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The Israeli-Iranian War and its environmental repercussions: A study on the targeting of nuclear facilities

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Abstract---On June 13, 2025, the Zionist entity launched sudden and unannounced attacks on the state of Iran through a direct military operation targeting vital Iranian facilities, namely missile strikes on nuclear sites and military zones. The consequences extended beyond this, including the killing of unarmed civilians. On another level, this blatant aggression by the ruthless Zionist occupier is expected to have severe repercussions on the region, particularly with regard to radioactive pollution, which will inevitably have a negative impact on environmental degradation, exacerbate climate change, and intensify problems such as land degradation and the loss of biodiversity. In addition, the dispersed gases are likely to have a harmful effect on the ozone layer. The international response has included widespread condemnation of this inhumane act of aggression. In retaliation, Iran responded in kind by launching missile strikes deep into Israeli territory, targeting nuclear facilities—an escalation with potentially catastrophic consequences for both the region and the international community. Through this research paper, we aim to examine nuclear reactors and their link to radioactive pollution, as well as the environmental impact of targeting nuclear facilities. We will study how war exacerbates nuclear radiation and its effects on environmental elements such as water, air, soil, land, and subsoil, using the Israeli-Iranian war as a case study and exploring its environmental implications.

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Introduction

The Islamic Republic of Iran was subjected to a direct military assault without prior warning, with strikes launched deep into Iranian territory. These military attacks targeted vital installations, particularly nuclear reactors, in addition to sovereign institutions. As a result, unarmed civilians were killed. Governments across the world considered these strikes by the Israeli entity a direct violation of international charters and agreements, particularly those related to human rights.

Iran's response was forceful, invoking the principle of legitimate self-defense and reciprocity, through missile strikes launched deep within Israeli territory. This grave escalation has since triggered both regional and global repercussions, particularly regarding third-generation human rights, foremost among them the right to a healthy environment. This right cannot be realized without international solidarity and cooperation, given the shared environmental heritage of humanity. Among the most serious consequences are radioactive leaks resulting from the targeting of nuclear reactors, rendering the Middle East vulnerable to the spread of radioactive pollution across marine, atmospheric, and terrestrial domains—an outcome with potentially devastating effects on Middle Eastern countries and the continents adjacent to the conflict zone.
Against this backdrop, the central research question of this study is: **What is the impact of the Israeli-Iranian war on the environment and its components, and what are the regional and international repercussions?**

Through this core question, we aim to explore the Israeli-Iranian war from all dimensions, particularly its environmental consequences such as radioactive pollution and its broader global and regional impacts. We will address issues including ozone layer degradation, marine pollution, the death of marine organisms, and threats to food security and fisheries, which are rich in the Middle East. Additionally, the study will examine the theoretical framework surrounding the impact of wars and armed conflicts on environmental degradation, as well as on various economic, social, and health crises.

To address this critical and timely issue—one that concerns the entire international community due to its far-reaching implications—we will adopt a descriptive-analytical methodology. This involves describing the characteristics of various lethal weapons, particularly nuclear weapons and other weapons of mass destruction used in warfare. The analytical aspect focuses on assessing the environmental consequences of this war, especially the problem of radioactive contamination resulting from attacks on nuclear reactors.

Chapter One: The Relationship Between Nuclear Radiation and Environmental Pollution

To study the relationship between nuclear radiation and environmental pollution, it is necessary to address the foundations of this relationship, namely nuclear reactors and nuclear testing, as they represent the primary sources of nuclear radiation. These two components form the core of the connection between nuclear radiation and the resulting environmental pollution. Accordingly, we will examine in Section One nuclear reactors and nuclear testing as sources of nuclear radiation, in Section Two nuclear radiation as a form of environmental pollution, and in Section Three the efforts of the United Nations to protect the environment during armed conflicts.

Section One: Nuclear Reactors and Nuclear Testing as Sources of Nuclear Radiation

Nuclear reactors and nuclear testing are considered the two main sources of nuclear radiation. In this regard, we will address in Subsection A, nuclear reactors and the dangers associated with their operation, in Subsection B, the risks involved in constructing and operating nuclear reactors, and in Subsection Three nuclear testing.

A. Nuclear Reactors and the Dangers of Their Operation

Energy is one of the primary concerns of the modern world. It forms the basis of various industries and serves as a measure of a person's standard of living within any society. Traditional energy sources such as coal, oil, and natural gas are finite, prompting the search for alternative, renewable sources like solar and nuclear energy.

