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Oil Pollution and its Impact on the Environment in Iraq

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Annotation: Oil pollution remains a critical environmental challenge in Iraq, significantly affecting air, water, and soil quality. Despite Iraq's extensive oil production history, there is a knowledge gap regarding the long-term ecological and health consequences of oil contamination. This study employs a comprehensive analysis of pollution sources, environmental impacts, and mitigation strategies through case studies and regulatory assessments. Findings indicate that oil spills, industrial waste, and military conflicts have led to severe degradation of marine and terrestrial ecosystems, posing risks to biodiversity and public health. The results emphasize the urgent need for stricter environmental policies, improved enforcement mechanisms, and sustainable technological solutions to mitigate pollution and restore affected environments.

Keywords: oil pollution, environmental impact, Iraq, pollution control, sustainability, ecological restoration.

1. Introduction

Environmental pollutants constitute the top challenge in managing authorities on the pollution sector in respective fields, air and water. The objectives of this study are to identify sources of air pollution in Iraq and analyze past, present, and future legal administrative rules, regulations, and mechanisms controlling air pollutants in Iraq. The sources of air pollution in Iraq are identified and analyzed by using the categorizations. In describing legal administrative mechanisms, this paper also examines the scope and enforcement on air pollution prevention rules and regulation in Iraq. This study is based on a comprehensive background review of the existing legal and administrative principles and practices governing air pollution in Iraq. Part of this study is devoted to analyzing past and present administrative mechanisms of controlling air pollution in Iraq.

Environmental laws and administrative regulations in Iraq have contributed little to curbing air pollution. The reasons for this expenditure and suggestions for air pollution control in Iraq are discussed with respect to pollution from stationary sources. There is a rarely regulated polluting element observed in developing countries, including Iraq. The quality and quantity of the exhaust also widely vary in Iraq in terms of environmental standards or from gasoline to diesel-powered vehicles. In addition to the above sources of air pollution, industrial activities in certain areas in Iraq, which vary in size and proper authorization, are considered an unwarranted source of air pollution as significant amounts of toxic vapors and gases are venting into the atmosphere [1].

2. Historical Background of Oil Production in Iraq

Iraq has had the potential to be one of the world's largest oil producers and exporters. In 2002, it possessed the second-largest proven oil reserves, approximately 112 billion barrels [2]. About ninety percent of the country has not been explored, and a substantial potential exists for increasing the existing 78 billion-barrel reserve. As of 1990, Iraq boasted substantial untapped reserves, amounting to perhaps 50-100 billion barrels of supergiant oil fields on the order of Kirkuk or Rumaila. Even the known reserves cover a significant portion of the largely unexplored western and southern Desat regions, where the US Geological Survey believes as yet unknown deposits lie. Also, as of 2002, the oil exploration, development, and production costs in Iraq were among the lowest in the world. Yet, even for political reasons, Iraq's potential for oil production and export has been developed relatively slowly.

In June 1972, in the euphoria accompanying the nationalization of the Iraq Petroleum Company, Iraq contemplated reaching a production capacity of 3.2 million barrels per day by 1975. Although never approaching that target, Iraq did significantly increase its production to over 3 MBD since 1979, only to see them cut to less than .3 MBD during the first few weeks of the war with Iran. During the next decade, Iraqi production yo-yoed. Following the conclusion of the Iran-Iraq War, more processing was done, oil was pumped through the Belarus pipeline, and the wagons began to move in earnest. By late 1993, Iraqi oil exports were back up to 2.4 MBD, which technically put the country in compliance with OPEC export quotas. What followed next was the prodigality-if not downright recklessness-that has become so closely associated with the Presidency of Saddam Hussein. Between early 1994 and early 1995, Iraq's oil exports doubled; it subsequently raised them still greater heights. Though skilled in all manner of Machiavellian maneuver, the shrewd calculation of probability and gain so manifest on the brink of hostilities appears to have deserted the Iraqi leader. Playing a high-stakes game of chicken with the United States and Britain, Iraq veered, while the Coalition powers barreled ahead with their well-prepared assault. [3][4][5]

