
THE GULF WAR AND THE ENVIRONMENT THE NEED FOR A TREATY PROHIBITING ECOLOGICAL DESTRUCTION AS A WEAPON OF WAR

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As the curtains close on the Persian Gulf War, the region is plagued by exploding refineries, the emission of thousands of tons of toxic chemicals into the atmosphere, and oil spills devastating the plains and coastal areas of the delicate Gulf ecosystem. The burning of oil wells, refineries, and other petroleum facilities in Kuwait has created an unprecedented atmospheric disaster and bears silent witness to human and ecological frailty. A good part of the exhaustible wealth of the Arab world is going up in flames.

The Gulf War has raised the specter of deliberate environmental destruction as a tool of war, and the damage wrought by the conflict should serve as an impetus for a convention outlawing such ecological warfare. The experiences of the Gulf War must not be repeated, and to this end the nations of the world should sign and ratify, under the auspices of the United Nations, a multilateral treaty prohibiting the utilization of the environment as a weapon of mass destruction.

Traditionally, typical military targets have included command, control, communications, and intelligence centers; military airbases; missile sites; tank deployments; artillery; troops; and naval vessels. Under contemporary conditions of warfare, however, certain civilian targets have become potential targets as well: these include oil refineries, oil wells, oil storage tanks, chemical plants, electric power facilities, and all other industrial sites which could support a war effort.

Military strikes on such civilian facilities can certainly cause widespread and long-lasting economic and environmental damage, as has been the case with the Gulf War. For example, military attacks against oil and industrial facilities, and even forests, could cause large fires, resulting in the emission of soot and smoke into the atmosphere, which diminishes air transparency and could spread vast amounts of toxic chemicals. Attacks on nuclear power stations and other energy-producing installations, nuclear fuel plants, nuclear weapons factories, and storage facilities for radioactive wastes could result in radioactive contamination by long-lived isotopes—perhaps of such intensity that large areas could become radioactive deserts for decades.

The possibility of deliberate ecological destruction in future conflicts, combined with the lessons of the Gulf War, enable one to speak of attacks on nuclear facilities, oil fields, and chemical and industrial installations as "environmental weapons," capable of causing widespread ecological disaster. Using the environment as a weapon in time of war could cause economic and demographic catastrophes for the immediate participant nations in the conflict, and could even usher in global climatic and ecological dislocations.

The destruction and loss of life caused by war have often inspired the establishment of conventions and institutions to avoid further war and to care for and protect populations. Europe, for example, still bristles with security arrangements, such as the North Atlantic Treaty Organization and the Conference on Security and Cooperation in Europe, even though the Berlin Wall has fallen. The Gulf War should similarly usher in new means of enhancing world security and welfare.

The Environmental Damage Caused by the Gulf War

In discussing the ecological consequences of the war in the Gulf, the most important issues concern the oil spills, the burning of oil wells, and the emission of large amounts of soot and toxic chemicals into the atmosphere. The following discussion details the environmental impact of these factors on the Gulf and surrounding region.

Oil Spills

The US National Academy of Sciences estimated in 1985 that approximately 3.2 million metric tons (985 million gallons) of oil enter the world's oceans each year.¹ Oil spilled from transport tankers account for most of the oil entering the oceans. In 1989 there were 2,978 operating oil tankers, of which the countries of the Organization of Petroleum Exporting States (OPEC) flagged 164.² Accidents during offshore oil exploration and production are also a major source of spills. Increasingly, however, oil spills are a direct consequence of warfare. For example in the Iran-Iraq War, between February and September 1983, a number of wells in the Nowruz and Ardeshir oil fields off the coast of Iran spilled over two million barrels of oil into the waters of the Gulf.

During the Gulf War, the first oil spill was reported on January 22, 1991, from two Iraqi tankers in the northern Gulf. Three other spills followed: the first occurred in the Khafji area; the second at the Sea Island Terminal at Mina Al Ahmadi in Kuwait; and the third from the Iraqi offshore terminal at Mina Al Bakr, which used to export about 350,000 barrels of oil a day. The final estimate of the amount of oil spilled into the Gulf is between two and three million barrels.