Nuclear reactors are widely used to generate electrical power in our contemporary world. However, they are also a significant source of radiation exposure, affecting both the workers inside these reactors and populations living nearby. In the event of radiation accidents, vast areas of the world can be impacted. Those primarily exposed include uranium miners, nuclear fuel production workers, nuclear reactor operators, and specialists responsible for managing and storing radioactive waste. [1]

It is worth noting that as of December 2006, there were 443 nuclear reactors in operation across 30 countries, generating approximately 369.552 gigawatts of electricity (according to the International Atomic Energy Agency).

B. The Dangers of Constructing and Operating Nuclear Reactors

The dangers of building and operating nuclear reactors manifest in several areas, including: [2]

- Routine and experimental operations such as irradiating stable elements to produce radioactive isotopes, followed by their dissolution, purification, and preparation for laboratory use. This process carries the risk of radioactive leaks into the environment, as seen in Canada in 1952, when uranium rods melted due to a water system error, resulting in extensive environmental contamination and reactor damage.
- Use of water or air in cooling processes during reactor operation, which may involve explosions in the cooling circuits. This can lead to the release of water contaminated with radioactive substances into the environment.
- Maintenance and cleaning activities, during which radioactive waste is collected and stored in specialized wells. These processes risk environmental leaks and accidents during maintenance procedures.
- The manufacturing of nuclear reactor fuel from uranium, and the reprocessing of spent fuel to extract strategic nuclear materials like plutonium, which produces vast amounts of dangerous radioactive waste.

C. Nuclear Testing

Nuclear testing is one of the most prominent artificial sources of nuclear radiation, primarily due to the detonation and use of nuclear weapons—considered among the most destructive weapons in existence. These weapons operate through nuclear fission and nuclear fusion.

- Nuclear fission involves splitting the nuclei of heavy atoms (like uranium), releasing substantial energy.
- Nuclear fusion combines the nuclei of light atoms by heating them to extremely high temperatures.

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[1] **Mohamed Amin Youssef**, *International Protection of the Environment from Pollution under the Provisions of International Environmental Law as a Branch of Public International Law*, 1st ed., Dar Al-Wafaa for Printing and Publishing, Egypt, 2019, p. 217.

[2] **Sadeq Mohamed Fathy**, "The Effects of Radioactive Pollution on Natural Elements," *Journal of International Law and Development*, Vol. 1, No. 1, 2013, p. 258.

Nuclear weapons utilize atomic components to cause mass destruction and come in various forms: atomic, hydrogen, and neutron bombs. Upon detonation, the released nuclear energy turns the materials into gas, generating intense pressure and high-speed winds due to sudden expansion. The explosion also emits a blinding flash brighter than the sun and temperatures reaching 12 million degrees Celsius.

As the gas decompresses, it sends out a deadly shockwave carrying various types of strong radiation. This results in widespread damage, including electrical outages, stalled engines, and the cessation of mechanical operations. Additionally, the blast raises heavy radioactive dust that merges with the explosion and radiation, forming a highly hazardous airborne mixture. [3]

Section Two: Nuclear Radiation as a Form of Environmental Pollution

There is no doubt that nuclear radiation has a direct impact on the environment by altering one or more of its components, leading to environmental radioactive pollution. To clarify the relationship between nuclear radiation and environmental pollution, we will examine **in** Subsection A**,** the definition of environmental pollution in the nuclear field, and in Subsection B, the concept of radioactive pollution.

A. Definition of Environmental Pollution in the Nuclear Field

Environmental pollution in the nuclear field refers to the degradation and alteration of the components and characteristics of the environment, which contributes to its damage or destruction. It occurs when human activity—whether directly or indirectly, intentionally or unintentionally—introduces nuclear materials or their radioactive waste into natural environmental elements. This results in threats to human health, plant and animal life, or has harmful effects on natural resources and ecosystems.

Environmental pollution caused by nuclear radiation can be observed in three main forms; land pollution, air pollution, and water pollution. [4]

B. The Concept of Radioactive Pollution

Radioactive pollution is considered one of the most dangerous types of pollution due to its long-lasting presence in the natural environment. It occupies a prominent position among other forms of pollution—such as chemical and thermal pollution—because of the widespread use of nuclear technology. The horizontal and vertical expansion of nuclear energy applications has led to increased quantities of radioactive materials and waste resulting from nuclear industries.

