



PERSPECTIVE

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West Asian War's Ecological toll on the GCC: The 2026 Conflict's Impacts on the Ecosystems, Water Security and Long-term Resilience

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Received:

2026/02/22

Accepted:

2026/04/22

Published:

2026/04/28



Abstract

The 2026 West-Asian conflict involving the Gulf Cooperation Council (GCC) countries, Iran, Israel, and the United States has caused significant environmental harm in a region already facing ecological stress. Beginning with strikes on 28th February 2026, the conflict quickly escalated and led to more than 300 reported environmental incidents across twelve countries, including Iran, Iraq, Saudi Arabia, the UAE, Qatar, Bahrain, Kuwait, Oman, Jordan, Cyprus, Israel, and Azerbaijan Conflict and Environment Observatory (CEOBS, 2024). Within just three weeks, the scale of environmental damage exceeded that of earlier Gulf conflicts in 1991 and 2003, particularly the 1991 Gulf War oil spill, which has been extensively documented in environmental assessments by the United Nations Environment Programme (UNEP, 2003).

Military strikes targeting oil facilities, refineries, desalination plants, ports, and strategic infrastructure resulted in massive oil leaks into the Persian Gulf, reflecting patterns of conflict-related environmental damage highlighted in UNEP's post-conflict environmental assessment studies. At the same time, billions of litres of crude oil remained stranded in tankers unable to move safely through the region, contributing to heightened risks of marine pollution. Toxic smoke clouds from burning fuel created polluted rainfall containing harmful chemicals, affecting Tehran and nearby areas, consistent with observations reported in global atmospheric impact studies. Debris from air defence systems also spread heavy metals across cities, a phenomenon aligned with findings on war-related contamination discussed in environmental conflict literature. In addition, disruptions to shipping and aviation increased fuel consumption, leading to higher greenhouse gas emissions, as reflected in global emission trends identified in the Emissions Gap Report 2023 published by the United Nations Environment Programme.

These environmental impacts intensify climate change by increasing carbon emissions and worsening ocean acidification, consistent with projections outlined by the Intergovernmental Panel on Climate Change. They also threaten sustainability in GCC countries, where water supply depends heavily on desalination plants that may now face contamination risks. Marine ecosystems are at risk of long-term damage, and limited environmental governance in some affected areas makes recovery difficult, as highlighted in global environmental risk and resilience reports by institutions such as the World Bank. The long-term consequences may include lasting pollution, biodiversity decline, and increased exposure to global warming. This situation highlights the urgent need for stronger international rules and policies to protect the environment during armed conflicts and preserve global ecological stability.

Keywords: West-Asian Conflict 2026; United Nations Environment Programme; Desalination plants; Ocean acidification; Climate Change



Introduction

The 2026 West-Asian conflict involving the Gulf Cooperation Council (GCC) countries has unfolded within one of the world's most environmentally fragile regions, intensifying pre-existing ecological vulnerabilities. The GCC states—Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates are characterized by extreme water scarcity, with renewable freshwater availability in countries such as Kuwait and the UAE falling below 15 cubic meters per capita per year (World Bank, 2023). This scarcity has resulted in a heavy reliance on desalination, which supplies nearly all potable water in Qatar (approximately 99%), more than 90% in Bahrain, and between 42–52% in the UAE (World Bank, 2023; International Energy Agency, 2022). Simultaneously, the region supports ecologically sensitive marine environments, including coral reefs, seagrass beds, and mangrove ecosystems, all of which are highly vulnerable to pollution and climatic stress (IUCN, 2022).

Against this already strained environmental baseline, the escalation of hostilities beginning on 28 February 2026 has significantly amplified ecological risks. Military strikes targeting oil and gas facilities, refineries, ports, tankers, and desalination plants have triggered widespread oil spills, atmospheric contamination, and disruptions to critical water infrastructure (UNEP, 2023; CEOBS, 2024). These developments highlight not only the immediate environmental consequences of warfare but also its capacity to destabilize interconnected ecological systems. The current conflict draws strong parallels with earlier regional crises, particularly the 1991 Gulf War, during which large-scale oil fires and spills caused long-term environmental damage (UNEP, 1991), as well as the Iran–Iraq “tanker war” of the 1980s that exposed the vulnerability of maritime oil transport routes (Cordesman & Wagner, 1990). However, the 2026 conflict differs in its simultaneity, scale, and multi-sectoral targeting, affecting multiple environmental domains across several countries within a compressed timeframe.