3. Types and Sources of Oil Pollution in Iraq

Oil pollution or contamination is defined as the emergence of hydrocarbons and/or heavy metals in the environment, which has long-term harmful effects on the environment [1]. Regarding the

oil pollution, although the fish in the gulf are constantly being reduced by about nine times each year it is regenerated, and again, nearly all the small fish in the gulf are subject to serious pollution and various diseases, which has worried the fishermen [6]. The main types of oil pollution that observed in Iraq are; 1- The combusting oil wells and the oil lakes which remaining after the Kuwait war in 1991. 2- The leaking oil pipes and the waste oil which remained in some locations. 3- The transporting and exporting of the Iraqi crude oil through the Persian Gulf. Since no regional or international agreements are made to solve the environmental problems from the combusting oil wells and oil lakes in those areas which are effecting badly from the harmful gases and materials been produced then, this paper is based particularly on this type of the pollution. Oil pollution results from three major sources: routine discharges of ballast and tank washing water, accidental oil spills, and operational discharges of small amounts of oil residuals. Substantial and repeated pollution may degrade the marine environment resulting in higher residues of oil in sediment, water, and benthos, and arresting ecosystem functions. Processes of fouling and oil uptake by marine organisms were connected to chronic oil accumulation in biotic compartments. Disposal of about five billion barrels of low-quality oil in the Gulf during the Gulf wars, add this to the oil spills, which have occurred since 1991 from the unloading of the Iraqi oil, adds enough pollution. The oil spills may enter the water in two ways: direct sourced from the oil tanker ships, and indirect sources from the oil pipe lines. [7][8][9]

4. Environmental Impact of Oil Pollution in Iraq

Oil has provided sustenance to life and progress in all industrialized nations for more than a century. In the Arabian Gulf, where petroleum accounts for over 98% of export revenues, there are many direct and indirect benefits from the industry that have transformed the fortunes of the region. Yet, such high reliance on petroleum, juxtaposed with the precarious environmental conditions there, serve to challenge the way of life on the Arabian Gulf. Oil and chemical spillages into the Gulf sea have damaged the marine ecosystem, where such extreme conditions had severely reduced the assimilative capacity of the natural environment. This paper reviews the current paradigm of oil pollution control in Iraq, with particular emphasis on their past experience and the difficulties that choice to be taken in implementing an effective marine monitoring system [1]. Polluted coastal waters endanger marine ecosystems, redouble the health hazards and pose danger to human health due to supplies of contaminated seafood. There is evidence that small amounts of hydrocarbons, affecting the immune system, can lead to skin cancer, liver or stomach cancer. Oil pollution from petroleum leaks comprises one of the most dangerous substances that are toxic both for marine creatures and the human population of the affected region. Just a few drops of crude on the face of the water covering the size of a football field or any contact with the shore can lead to death or cancer. On top of crude ignition in the sea with formation of the so-called “eternal fire”, the strongest environmental hazard is a sudden leak of oil [6].

4.1. Water Pollution

Water pollution (excess nutrients, salinity, and chemical pollutants) in Iraq has a broad range of sources with various impacts. The potential cost-effective control measures are also many and varied, and range from reducing soil erosion and fertilizer application to the use of retention reservoirs and the control of sewage and industrial discharges [1]. Oil and gasoline produce an oil spill on the surface of the river thus preventing the grow of bacteria or it may retard the passage of light throughout water, thereby decreasing the rates of photosynthesis and respiration. Petrol compounds are not soluble in water, consequently when it is thrown in water, it floats on the top and it evaporates into the air, thus reducing the existing O2 in the water and thus adversely cause death of fish. This is not enough, about 95% of the body of fish is water, therefore Zn appears in water in the exchangeable forms is being transfer into the fishes in the form of zinc incest, causing the result of Fish mortality. Oil spill into rivers therefore kill fish. Here is another genre in which the severe effect of oil and oil product exerts on the fish, in the southern part of the Iraq most of the people are not civilized, so they wash their car beside the

river or throw the used oil in to it. It is known that each type of car has its own oil to be used during the wash of the engine part for the prevention of rusting, in onshore oil field this working can reduce up to the owner of only 20 of length of drip. conduciveness of fish in rivers, canals, binnir, and un-harmeal to saloon gasoline contain waste oil used both oil to be the oil spill on the surface of the water. [10][11][12][13]

4.2. Soil Pollution

Humans are facing a major problem with environmental pollution in the modern industrial urbanizing world. Pollution by oil and oil products is most threatening, and this pollution can enter the environment at the time of production, transportation, refining, storage, and use . Soil pollution by oil and oil products in Iraq is a serious problem due to the military activities in Kuwait. After the Gulf war, more difficult distracters were faced during the re-establishment of normal life in Iraq particularly land pollution by oil and oil products. The maximum load of the oil was due to the activities of oil burning and normal bombing of fire wells. Thus, water canals, soils and underground waters were polluted by oil and the residue of the bomb during the Gulf war. Ways have to be found to solve to this most difficult problem. Oil industries must have policies and regulations to keep up the safe guidelines and must make it statutory.