Radioactive contamination also occurs through its use in generating electricity, producing radioactive isotopes in medicine, agriculture, industry, and scientific research across multiple fields. This type of pollution has unique characteristics, notably its invisibility to human senses and the fact that it can only be detected by specialized instruments.[5]

In this regard, the International Convention for the Suppression of Acts of Nuclear Terrorism (Article 1) defines "radioactive material" as:

"*Nuclear materials or other materials containing nuclides that undergo spontaneous disintegration, a process accompanied by the emission of one or more types of ionizing radiation—such as alpha, beta, or gamma rays—which are extremely dangerous due to their radioactive or fissile nature. They may cause death or serious bodily harm, or result in damage to property or the environment.*" [6]

Section Three: Efforts of the United Nations in Protecting the Environment During Armed Conflicts

The United Nations' efforts to protect the natural elements of the environment during periods of armed conflict are reflected primarily in two key contributions: the role of the International Law

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[3] **Salma Khenshali** and **Ahmed Baytam**, "Radioactive Pollution as One of the Most Dangerous Types of Environmental Pollution," *Journal of Legal and Economic Studies*, Vol. 5, No. 2, 2022, pp. 1056–1080, p. 1073.

[4] **Mohamed Amin Youssef**, *op. cit.*, p. 206.

[5] **Ibid.**, p. 204.

[6] **Sadeq Mohamed Fathy**, *op. cit.*, pp. 256–268, p. 261.

Commission (ILC) in codifying legal norms (Subsection A), and the proposal submitted by the United Nations Environment Programme to the ILC (Subsection B).

A. The Contribution of the International Law Commission to Legal Codification

The International Law Commission, a subsidiary organ of the United Nations General Assembly, addressed environmental protection during armed conflict in three key areas, as follows: [7]

1- In its Draft Articles on State Responsibility, the Commission adopted Article (19), titled *"International Crimes and Delicts"*, in which paragraph 3(d) states:

"*An international crime may result from a serious breach of an international obligation of essential importance for the safeguarding and preservation of the human environment, such as that prohibiting the pollution of the atmosphere or of the seas.*" This clearly affirms the ILC's interest in contemporary global issues, particularly in the important field of environmental protection.

2- In the Draft Code of Crimes Against the Peace and Security of Mankind, Article (22), which concerns *grave war crimes*, contains two references related to environmental protection during armed conflict. It specifies that:

"*Any individual who commits or orders the commission of extremely grave war crimes shall be held criminally responsible and punished accordingly.*" This includes acts leading to serious environmental damage during wartime.

3- The Commission also adopted Article (29) in its Draft Articles on the Law of the Non-Navigational Uses of International Watercourses. This article, titled *"International Watercourses and Installations in Time of Armed Conflict"*, provides that:

"*International watercourses and the associated installations, facilities, and engineering works shall enjoy the protection conferred by the principles and rules of international law applicable in both international and internal armed conflicts. They must not be used in a manner that violates these principles and rules.*"

B. The Proposal Submitted by the United Nations Environment Programme to the International Law Commission

In (2009), the United Nations Environment Programme (UNEP) and the Environmental Law Institute conducted a joint assessment of the current legal framework for the protection of environmental and natural resources during periods of armed conflict. This initiative was driven by growing concerns over environmentally harmful practices that increasingly render the environment a victim of "silent wars."

The assessment coincided with a high-level international meeting held in March 2009, which brought together legal experts and representatives from UNEP and the International Committee of the Red Cross (ICRC). The resulting report put forward a number of important recommendations, most notably the call for the International Law Commission, as a leading expert body in international law, to review the current legal framework for the protection of the environment during armed conflict, and to identify ways of clarifying, codifying, and expanding it.

The report summarized its key proposals for addressing the following issues: [8]

- Compiling an inventory of legal provisions and identifying the **gaps and obstacles** that hinder their implementation.
- Exploring the options available to clarify and codify this branch of law.
- Defining key terms such as "widespread," "long-term," and "severe."
- Examining the applicability of multilateral environmental agreements during armed conflict, as part of the Commission's ongoing analysis of how conflict affects treaty obligations.
- Expanding the scope of environmental and natural resource protection **to include** non-international armed conflicts**.**
- Considering how best practices, soft-law standards, and international environmental jurisprudence can help to clarify the ambiguities and fill the gaps that persist within international humanitarian law**.**

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[7] **Moussa Mohamed Misbah Hamad**, *op. cit.*, p. 236.