Within this context, the central research question guiding this study is: How has the 2026 conflict degraded air quality, marine ecosystems, and freshwater systems in the GCC region, and what are the implications for human health, biodiversity, and long-term sustainable development? Addressing this question requires an integrated assessment of both direct and indirect environmental impacts, including pollution from hydrocarbon fires, contamination of marine and coastal ecosystems, and disruptions to desalination-dependent water systems.

This paper argues that while the immediate consequences of the conflict—such as oil fires, spills, and toxic emissions—are severe, their long-term implications are even more critical. The destruction of infrastructure and release of pollutants generate persistent, transboundary environmental damage that threatens regional habitability and accelerates existing climate vulnerabilities (IPCC, 2022). At the same time, the GCC's financial capacity and access to advanced environmental monitoring technologies provide potential pathways for recovery. However, such recovery is contingent upon the implementation of stronger environmental governance frameworks, enhanced regional cooperation, and the integration of ecological considerations into security and development planning (UNEP, 2023; World Bank, 2023).

Historical Context and Literature Review

The environmental consequences of the 2026 West-Asian conflict must be understood in relation to earlier regional conflicts that established critical precedents for ecological damage. The 1991 Gulf War remains a defining benchmark, during which more than 700 Kuwaiti oil wells were deliberately set ablaze and burned continuously for approximately 8–10 months. At its peak, emissions reached nearly 4.6 million barrels per day, releasing vast quantities of soot and toxic gases into the atmosphere, resulting in acid rain and long-term atmospheric contamination (UNEP, 1991). The associated oil spills caused severe and persistent damage to marine ecosystems, with impacts on fisheries, sea turtles, and coastal biodiversity that lasted for decades.

More recent developments, including disruptions in the Red Sea linked to Houthi activity between 2023 and 2025, as well as pollution associated with the prolonged Yemen conflict, further illustrate the environmental vulnerabilities of maritime oil routes. However, the 2026 conflict represents a significant escalation in both scale and complexity. Unlike previous conflicts, it marks the first instance of coordinated attacks on desalination infrastructure alongside simultaneous strikes on oil facilities across multiple countries. Early assessments indicate that over 120 environmental incidents were recorded within the first few days alone (CEOBS, 2024), underscoring the intensity and rapid spread of ecological damage.

Direct Environmental Impacts

Oil Spills and Marine Contamination

The 2026 conflict has resulted in extensive marine pollution due to targeted attacks on oil tankers, refineries, and port infrastructure. Incidents involving vessels such as tankers operating northwest of Dubai and within the Strait of Hormuz, including the reported “Skylight” tanker attack, have released significant quantities of crude oil into the Persian Gulf. These spills form surface oil films that restrict oxygen exchange, thereby reducing marine oxygen levels and threatening aquatic life.

The ecological consequences are exacerbated by the Gulf's low water circulation, which limits the natural dispersion of pollutants. As a result, toxic substances accumulate in marine environments, affecting coral reefs, seagrass beds, mangroves, fisheries, and seabird populations. In addition, damaged or sunken vessels act as continuous sources of pollution, creating long-term point-source contamination. Observational evidence suggests that the scale and frequency of these incidents may surpass those recorded during earlier conflicts, indicating a critical escalation in ecological risk.



Fig. 1. Showing Iranian Attacks against Civilian Vessels (Source: Fox News, 12 March, 2026)

Atmospheric Pollution and Toxic Emissions

The destruction of hydrocarbon infrastructure has generated significant atmospheric pollution, with large-scale oil and gas fires releasing greenhouse gases and hazardous particulates. Within the first two weeks of the conflict, emissions were estimated to reach approximately 5 million tonnes of CO₂ equivalent, comparable to the annual emissions of smaller nations such as Kuwait or Iceland. Major incidents, including strikes on the Saudi Ras Tanura refinery, the UAE's Fujairah port, and Iranian coastal facilities, produced dense smoke plumes containing nitrogen oxides (NO_x), sulphur dioxide (SO₂), polycyclic aromatic hydrocarbons (PAHs), and dioxins.

