level of knowledge and decision concerning air pollution equivalent of that of many European countries".

### **Radioactivity**

When dealing with the impact of the aggression on Iraq, one must not overlook the fact that on the eve of Jan. 16<sup>th</sup>, 1991, enemy airplanes and missiles attacked the civilian nuclear reactor in Tuwaitha, in direct violation of international agreements regarding the utilization of research and power nuclear reactors. all which Iraq is a signatory to. The reactors were operational (in full power) and had they been hit at that time. a catastrophe to humanity and environment would have taken place due to the fission products released from the would be damaged cores.

In addition to that. and during the military campaign, the enemy used radiation weapons against Iraq's armed forces especially the armored corps in the southern front (west of Nasirya City and on the road between Kuwait and Safwan) in direct violation of the international conventions.

The following documents represent some of the evidences of these atrocities which were displayed in many articles and interviews with American and western officers who participated in the aggression.

\* Uranium Battlefields, Home and Aboard  
(Depleted Uranium used by U. S. Department of Defence) by Grace Bukowski et al.  
March 1993

\* U.S. Uranium Shells Used in the Gulf War May be Killing Iraqi Children  
by Eric Hoskins  
New York Times. Jan., 21,1993

and the report of the Middle East News Agency on Nov., 30th, 1993. which stated that an uncountable number of Iraqi soldiers and civilians were killed by the depleted uranium either directly or due to exposure to its radiation. These reports stated that about 50.000 Iraqi children died during the first three months of 1991 due to the use of those banned weapons.

The British ex-Minister of Defence, David Rifkind. in his letter No. DS/S/SS 0962/94M of 6 December 1994 addressed to Sir Malcolm Steel, MP, admitted that the British troops used 88 DU rounds in the war against Iraq, and-that the United States used much more than that. In this letter, he also explains that when DU rounds impact with a hard surface emit radioactive and toxic substances that present a health hazard.

### **Health Status**

As a result of all what have been mentioned earlier 5 the health status in Iraq has been seriously affected. The statistics show sharp increase in the incidence of water borne diseases. nutrition related diseases, cancer cases such as acute leukemia. plastic anemia, relapse cases of cancer, congenital malformations. still births, abortion, ... etc. On top of that, health authorities are reporting the occurrence of many diseases that had never been reported before. These cases affect the general population, but the most affected groups are children, women. and the elders. The Following part of this report deals with some aspects of health consequences of the use radiation ammunition by the US troops against Iraq in 1991.

### **Impact of Radiation Weapons on Health**

The population in Iraq was exposed to the explosion of thousands on tons of ammunition in the course of military operations of the US led allies. The ammunitions used were so immense and diversified, among which some were used for the first time in the history such as depleted uranium (DU). In addition to the severe direct effects of those weapons on civilians. their use caused a serious pollution of the environment. After many years, the long-term effects started to appear. These health effects were studied and the related data were analyzed. These effects include cancer, congenital anomalies, abortion, neuropathy and myopathy. Epidemiological and statistical studies are still being carried out to measure the extent of the immoral and illegal use of these weapons against Iraq. The collected data were tested for their statistical significance to assess their scientific value . and to prove the causal relationship of using DU with the impact on health and environmental pollution.

This report is not but a scientific proof put before the researchers and scientists for their consideration, and to enhance their work in this field in order to uncover the immoral and illegal use of DU by the US. The report, also, gives clear picture of the environmental pollution in Iraq which greatly affected and is still affecting the citizens of Iraq, specially in the bombarded areas. We put this scientific document before the

world to reveal the intentions of the US aggression on Iraq. After all, will the claim of the aggressors that what they so call "Second Gulf War" was "clean"?!!!  
The research included the following;

### 1- Field Environmental Studies

A- Many studies were carried out to determine the types of weapons and ammunition used and their impact on people and on environment. Special emphasis was given to the southern areas of Iraq that was subjected to intense bombing in the course of military operations.