[8] **Ibid.**, p. 242.

These efforts by the United Nations system reflect a growing awareness of the environmental devastation caused by armed conflict, particularly as evidenced in the Gulf War, with its catastrophic effects on the environment following the destruction of oil facilities in Kuwait, then Iraq, as well as subsequent devastation in Afghanistan and the Gaza Strip.

Moreover, these initiatives signify a maturing global consciousness of the dangers of modern warfare and the deployment of the world's most devastating weapons—threats that endanger third-generation human rights, particularly the right to a healthy environment, the right to development, and the right to peace and to the common heritage of humankind, all of which are difficult to realize in the context of escalating destructive power and the proliferation of nuclear weapons.

Part Two: The Targeting of Nuclear Reactors and Its Radiological Impact on the Environment

In the context of modern warfare, which relies heavily on advanced weaponry—ballistic and nuclear in particular—there is no doubt that such conflicts have a direct impact on the essential components of the environment, especially when nuclear facilities are targeted. The contemporary world has witnessed wars of this nature, and this study will focus on one such conflict as a case study: the Israeli-Iranian war, in which both parties are involved in nuclear activities.

To explore this subject in greater depth, we will address the following in:

- **Section One**: Wars and Their Radiological Impact on the Environment
- **Section Two**: The Israeli-Iranian War and Its Various Consequences
- **Section Three**: The Regional and Global Environmental Impact of the Israeli-Iranian War

Section One: Wars and Their Radiological Impact on the Environment

As previously indicated, modern wars—particularly those involving states with active nuclear programs—undeniably have a **direct and destructive impact** on environmental components. Accordingly, this section will cover: **A,** the Impact of Wars on Environmental Elements, and **B**, Environmental Damage as an Act of Aggression

- **Subsection C**: Military Waste as One of the Byproducts of War

A. The Impact of Wars on Environmental Elements

Studies conducted by environmental specialists have shown that wars have devastating effects on the environment. This is due to the use of modern advanced weapons such as nuclear, chemical, and biological weapons, which disrupt the global ecological balance. Wars also hinder the implementation of sustainable development by increasing expenditures on military weaponry.

This impact is clearly illustrated by the consequences of the atomic bombings of Hiroshima and Nagasaki in Japan, as well as by the manifestations of radiation pollution, which appeared in the genetic makeup of future generations, becoming evident only sometime after this catastrophic event. [9]

B. Environmental Damage as an Act of Aggression

A group of environmental law experts argues that environmental harm may be considered an act of aggression, based on two legal frameworks:

- The first: If the UN Security Council determines that the environmental damage constitutes an act of aggression, it may authorize a military response in accordance with Articles (39)–(42) of the United Nations Charter. The Council may also hold the aggressor party internationally liable and demand compensation for the damage caused.
- The second: This refers to Article 6(a) of the Nuremberg Charter, which states that planning and preparing a war of aggression is considered a crime against peace. Under this provision, ten German civilians—who held administrative positions in the Polish forest regions during the German occupation (1939–1944)—were prosecuted. They had pursued policies that led to the exploitation

[9] **Adnan Abdulaziz Mahdi Al-Douri**, *Legal Protection of the Environment in Arab States*, National Center for Legal Publications, 1st ed., Egypt, 2020, p. 368.

of Polish forests in harmful ways, including the indiscriminate cutting of trees, neglecting the important duty to preserve the timber resources. [10]

C. Military Waste as a Byproduct of War

Debates continue over how to properly handle and dispose of radioactive waste, with no satisfactory solution yet reached—despite the covert discontinuation of some nuclear programs. The real issue lies not only in the production of more nuclear weapons, but in the complexity of disposing of them safely, which adds another dimension to the problem.

The challenge also includes the safe storage of radioactive materials using appropriate techniques, and the massive financial burden associated with covering the costs of decontamination, which is already being triggered by this waste. [11]

Section Two: The Israeli-Iranian War and Its Various Consequences

The modern world has recently witnessed a war between two states actively involved in nuclear activities, both possessing nuclear reactors on their territories. This situation has raised significant global concerns and disapproval, especially regarding the potential violation of international humanitarian law, should either party resort to using nuclear weapons or targeting nuclear facilities.