These emissions have contributed to severe air quality deterioration and the formation of black or acidic rainfall in affected regions, including Tehran and downwind GCC areas. Such atmospheric disturbances not only pose immediate health risks but may also alter regional climatic patterns. The persistence of airborne pollutants highlights the prolonged environmental consequences of conflict-induced emissions (IPCC, 2022; UNEP, 2023).

Climate Change Implications

The environmental effects of the conflict extend into the broader domain of climate change, as increased emissions from military operations, infrastructure destruction, and disrupted logistics contribute to global warming. The rapid surge in unregulated emissions during the early phase of the conflict reflects inefficient fuel use and the absence of monitoring mechanisms typically applied to industrial activities.

Time period defined as Week 1 (March 12–18, 2026), Week 2 (March 19–25, 2026), and Week 3 (March 26–April 1, 2026).

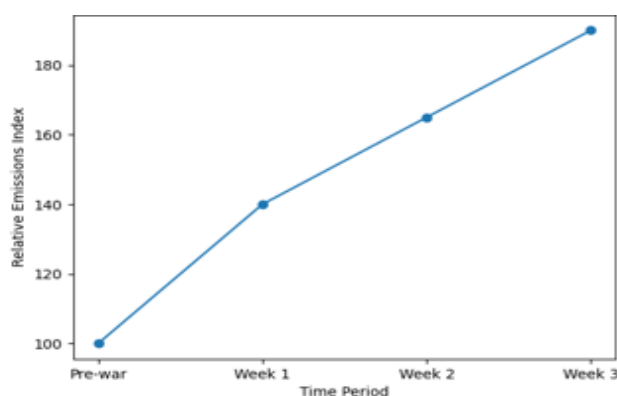


Fig. 2. Emissions Trend During Early Weeks of the 2026 Conflict

As illustrated in Figure 2, (Emissions Trend During Early Weeks of the 2026 Conflict), there is a steady rise in emission levels driven by military activity and energy infrastructure damage. These emissions not only intensify regional warming but also undermine international climate mitigation efforts, as highlighted in the Emissions Gap Report (UNEP, 2023). The underreporting of conflict-related emissions further complicates global climate governance, masking their true contribution to atmospheric change.

Water Security and Desalination Crisis

Water security has emerged as one of the most critical environmental challenges during the conflict. Targeted strikes on desalination facilities, including those in Iran's Qeshm Island and Bahrain, have disrupted freshwater supply systems that serve approximately 100 million people across the region. In addition to direct damage, oil contamination in seawater poses a serious threat to desalination processes by clogging intake systems and reducing operational efficiency.

The infiltration of contaminants into soil and groundwater systems further raises concerns about long-term food chain pollution. Given the region's dependence on desalinated water, even temporary disruptions can have severe socio-economic consequences. The vulnerability of desalination infrastructure thus represents a key dimension of environmental risk in the conflict (World Bank, 2023).

Biodiversity and Ecosystem Degradation

The combined effects of marine pollution, atmospheric contamination, and habitat destruction have significantly impacted biodiversity across the GCC region. Toxic substances released during the conflict accumulate in marine sediments and terrestrial soils, altering ecological balance and reducing species survival rates.

Long-term exposure to heavy metals and chemical pollutants threatens the reproductive cycles of marine organisms and disrupts food chains. Coastal ecosystems, already under stress from climate change, face additional pressure from habitat degradation and contamination. These developments have led to growing concerns regarding "ecocide," reflecting the scale and severity of environmental destruction. The cumulative impact may result in irreversible ecosystem imbalance and diminished ecological resilience (IUCN, 2022).

Country-Specific Variations and Transboundary Effects

The environmental impacts of the conflict vary across GCC countries, depending on their geographic proximity to conflict zones and the concentration of industrial infrastructure. High-exposure areas include the UAE, particularly Fujairah, Dubai, and Jebel Ali ports, as well as Saudi Arabia's Ras Tanura refinery, Bahrain's desalination facilities, and Qatar's Ras Laffan industrial zone. These locations have experienced direct environmental damage due to targeted strikes and industrial disruption.