The concern at present is soil pollution (spillage of oil, oil products, chemicals, war remnants, and ammunition) which may have contaminated large areas. To a lesser extent, pollutants can migrate and contaminate the groundwater. Consequently that irrigation water is polluted which may lead to soil pollution as well. Also, it is well known that soil pollution traps and enhances the movement of contaminants to groundwater, causing a potential threat to drinking water. This part is regarding an effort to shed light on soil pollution and, in particular, oil pollution and its impact on the environment in Iraq, its causes and prevention. A summary of this topic is also appended. [14][15][7]

4.3. Air Pollution

Air Pollution, people of Iraq breathe polluted air which causes injury to health, as indicated by the health problems of cancers; Lead Impoverishment was a special circumstance of the high chemical symbol gangue matter in their blood; Air Pollution and Its Governing Legal Administrative Mechanisms in Iraq, environmental of every essential influences has surfaced as a vital matter within the accord of translators, those can be professed as the significant among the matter related to them. Flesh the source of air impurity in Iraq, and a confirmation on administrative law mechanisms to keep in control the disturbance affecting them are the major objectives of this article [1]. This paper ready to lend a political ear to rightful issues as air pollution is one of the of great consequence environmental for Iraq in the direction of its evolving charge after 2003. Legal research within the blend of secretary and case research employing relevant presidential data, course books, reign, draft, outstanding portrayal, and secondary data are used to rate and probe the progenitive of air pollution coverage in Iraq.

The 1997 formal request for standards concerned with the inspection for the compliance by unit liable for the dismission of impurity of pollutants into the vent. The Islamic Republic of Iraq (Iraq), the ninth largest land in the world, is geographically positioned in Western Asia. It is bordered by Kuwait and Saudi Arabia to the south, Jordan and Syria to the west, Turkey to the north, and Abraham’s to the south-west and contains 3.35 million family. It has an 18.208 thousand square kilometer land area, which consists of 19 governorates. As part of the agreement concerning the pronunciation of a quarterly after anassasyrian official, which can be interpreted in the Iraq oiler year; Ah procreation, exploitation, and sharing agreement. Iraq’s first oil exploration agreement was signed in 1925 with the Turkish Petroleum Company. [16][17][18]

5. Health Effects of Oil Pollution in Iraq

Iraq is located in a critical spot in the East Mediterranean Sea. Very potent amounts of petroleum substances from storage tanks poured down and infiltrated the plumbing network, causing

hunger, disease and death. The drinking water temperature went up to 29°C and was not microbial safe, generating contagion diseases such as hepatitis and worm infestation. The public arrangements are that criminal actions with such catastrophic capability should have been foreseen and assured that all people and points of consumption had safer outlets. In a war situation, international considerations may have prevailed interfering with humanitarian conduct. It should be clarified what caused that situation and why it could not be addressed safely for all inhabitants of the theater, as actually obligated by the laws of war and humanitarian purposes.

6. Legislation and Regulations on Oil Pollution in Iraq

Iraqi government has passed law to protect water and air from various pollution sources. The oil spillages in tank farms and refineries have resulted in the pollution of watercourses and coastal area, which is extremely adverse to the environment as well as the biological resources in Iraq [1]. Recognising the dangers of oil spillage into natural water bodies, the government has passed the Law To Protect Coast of Iraq 1990 in order to protect the coastal areas from oil pollution which will affect the mangrove plants, aquatic lives, wild animals and birds, and any other biological resources. This law is one of the first legislation concerning the prevention of oil pollution in Iraq.