In this context, we shall examine the implications of Israel's attack on Iran in Subsection A, and the implications of Iran's response to Israel in Subsection B.

A. Implications of the Israeli Attack on Iran

The main motivation behind Israel's aggression against the Islamic Republic of Iran was the targeting of nuclear reactors, as well as the disruption of key infrastructure and vital institutions within Iran. The broader goal was to undermine Iran's nuclear capabilities.

This was reflected in over 200 targeted locations, including nuclear facilities, missile bases, civilian institutions, and the assassination of senior military leaders and nuclear scientists. This blatant act of aggression conveyed several messages, which can be summarized as follows: [12]

- Domestically, Israel aimed to divert criticism directed at the Netanyahu government by projecting a strong and aggressive image externally.
- By targeting top leadership, including first-tier commanders, Israel intended to deliver a clear message: the strategic minds behind the nuclear program are not safe.
- On the regional and international level, Israel sought to enhance its bargaining position in any future security arrangements, especially amid stalled nuclear negotiations between Tehran and Washington.
- Israel aimed to adopt a preemptive doctrine, deterring what it perceives as existential threats before they materialize.
- Israel is trying to enforce a strategic deterrence equation through preemptive strikes, while Iran seeks a retaliatory capacity, even at significant economic or political cost.

B. Implications of Iran's Response to Israel

Iran's response carried several strategic implications, which can be outlined as follows: [13]

- Iran aimed to reinforce its regional influence by demonstrating its ability to retaliate swiftly, thus reasserting its position among its regional allies.
- The missile attacks sent a reassuring message to the Iranian public regarding the state's capacity for retaliation.

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[10] **Moussa Mohamed Misbah Hamad**, *Protection of the Environment from the Dangers of Pollution According to International Law and National Legislation*, Arab Center for Publishing and Distribution, 1st ed., Sudan, 2019, p. 224.

[11] **Sultan Al-Rifai**, *Environmental Pollution: Causes – Dangers – Behavior*, Dar Osama for Publishing and Distribution, Amman, 2014, p. 163.

[12] *Rules of Engagement Between Israel and Iran: From Proxy Wars to Direct Confrontation*, Aljazeera.net, accessed 18 June 2025 at 12:55 p.m.

[13] *Ibid.*

- Iran conveyed a message to the West, linking military confrontation to the nuclear negotiation track, thereby placing pressure on Washington and Brussels to resume talks under terms more favorable to Iran.
- The response reflected a broader Iranian strategy focused on building effective deterrence against any future Israeli aggression.

Section Three: The Regional and Global Environmental Impact of the Israeli-Iranian War

The reciprocal war between Israel and Iran has generated numerous consequences, particularly for neighboring states. In this regard, we shall explore the regional environmental impact of the Israeli-Iranian war in Subsection A, followed by its global environmental aftermath in Subsection B.

A. The Regional Environmental Impact of the Israeli-Iranian War

1. Impact on Gulf States (Middle East)

Dr. Liqaa Makki, a researcher at the Al Jazeera Center for Studies, asserted that the ongoing conflict between Iran and Israel represents a serious turning point in the Middle East, with signs pointing to a potential escalation and direct threats to human life and the stability of neighboring countries. He warned that any escalation may involve major international actors and lead to a comprehensive regional confrontation.

Dr. Makki emphasized the strategic importance of the Gulf region, particularly the Strait of Hormuz, a vital oil artery. Should it be closed—a likely scenario amid continued escalation—up to 60% of global energy supplies could be disrupted. Furthermore, direct strikes on nuclear or energy infrastructure could trigger a global economic crisis.

In the same context, Egyptian nuclear energy expert Dr. Ali Abdel Nabi outlined the worst-case scenario: an Israeli strike on Iran's Bushehr nuclear reactor could result in radiation leaks contaminating desalinated drinking water across the Gulf. Health-wise, radiation exposure could lead to cancers, blood disorders, and other diseases. Iran's Atomic Energy Organization has already confirmed contamination at the Natanz nuclear site due to Israeli attacks. [14]

Also, an Egyptian economic expert affirmed that giant oil tankers crossing the Strait of Hormuz annually carry about 90 million metric tons—approximately 20% of global energy needs and 25% of global liquefied gas demand. The volume of trade through the strait exceeds $1 trillion per year, and more than 2.5 billion tons of cargo cross it annually. Closure would immediately disrupt 20% of the world's oil shipments, directly impacting 30 countries and indirectly affecting many others via spiking energy prices. [15]