Countries such as Oman, while located outside the primary chokepoint of the Strait of Hormuz, still face indirect risks from tanker traffic and potential spillovers. Kuwait has also been affected through tanker-related incidents. The transboundary nature of environmental damage is particularly evident in the Persian Gulf, where ocean currents facilitate the spread of pollutants across national boundaries, affecting all GCC states as well as Iran. This interconnected impact underscores the need for coordinated regional environmental management strategies.

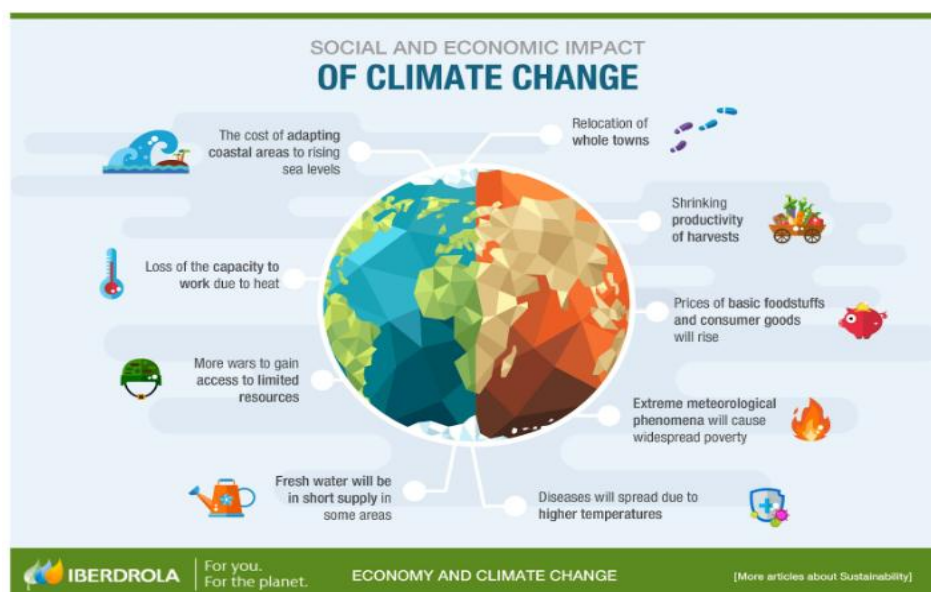


Fig. 3. Showing Social and Economic Impact of Climate Change (Source: Iberdrola. (n.d.). *Social and economic impact of climate change* [Infographic]).

Implications and Broader Consequences

The environmental damage caused by the conflict has far-reaching implications for human health, economic development, and global sustainability. Exposure to toxic pollutants increases the prevalence of respiratory

illnesses and raises long-term cancer risks, while contamination of water and food sources poses additional health challenges.

From an economic perspective, the destruction of environmental resources and infrastructure imposes significant cleanup costs and disrupts key sectors such as fisheries and agriculture. These impacts hinder ongoing efforts toward economic diversification and sustainable development in the GCC region. At the global level, increased emissions contribute to climate change, while disruptions in maritime routes, particularly through the Strait of Hormuz affect global supply chains, including fertilizer distribution, with indirect consequences for food security. Furthermore, the conflict exposes gaps in environmental governance, prompting calls for the recognition of ecocide under international law and the strengthening of policy frameworks to address environmental damage in conflict scenarios.

Disruption of Maritime Activity and Environmental Implications

The sharp decline in maritime traffic through the Strait of Hormuz during the conflict reflects a near-total disruption of one of the world's most critical energy transit routes. While this reduction may temporarily decrease direct shipping emissions, the broader environmental implications remain negative. Rerouting of vessels and prolonged anchorage increases fuel consumption, thereby elevating greenhouse gas emissions over time. Additionally, stationary tankers carrying crude oil present heightened risks of accidental spills, particularly in unstable conflict zones. The accumulation of such vessels contributes to localized marine pollution and amplifies ecological risks.