1. Jerry M. Neff, *Sea Mammals and Oil: Confronting the Risks* (New York: Academic Press Inc., 1990).

2. OPEC 1989 *Annual Bulletin* (Vienna: OPEC News Agency, Department of Information, 1990), 102.

It is possible that Iraq hoped to gain two military benefits from the oil spills. The release of vast quantities of oil into the Gulf could have delayed or disrupted naval operations, such as an amphibious landing on the shores of Kuwait, and the ignition of the oil slicks could have created a wall of fire effectively forcing allied naval vessels to operate farther offshore. In reality, however, due to spreading, evaporation, and dispersion of the oil, as well as insufficient quantities of oil actually released (the successful implementation of either of these strategies would have required the release of more than fifteen million barrels of oil), the three million barrels that were spilled served no military purpose at all. The only casualty was the already fragile Gulf ecosystem.

The Gulf is about 600 miles long and its width varies between fifty miles at the straits of Hormuz to 200 miles in other sections. It is almost entirely an enclosed sea. As a result, water exchange between the Gulf and the adjacent Indian Ocean has a low turnover time, estimated to be in the range of three to five years. Any oil spill would therefore remain in the Gulf region until the oil dissipated. Tidal currents (to the north and clockwise) would only carry the oil around the narrow coastline of the Gulf. One of the most important considerations for the Gulf's economic health is the potential impact of the spilled oil on the region's desalination plants, power plants, and other industrial facilities. For example, Kuwait, Saudi Arabia, Bahrain, Qatar, the United Arab Emirates, and Oman all depend heavily on desalinated and brackish water for their water supply. As a result of the environmental destruction caused by the Gulf War, and the potential for further damage to the region's desalination plants, people everywhere in the region will suffer.

Marine life and other natural resources will also be adversely affected by the war. Gulf wildlife includes fish reserves, seabirds, dolphins, certain endangered breeds of turtles, and the dugong, long judged to be extremely vulnerable to changes in the environment. These animals, and the ecosystems on which they and other species depend, represent an appreciable offshore resource base. Additionally, many of the Gulf's major renewable resources, such as the coral reefs and mangroves/tidal flats, lie in shallow waters, and a significant portion of these have already been exposed to war-related pollution.

The Burning of Kuwaiti Oil Wells

Much of the Gulf War was fought over Kuwait's oilfields, which contain approximately ninety-four billion barrels of oil (9 percent of the world's proven reserves), and a well-developed infrastructure of wells, storage tanks, refineries, and pipeline networks. These were targets of direct Iraqi attack or deliberate sabotage. The burning of Kuwait's oil wells and refineries will have two primary and related ecological consequences: atmospheric pollution and possible climatic changes.

In order to evaluate accurately the climatic consequences of the war, it will be necessary to ascertain the quantity of smoke emitted into the atmosphere, how high and how far it spreads, and how long it resides in the atmosphere.

It may be quite a while before scientists can obtain this information, however, since fires from these burning sites will continue for some time. According to experts in the field, it could take from weeks to months to bring each oil well under control; with some 500 wells burning, the entire process could take months or even years.

Combustion is not complete in high-intensity fires such as the burning of an oil well. As a result, smoke particles emitted into the atmosphere contain a substantial fraction of soot, a complex mixture of unburnt organic matter consisting primarily of amorphous elemental carbon and oil material. The release of sooty smoke seriously affects the atmospheric radiation balance because it absorbs sunlight very efficiently and gives rise to atmospheric perturbations.

If a new world order is to arise in the aftermath of the Gulf War, the protection of the environment must be a central issue.

Smoke and soot reduce sunlight reaching the earth's surface, thereby reducing daytime temperatures. With the large number of ignited oil wells in Kuwait, the area of smoke generated every thirty days of burning could be up to three million square kilometers, and the height of the smoke cloud could reach five kilometers. With the low levels of precipitation and high temperatures from April to September, smoke over Kuwait may rise even farther into the troposphere. The result of these soot emissions will be a drop in temperatures in and around Kuwait. At times during the war, for example, surface temperatures were reduced by fifteen degrees celsius, and visibility dropped to below 500 meters.