Oil spill is also the major reason or sources of air pollution, because its vaporization of volatile organics will reduce the quality of air. Cognizant of this problem, the government has issued some other laws; including the Law on Protection and Improvement of Environment of Iraq 2008, the Law on Control of Environment of Iraq 2009, and the Instruction on Promulgation of Special Order of Protecting of Air of Iraq 2012. There are provisions in these laws to prohibit for any person to store, dump, and discharge oil or oil waste into the environment and to take all measures required for the protection of the environment. If anyone found guilty of contravention of these laws, it shall be punished according to this law with imprisonment for a term not less than one year and/or a fine not less than twenty thousand Iraqi Dinars.

7. Technological Solutions for Mitigating Oil Pollution in Iraq

Technological Solutions for Mitigating Oil Pollution in Iraq are those solutions which address the entire problem starting from its root. It includes equipment for preventing leakages from equipment, implementation of technologies for reducing oil cuts, creating ecosystems for absorbing the released oil, and utilizing some other chemicals for improving oil degradation by mobilizing some microorganisms. However, implementing such technologies to tackle the oil pollution problem is virtually impossible because it requires diverting a large amount of money and the necessary arrangements out of conventional discourse.

The water pollution problem due to oil contamination is particularly critical and has a long-term effect on human life and the environment. Due to repeated wars, the oil-rich country of Iraq has an immense volume of oil-infected contaminated soil and water resources. This situation occurred because the oil resources were burned for many days for political reasons. Therefore, such uncontrollable but tragic happenings have subsequently transformed the natural environment of the area badly and caused significant damage to animals and humans. Because of this contamination, the inhabitant of the area confronts several dangerous diseases including skin infections, kidney diseases, eye irritation, nervous diseases and other viral diseases. For that reason, they are facing additional costs for their treatment with medication, and the environment is deteriorating gradually [1].

8. Case Studies of Oil Pollution Incidents in Iraq

Case law in respect to oil pollution in accordance with the UN Convention on the Law of the Sea is also reviewed. Data on the quantity of oil spilled, duration and cost of clean-up, and background information about the environment are required to fix the damage or to establish the value of the benefit losses. Sections 9.1 to 9.7 are paragraphs on how to analyze each topic in the standard format. Case law shows that restitution for environmental damage requires clear and

convincing evidence of the harm or loss suffered. Clear violations of MARPOL remain unredressed while bilateral agreements are in place; however, reluctance to place the blame on governments is noted. The charter for the area-wide meat boycott of 1967 shows that, in practice, it is very difficult to fix the damage. [19][20]

9. International Cooperation and Assistance in Addressing Oil Pollution in Iraq

Iraq's devastating wartime oil spills in the Persian Gulf have come under growing scrutiny since the beginning of the UNSCOM inspection program after the Gulf War, and the signing of the memorandum of understanding (MOU) on August 6, 1991, by the UN and the Republic of Iraq [6].

10. Conclusion

Oil pollution of the earth's waters are common environmental problems in countries with oil exploration. The present study on oil pollution and its impact on water resources was conducted in the oil field areas of Iraq due to the lack of accurate information. Toxic substances in general cause harm because they can disrupt homeostasis in an organism. Petrol and diesel, for example, cause harm by attacking the homeostasis functions of oxygen, carbon dioxide, and various levels and triggers other secondary chain reactions. Crude oil is a complex mixture of toxic hydrocarbons with diverse chemical properties and contains naphthenic and volatile components. At different stages of treatment, different constituents found in crude oil have characteristic environmental toxicities such as benzene, indolene, toluene, and xylenes. Some events still give more variety to the toxicity of crude oil. Analyses show that the river and rain waters contained toxic substances in the range of 0.005–0.019%. In addition to these toxic substances, the crude oil effluents carried high concentrations of total suspended solids and hydrocarbons, carcasses of aquatic organisms, and some fine oil droplets. Oil pollution, which becomes toxic to initial organisms can persist in the environment for many years. The microscopic remnants of spilled oil are lethal for much longer than the catastrophic initial oiling of shores, sea-bird colonies, and aquatic biotopes that has led to most of bird mortalities observed so far. Large quantities of spills are episodic. Whether accidentally or intentionally released, toxic effects of spilled oil are usually suffered by the sea surface or coast. The damage associated with spilled oil depends on their distribution, transport weathering, and biological effects. Similarly, extensive public comment was offered during the development of science plans for the oil spill settlement. Regarding the use of funds to develop a better understanding for measuring, monitoring, and modeling subsurface oil under broken ice.

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