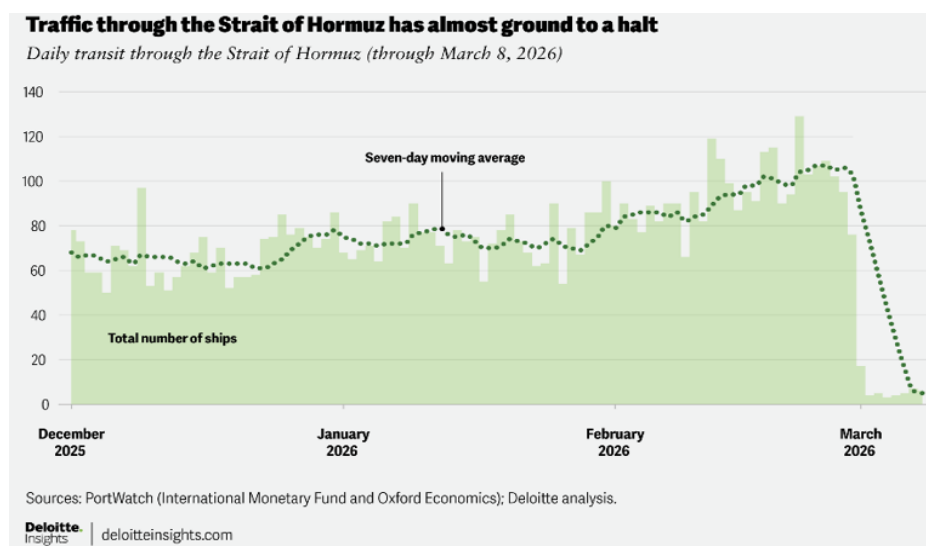


Fig. 4. Showing Traffic through the Strait of Hormuz over the war period

This disruption also affects global supply chains, forcing reliance on less efficient transportation routes that increase overall carbon intensity. Consequently, while reduced maritime activity may appear environmentally beneficial in the short term, the indirect effects significantly exacerbate long-term environmental challenges (IMF PortWatch; Oxford Economics; Deloitte, 2026).

Policy Recommendations and Conclusion

The environmental consequences of the 2026 West-Asian conflict highlight the urgent need for both immediate and long-term policy interventions in the GCC region. The temporary reopening of the Strait of Hormuz presents a crucial opportunity to restore essential supply chains and facilitate environmental response efforts. This window should be strategically utilized for deploying oil spill containment measures, enabling transboundary environmental monitoring, and ensuring the uninterrupted functioning of desalination systems critical to regional water security.

In the short term, coordinated action among regional governments and international environmental organizations is essential to establish real-time monitoring systems and rapid response mechanisms. Strengthening contingency infrastructure, particularly for desalination and marine ecosystems, remains a priority. Simultaneously, enhanced maritime governance in the Strait is necessary to minimize environmental risks during this fragile recovery phase. From a long-term perspective, the conflict underscores the importance of integrating environmental risk assessments into defense and infrastructure planning. Reducing overdependence on strategic chokepoints like the Strait of Hormuz through diversified energy and trade routes is critical for resilience. Moreover, accelerating the transition to renewable energy can mitigate the vulnerability associated with hydrocarbon-based assets.

The establishment of a regional environmental governance framework among GCC nations is imperative to ensure coordinated policy responses, shared accountability, and sustainable resource management. Such cooperation will be instrumental in addressing transboundary environmental challenges and strengthening ecological security.

In conclusion, the 2026 conflict reveals a profound “environmental fragility paradox” in the GCC region—where resource wealth simultaneously enables recovery and amplifies environmental risk. The reopening of the Strait of Hormuz reflects both the region’s vulnerability and its adaptive capacity. As environmental degradation increasingly emerges as a central dimension of modern conflict, it necessitates a shift toward integrated, sustainability-driven security strategies. By leveraging this crisis as a turning point, the GCC region can advance toward a more resilient, cooperative, and environmentally sustainable future.

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Author Contributions

AJ and MRAF conceived the concept, wrote and approved the manuscript.

Acknowledgements

Not applicable.

Funding

Not applicable.

Availability of data and materials

Not applicable.

Competing interest

The authors declare no competing interests.

Ethics approval

Not applicable.



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Citation: Joy A and Fathima MRA (2026) West Asian War's Ecological toll on the GCC: The 2026 Conflict's Impacts on the Ecosystems, Water Security and Long-term Resilience. *Environmental Science Archives* 5(1): 268-274.