B- A study revealed that vast areas in the south are polluted due to the use of radiological weapons. On top of the large number of casualties in those areas due to the instantaneous effect of these weapons, unusual diseases were registered later on. Also, many unexploded projectiles were found, among which was DU ammunition. (Fig.1)

C- Tables 1, 2 and 3 clearly reflect the results of radiological pollution in the southern region, and present the material proof against the claim that the "Gulf War-II" was clean!!!.

D- The long-term effects of DU on the environment are still not fully developed. This presents a potential risk with time. This situation imposes the need to further field and specialized studies and research.

TABLE 1: Field Measurements at North Rumaila Area

	<i>Type of chosen sample</i>	<i>Radiation Exposure (micro R/hr)</i>	
		<i>Background</i>	<i>Chosen Sample</i>
1	1 Armored personal Carrier BMB-1	8.1	24.6
2	21 Armored personal Carrier MTLB	8.2	9.7
3	3 T-72 Tank	8.7	15.1
4	4 Rescue Tank	7.2	13.2

TABLE 2: Field Measurements at Shamia Airfield/Gudairat Al-Audhaimi area

	<i>Type of chosen sample</i>	<i>Radiation Exposure (micro R/hr)</i>	
		<i>Background</i>	<i>Chosen Sample</i>
1	T-72 Tank	7.0	60.8
2	Armored personal Carrier (Watercan)	7.2	60.3
3	Far away area from chosen sample (1) / T-72	7.1	7.3
4	Far away area from chosen sample (2) / Watercan	7.3	7.2

TABLE (3) Field Measurements at DMZ and Surrounding Area

	<i>Type of chosen sample</i>	<i>Radiation Exposure (micro R/hr)</i>	
		<i>Background</i>	<i>Chosen Sample</i>
1	Unexploded DU Warhead (near Karrange Oil Pumping Station on the Iraqi - Saudi border	7.4	83
2	Tank/T-55 (between cross road Nos	7.6	21

	13 and 14)		
3	Tank / T- 72 (No. 16107)	7.2	23
4	Tank /T-55 ( Left of cross road No.9	7.4	67
5	Tank/T-72 near international observation post between cross roads 12 and 13)	7.6	69
6	Tank/ T- 72 (South West on Mount Sanam)	7.0	65

## **2- Medical Studies**

Many epidemiological and analytical studies were carried out on samples of unusual cases and diseases, and were statistically compared to control groups according to academic and scientific methodology.

### **2-1 First Study**

A- This study dealt with five diseases; cancer, abortion, congenital anomalies, neuropathy and myopathy.

B- The study sample was selected from the cases that occurred for each of these five diseases for each governorate of Iraq.

C- For statistical analysis, a control group for each disease was selected from the same governorate.

D- Being subjected to bombardment or being in the bombarded regions was taken as an indicator in this study.

E- Five forms were carefully designed for this study. These included personal, environmental, social, epidemiological, health history, disease history and exposure to bombardment (place and time) data. The same applies to the control groups.

F- Data were statistically examined and analyzed to find out Relative Risk, Odds Ratio and Test of Significance.

G- The total number of forms was 5764. Among those were 1314 abortion, 752 congenital anomalies, 667 cancers, 68 neuropathy and 81 myopathy cases, i.e., totaling 2882 cases. The number of control group was also 2882. (Table-4)

H- The study concluded that there is a statistically significant relationship between the exposure to bombardment and the increase in cancer, abortion and congenital anomalies with odds ratios 4.6, 3.2 and 2.8 respectively. (Table- 8)

I- Diyala, Basra, Misan, Muthanna and Thi-Qar Governorates had the highest increase in cancer cases among other governorates. (Table- 5)

J- Nineva. Diyala, Baghdad, Basra, Misan and Najaf Governorates had higher increase of abortion cases. (Table-6)

K- Tamim. Diyala, Baghdad, Basra, Misan, Muthanna and Najaf Governorates had the highest increases in congenital anomalies. (Table-7)

## **Conclusions**

1- The odds ratio in retrospective epidemiological studies had shown substantial deviation towards the exposure to bombardment and its relation to each of the five diseases that were examined in this study. The significance test assures that this relationship can in no way happen by chance.