B. Global Environmental Aftermath of the War

1. Ozone Layer Depletion Due to Nuclear Radiation

Depletion of the ozone layer exposes plants to ultraviolet (UV) radiation, impairing growth and reducing agricultural yields by damaging cell structures, including DNA and vital cellular components. Over 200 plant species, such as peas and beans, are vulnerable to UV radiation. [16]

Human activities contribute 75–85% of ozone layer degradation, while natural processes account for 15–20%, and volcanic eruptions for 1–5%. Much of the human impact comes from the use of chlorofluorocarbons (CFCs)—chemicals made of one carbon atom and three chlorine atoms. [17]

The ongoing war causes nuclear radiation leaks, accelerating ozone depletion. According to Dr. Yousry Abu Shadi, senior inspector at the International Atomic Energy Agency (IAEA), the colored lights observed in the sky result from complex physical and chemical reactions in the atmosphere caused by ballistic missile launches at high altitudes, visible even from countries far from the conflict zone.

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[14] *Energy Expert Reveals Worst-Case Scenario After Israeli Strike on Iranian Nuclear Facilities*, Arabic.rt.com, accessed 17 June 2025 at 3:15 p.m.

[15] *Expert Explains the Impact of the War Between Israel and Iran on the Egyptian Economy*, Alarabiya.net/arab-and-world/egypt/2025/06/17/, accessed 18 June 2025 at 2:30 p.m.

[16] **Adel Sheikh Hussein**, *op. cit.*, p. 91.

[17] **Nouman Shahada** and **Dalal Zreiqat**, *op. cit.*, p. 317.

Experts further explain that missile interceptions or detonations release immense energy, heating the air rapidly and forming clouds that rise through atmospheric layers, contributing to air pollution and atmospheric contamination. [18]

2. Contamination of Global Waters (Pacific, Indian Oceans, and International Rivers)

One major environmental consequence of the war is the pollution of marine ecosystems due to infrastructure destruction and chemical/radioactive discharge. Radioactive pollutants dissolve in water, forming heavy metals like lead, nickel, cadmium, arsenic, mercury, and cobalt, severely affecting aquatic life and fish stocks, which are crucial to the human food chain. [19]

Radioactive leakage threatens major regional water bodies, such as the Tigris, Euphrates, and Persian Gulf, putting drinking water and marine resources at risk. In the event of nuclear facility damage, radioactive waste may also reach the Mediterranean Sea via water currents. As in Chernobyl (1986), radioactive particles could spread through air currents, reaching Europe and Asia—sparking oil price increases, diplomatic crises, and international accountability disputes.[20]

3. Worsening of Environmental Refugee Phenomena [21]

The environmental destruction from armed conflict extends to animals, causing disease and reduced economic value, and to plants, significantly lowering agricultural productivity in areas with elevated pollutant concentrations. Indirectly, these effects disrupt the global climate, as increased emissions of gases like CO_2 intensify global warming.

This chain of events compels populations to migrate in search of livable environments, increasing environmental displacement. As previously discussed, the Israeli-Iranian war exacerbates this by contaminating soil with radioactive particles, affecting crops and pastures, and deepening the food insecurity crisis.

Health consequences include thyroid cancer (iodine-131), leukemia (cesium-137), respiratory illnesses, and skin disorders, especially in neighboring countries. Economically, the agricultural sector collapses, leading to mass displacement from contaminated zones. [22]

The Intergovernmental Panel on Climate Change (IPCC) predicts that by 2050, over one billion people worldwide may face climate risks, especially in coastal areas, forcing tens or hundreds of millions to migrate. The ongoing war compounds this trend. The World Bank's Ground Swell report estimates up to 216 million climate migrants across six regions: Sub-Saharan Africa, Latin America, East Asia and the Pacific, North Africa, Eastern Europe, and Central Asia. [23]

4. Transboundary Pollution

One of the most serious effects of the war—particularly its nuclear dimension—is cross-border radioactive pollution. Targeting reactors like Bushehr (Iran) or Dimona (Israel) could lead to massive radioactive leaks, spreading across borders via wind and water currents.