Other major dangers associated with the uncontrolled combustion of oil wells and refineries include the release of sulphur dioxide, nitrogen oxide, carbon monoxide, carbon dioxide, and hydrogen sulphide into the atmosphere. In the Gulf, experts have conservatively estimated that around 500 wells are burning a minimum of three million barrels of oil per day. This amounts to the burning of 400,000 tons of crude oil daily, producing 10,200 tons of sulphur dioxide, 2,550 tons of nitrogen oxide, 42,840 tons of carbon monoxide, and 285,600 tons of carbon dioxide. Large amounts of the sulphur and nitrogen oxide in the atmosphere will come into contact with water droplets, and will turn into nitric and sulphuric acids and fall to the earth as acid rain. The main effects of acid rain are soil acidification, groundwater pollution, and damage to vegetation.

The risk of the fires in Kuwait may not be limited to the Gulf area alone, for the smoke may be transported to regions remote from the Gulf. Smoke and soot could travel on the Southern Gulf Wind to Iran and Pakistan, and

could reach the Indian sub-continent. In a worst-case scenario, perturbations in the monsoons in southern Asia induced by smoke in the atmosphere could cause a drop in the region's agricultural production. Many people could face famine as a result.

Within Any New World Order: Control the Destruction of the Environment

The geographic position of Jordan, in the center of the fragmented and potentially volatile Middle East, is not an easy one. Jordanians cannot distance themselves from ties of blood, culture, creed, or eventual common interests which they share with the people of the region—from the Mediterranean to the Gulf. In the Arab world, we are conscious of our shortcomings; this last war was a tragic and complex phenomenon of our Arab reality. In the words of King Hussein of Jordan, Arabs must now look to "the new dawn" that must emerge if we are to rise above the trauma that the Arab world has undergone. We must become part of the new world order of which many now speak, and we must gather the incentive and assume our responsibility within the debate over the parameters of such a new world order.

While any world order must be new, it must also incorporate existing structures that have been established through past suffering. A leading issue in any such order must be the protection of the environment, especially in times of international conflict. The environment, in its broadest sense, must be considered at the initial stages of political and military crisis management. Information must play an active role. To this end, an "international environmental data base" should be established as a confidence-building measure and as a first step toward a definitive treaty prohibiting the utilization of the environment as a wartime weapon. Such a treaty should have as its ultimate goal the avoidance of ecological destruction at the national (i.e., industrial carelessness), regional (as in the Gulf War), and international levels. Furthermore, the "international environmental data base" could be institutionalized to serve as an "international environmental crisis management center," monitoring environmental damage and assisting in corrective action during periods of conflict.

In Jordan, the implementation of a treaty to protect the environment is one of our primary objectives in the wake of the tragedy of the Gulf conflict. The treaty should be signed and ratified under the auspices of the United Nations, and should be enacted in a manner similar to other related international conventions, such as those covering the use of nuclear, biological, and chemical weapons. In fact, a treaty outlawing the use of environmental weapons could also encompass the ecological threats posed by these three types of weapons.

Such a treaty could follow the existing United Nations Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques. This convention, established in 1978 (and ratified by the United States in 1981), was proven painfully inadequate during the Gulf

War. A new treaty protecting the environment in time of war would have to be far more explicit and possess greater regulatory power than any existing accord. The international community should therefore seek, in the implementation of such a treaty, the same strength of character that fueled the allied coalition in its war against Iraq. Concurrently, however, the leaders of that coalition should be cognizant of the fact that it is not always easy for even the mightiest of nations to defend their own interests, let alone to ensure global security and heal the wounds of an area torn by war. The effort must be multilateral.

This planet and its inhabitants cannot tolerate the shocking waste of human and natural resources caused by the destructive violence of war. If a new world order is to arise in the aftermath of the Gulf conflict, the protection of the environment must be a central issue. We have reached the rim of our world: there are no more assets to vandalize, and there are already many areas, such as Sudan and Ethiopia, which suffer from extreme deprivation. The world simply cannot afford to lose further resources. Environmental concerns must serve as the building blocks of a new world order, incorporating the existing structures in Europe and across the Atlantic with any regional arrangements that may arise from the Persian Gulf War.