- 2- The increase in cases and their geographical distribution among the governorates coincides with the actual bombardment and military operations and their intensity
- 3- The cancer cases that had higher increase were leukemia, Lung Cancer, Ca Bronchus, Ca Bladder, Ca Skin, Ca Stomach for males and Ca Breast for females. This goes with WHO publications and the results of international research and studies on the impact of ionizing radiation. The increase in these types of cancers took place within three years after the aggression. Other types of cancer, such as CA Thyroid. needs more time to appear, 10-40 years after the exposure to radiation according to VMO literature.
- 4- The increases in abortion and congenital anomalies cases are considered to be rapid consequences of exposure to radiation. There are other congenital anomalies that continue for three to four generations for parents that were exposed to radiation.

Table -4 Sample and control groups for the five diseases according to governorate of Iraq

	<i>Governorate</i>	<i>Abortion</i>	<i>Congenital Anomalies</i>	<i>Cancer</i>	<i>Neuropathy</i>	<i>Myopathy</i>
1	Baghdad	44	42	16	4	13
2	Ninevah	90	30	39	14	6
3	Basra	42	94	31	28	10
4	Tamim	98	61	112	4	2
5	Misan	96	89	58	0	0
6	Anbar	92	77	54	3	12
7	Salahudin	97	51	39	3	2
8	Thi-Qar	98	76	45	2	6
9	Muthanna	82	15	42	2	7
10	Wasit	96	37	53	4	11
11	Diyala	97	42	44	3	6
12	Babil	90	16	30	0	0
13	Najaf	111	79	43	1	6
14	Kerbala	90	16	30	0	0
15	Qadisia	91	17	31	0	0
	Total	1314	742	667	68	811

Table -5 Registered Cancer Cases in Baghdad and other govemorates

	<i>Governorate</i>	<i>1989</i>	<i>1994</i>	<i>Relative Risk</i>
1	Baghdad	4183	6427	1.53
2	Ninevah	1500	1629	1.09
3	Basra	180	461	2.56
4	Tarmm	86	114	1.33
5	Misan	37	218	5.69
6	Anbar	51	95	1.86
7	Salahudin	90	94	1.04
8	Thi-Qar	72	489	4.01
9	Muthanna	27	59	3.18
10	Wasit	44	69	1.56
11	Diyala	69	134	2.19

12	Babil	73	166	2.27
13	Najaf	70	126	1.80
14	Kerbala	28	45	1.61
15	Qadisia		86	10.62
	Total	6563	10212	

Table- 6 Abortion Cases in Baghdad and other governorates for 1989 and 1994

	<i>Governorate</i>	<i>1989</i>	<i>1994</i>	<i>Relative Risk</i>
1	Baghdad	6281	7729	1.2
2	Ninevah	2364	3440	1.5
3	Basra	2137	3618	1.7
4	Tamin	1458	1826	
5	Misan	1879	3196	1.3
6	Anbar	2351	2622	1.1
7	Salahudin	1611	1507	0.9
8	Thi-Qar	1491	2728	1.8
9	Muthanna	1015	707	0.7
10	Wasit	1234	1882	1.5
11	Diyala	1382	3314	1.4
12	Babil	1219	1724	1.4
13	Najaf	987	2480	2.8
14	Kerbala	1138	2316	2.1
15	Qadisia	1223	2627	2.1
	Total	27770	41716	

Table- 7 Registered Cases of Congenital Anomalies Abortion in Baghdad and other governorates for the years 1989 and 1994

	<i>Governorate</i>	<i>1989</i>	<i>1994</i>	<i>Relative Risk</i>
1	Baghdad	138	294	2.1
2	Ninevah	65	77	1.1
3	Basra	40	117	2.9
4	Tamin	45	122	2.7
5	Misan	41	86	2.1
6	Anbar	34	71	2.1
7	Salahudin	64	68	1.1
8	Thi-Qar	29	32	1.1
9	Muthanna	35	81	2.3
10	Wasit	49	54	1.1
11	Diyala	34	36	1.1
12	Babil	38	44	1.2
13	Najaf	0	1235	
14	Kerbala	25	27	1.1
15	Qadisia	37	42	1.1
	total	674	2386	