Countries near the conflict—Iraq, Jordan, Saudi Arabia, and the Gulf states—are at risk. Radioactive particles such as iodine-131, cesium-137, and strontium-90 may travel long distances, especially following high-altitude detonations. [24]

In the event of nuclear fallout in Iran, Iraq, Syria, and Jordan would be most affected. If it occurs in Israel, Egypt and Cyprus are at risk. The Gulf states would be impacted if Bushehr is targeted.[25]

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[18] *Dazzling Lights in the Sky – Massive Silent Flashes*, Akhbar Elyoum, [https://akhbarelyom.com/news/newdetails/4637989/1/], accessed 18 June 2025 at 2:40 p.m.

[19] **Kamal Mehni**, *Confronting Desertification in Light of International Environmental Conferences and Agreements*, Fahrenheit Publishing, Algeria, 2025, p. 59.

[20] **Osama Sayed Ahmed Hussein**, *The Impact of Radioactive and Nuclear Pollution in the Israeli–Iranian Conflict on Neighboring and Surrounding States*, published 14 June 2025, Josournews.net, accessed 20 June 2025 at 9:12 p.m.

[21] **Kamal Mehni**, *op. cit.*, p. 86.

[22] **Osama Sayed Ahmed Hussein**, *op. cit.*

[23] *Environmental Migrants or Climate Refugees?*, [www.migrationdataportal.org], accessed 28 January 2025.

[24] **Osama Sayed Ahmed Hussein**, *op. cit.*

[25] **Ibid.**

Conclusion

This research paper addressed one of the most pressing contemporary issues: the Israeli-Iranian war, also dubbed by some as the "12-Day War." We sought to explore this topic from multiple angles, particularly its threat to international peace and security, with a focus on its environmental consequences, especially due to radioactive leaks resulting from the targeting of nuclear reactors. The following key findings were reached:

- Practices involving nuclear reactors, such as the irradiation of stable elements to produce radioactive ones, and the subsequent processes of dissolution, purification, and preparation for laboratory use, involve risks of radioactive leakage. These practices contribute significantly to environmental degradation, especially in marine, aquatic, and terrestrial ecosystems. Restoring ecosystems, particularly marine environments, after contamination remains extremely difficult. The attack on the Natanz nuclear site in Iran serves as a clear example of potential catastrophic regional consequences.
- Nuclear radiation is produced through nuclear experiments, acting as a devastating weapon through nuclear fission and fusion reactions. The use of atomic components in weapons of mass destruction results in profound and often irreversible damage to natural environmental elements.
- Nuclear pollution is among the most dangerous forms of pollution, due to its lethal effects on human, animal, and plant health. Numerous studies and research efforts confirm the serious risks associated with radiation exposure.
- The ongoing war between Israel and Iran will have a negative impact on the realization of the 2030 Sustainable Development Goals, particularly in relation to the nuclear waste crisis, the increase in global warming, the deterioration of biodiversity, and the expansion of desertification as a result of worsening environmental displacement (environmental refugees).

Recommendations

Based on these findings, we put forward the following key recommendations:

- Activate and reinforce international treaties and conventions governing warfare, including the Treaty on the Prohibition of Nuclear Weapons, the four Geneva Conventions and their Protocols, as well as international criminal law, particularly in holding accountable those who initiate hostilities—notably the Israeli side and its supporters.
- UN-affiliated specialized agencies, especially the International Atomic Energy Agency (IAEA), must play a stronger role by updating monitoring mechanisms stipulated under international agreements. This could be achieved by establishing coordinated international, regional, and national bodies for the implementation of nuclear oversight.
- Expand the powers of the IAEA, by granting it greater autonomy and binding authority over its decisions to ensure they have compulsory international legal force.
- Establish mechanisms to subject all states to IAEA supervision, especially to ensure oversight over nuclear activities. This includes addressing Israel's Dimona reactor, which currently operates outside IAEA authority.
- Raise public awareness of the dangers of nuclear radiation and implement educational and sensitization mechanisms to help societies respond effectively in the event of nuclear emergencies.
- The World Health Organization (WHO) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) must enhance their roles. The WHO must highlight the health consequences of nuclear radiation on humans, animals, and ecosystems, including its links to various cancers and other diseases. It must also advocate against the military use of radiation.
- UNESCO should lead awareness campaigns about the dangers of nuclear weapons, encourage the organization of environmental summits, and conduct research by engaging experts in nuclear and environmental sciences. It should also produce reports and preventive frameworks, and integrate environmental protection against nuclear radiation into educational curricula, especially focusing on the threats posed by nuclear facilities and weapons testing.

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