Table 8: Odds Ratio of the exposure to bombardment for the study and control groups for the five diseases in Iraq

Cases	Sample Size	No. of cases	Control	Odd Ratio
Abortion	1314	988 75%	637 48.7%	3.2
Congenital Anomalies	752	463 61.5%	318 42.2%	2.8
Cancer	667	519 77.8%	224 33.5%	4.6
Neuropathy	68	63 92.6%	58 85.3%	1.7
Myopathy	81	77 95%	73 90%	1.4

## 2-2 Second Medical Study

Another study was conducted after analyzing available data for cancer, congenital anomalies and abortion cases for some governorates. The study concluded the following;

A- There is a statistically significant relationship (odds ratio=3.85) for the sample group of cancer patients compared to the control group. This proves that there is 'Causal Association' between exposure to bombardment and increase in cancer cases. (Table-9)

B- The study, also, concluded that there is a statistical relationship for the sample group of congenital anomalies cases compared to the control group (Odds Ratio=2.05). Statistically, this is considered to be highly significant, and proves that there is a relationship between exposure to pollution and the cases.

C- The above also applies for the abortion cases where Odds ratio was 2.9.

D- There is a change in the epidemiological pattern for the most prevailing cancer types in Iraq. Leukemia and Non-Hodgkin's Lymphoma became the 2<sup>nd</sup> and 3<sup>rd</sup> rank respectively, while rank of Ca Bladder changed after being the 2<sup>nd</sup> rank for a long period (25 years) next to Ca Bronchus. (Table- 12)

E- The incidence rate for age groups (45-50) and (50-55) had become the highest after Jan. 1991. Prior to that, the age group (60-65) had the highest cancer incidence in Iraq. (Cancer Registry, 1976-1991, Ministry of Health)

F- New type of cancer cases had emerged. These types were not of did not have importance prior to Jan., 1991. These include Osteo Sarcoma, Teratoma. Nephroblastoma and Rhabdomyosarcoma.

## 3- Recommendations

A- Some types of cancer cases do not appear until a long period of time elapses after exposure to radiation. WHO, in its publication on exposure to radiation. estimates that period to be 40 years for Ca Thyroid. The same applies for other long term diseases and health problems that do not show until more time passes. This implies continuous monitoring and surveillance.

B- All medical studies recommended that research and studies should be enhanced and continued. They also recommend future prospective studies to be conducted.

## 4- Summary

In 1991, the environment in Iraq was exposed to the greatest ever damage due to the aggression led by the US. In order to highlight the extent of that damage, this report was presented to the exceptional session of the UN General Assembly on Environment and Development. All friends, international and humanitarian organizations are called upon to join us to overcome the burden of pollution caused by the aggression and the continuation of UN sanctions imposed on Iraq, and hence to put an end to this humanitarian catastrophe. And, simply because the environmental impact is not stopped by political borders. the damage does not affect Iraq only, but it as well, affects all the countries of the region and the global environment.

Table - 9 Study Group for Cancer Cases vs. Control Group

	<i>Study Group</i>	<i>Control Group</i>
Yes	197	286
No	5	28
Total	202	314

Cause: Exposure to Bombardment
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Odds Ratio = 3.85

Table - 10 Study Group for Congenital Anomalles Cascs vs. Control Group

	<i>Study Group</i>	<i>Control Group</i>
Yes	41	39
No	6	13
Total	47	52

Cause: Exposure to Bombardment
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Odds Ratio = 2.05

Table - 11 Study Group for Abortion Cases vs. Control Group

	<i>Study Group</i>	<i>Control Group</i>
Yes	24	41
No	3	15
Total	27	56

Cause: Exposure to Bombardment
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Odds Ratio = 2.9

Table - 12 Percentage of Cancer Types of the study group

Ca Bronchus	16.4%
Leukemia	14.3%
N-lymphoma	13.7%
Ca Larynx	10.6%
Ca Bladder	9.4%
Ca Skin	8.6%
Others*	27.0%

\*: Others include Osteosarcoma. Tertoma, Medull blastoma, Nephroblastoma 3<sup>rd</sup> Ventricle Tumors, Rhabdomyosarcoma.