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Dust Storms Batter Iraq: A New Environmental Security Challenge

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Graphical Abstract

This study examines the intensification of dust storms in Iraq as a growing environmental security concern. The country is exposed to over 100 storms and more than 200 dusty days annually, with projections indicating up to 300 days per year in the near future. These storms, driven by both local and regional sources, present serious health risks and compromise living conditions. The analysis highlights the national anti-desertification programme, still at an early stage, and its limited capacity to deliver effective and durable solutions.



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Abstract: Environmental problems are increasing and are new threats to Iraq. The country, under Saddam Hussein, fought an eight-year-long and devastating war against Iran and, later, in 1990, occupied Kuwait. It also engaged in many internal conflicts. The military security mindset persisted until the fall of the regime in 2003 and continued beyond. The improvement in security since 2018 should help Iraq address the growing unconventional problems that threaten the well-being of its population. Water shortages, desertification, and dust storms are among the environmental challenges the country faces. Dust storms are posing significant threats to Iraq. This paper studies dust storms in Iraq and discusses challenges to their solutions. The phenomenon has both local and regional origins.

Keywords: Dust storms, Threats, Iraq, Challenges, Cooperation.

Introduction

Iraq suffers greatly from increasing environmental problems such as rising temperatures, drought, desertification, and air, water, and soil pollution. Dust storms are increasing in their intensity and frequency. The dust storm that struck Iraq on May 16, 2008 wreaked havoc across the entire country. The city of Baghdad suffocated under the heavy dust load; visibility was reduced to less than 300 metres, and air quality fell sharply. Airports were shut down. Buildings, vehicles, power poles, and trees throughout the city suffered damage, and people were strongly advised to stay indoors. The massive storm was clearly visible from outer space and was considered one of the heaviest storms in recent decades. It was proof of new sources of 'existential threats' in that they affect people's health and various activities and hinder the country's development.

Iraq is located in the dustiest region of the world, characterized by the lowest rainfall, minimal natural vegetation, deterioration of the agricultural sector, degraded soil, expansive deserts, very high temperatures, and increased evaporation rates. These characteristics have made the region one of the biggest sources of dust in the world, a vast bowl of dust. Dust storms have certainly become one of the visible features of climate change in the Middle East, including Iraq.

Iraq endures many dust storms each year, exceeding 100, and has over 200 dusty days annually. It is projected to reach 300 days per year within the next decade or two. Iraq's population and environment increasingly suffer from the effects of dust storms. Many people, particularly the elderly with respiratory diseases, require urgent medical treatment during dust storms, and agriculture and vegetation are significantly impacted. The country's desertification worsens partly because of the increasing frequency of dust storms.

Dust storms are not new in Iraq, nor are they new in the world. Global climate change and human economic and industrial activities have exacerbated the problem. Additionally, Iraq's geographical position in the Middle East, combined with the aridity of its land, significantly contributes to its dust storms. These are also a transboundary issue. In other words, long-term solutions to the problem require regional cooperation and coordination as well.

This paper examines the growing problem of dust storms in Iraq and their impact on the people and the environment. It argues that dust storms constitute new existential threats; therefore, they must not be ignored. Urgent and appropriate measures must be taken. The paper identifies local and regional sources of dust in Iraq, exploring the challenges that hinder domestic solutions and cooperation with regional governments. The paper attempts to answer this question: how threatening are dust storms in Iraq, and what impediments exist for Iraq to address the local sources of dust and undertake joint actions with neighbouring countries to resolve the problem?

Dust storms in Iraq

Dust storms are a common environmental phenomenon in Iraq. They occur almost every year in varying sizes and intensities across all regions, mostly in spring and summer. By mid-July 2025, when this paper was finished, the country had experienced several light and heavy dust storms affecting every area. Dust storms have a significant impact on human activity and the environment, including breathing issues for many people, forcing many to stay home, reducing visibility, suspending flights, turning the sky orange, damaging crops and vegetation, and affecting soil fertility, among other effects. One news report describes a dust storm that happened in April 2025: ‘The sand and dust were so pervasive that they penetrated almost every house and vehicle, coming through the smallest cracks to coat every surface, making it difficult to work on computers and forcing almost all but emergency workers to stay indoors’ [1,2]. It has been increasingly understood that threats to life and well-being come from many sources, not just from the armies of other states.

The World Meteorological Organisation (WMO) defines dust storms as ‘a solid, wind-driven occurrence that causes significant amounts of dry soil particles or other tiny, separated materials to be suspended and transported in the atmosphere, resulting in visibility of less than 1,000 m.’ The dust storms in the arid and semi-arid regions, such as Iraq, are also known as ‘al-Haboob,’ which is ‘typically associated with the outflow of a thunderstorm...characterized by a wall of blowing dust and sand that advances rapidly, often reducing visibility to a few meters (sic) or less.’ Dust storms are part of a dry environment in Iraq which also includes high temperatures, low humidity, and minimal precipitation [3].

Global dust emissions, approximately 5,000 tonnes annually, have increased significantly over the last century because of changes in land use and climatic conditions. A twenty-five to fifty percent rise in annual dust storms has been recorded across many regions worldwide [4]. Iraq has a large share of the global increase in dust storms. According to one study, ‘Iraq has been exposed to the maximum number of dust events in spring and summer seasons over the past 35 years’ [5]. Another study shows that dust storms have increased from 75 to 200 times per year during the period from 1960 to 2022 [4].

Dust storms are a normal climatic phenomenon in Iraq, and their frequency has seriously increased since Iraq is one of the five countries most vulnerable to climate change, which means extreme temperatures, diminished water availability, intensified droughts, and frequent sand and dust storms [6,7]. Iraq is a semi-arid and largely low-lying country situated in a hot and dry region with very little vegetation. It has vast deserts in its western and southwestern areas, but it is also surrounded by more deserts. It is bordered by arid regions of Iran in the east, Kuwait and the deserts of Saudi Arabia in the south, and the deserts of Jordan and Syria in the west, as well as the arid regions of Türkiye in the north. Dust storms in Iraq originate from its own western deserts and the area between the Tigris and

Euphrates rivers; they also come from the neighbouring countries to the west: Saudi Arabia, Jordan, and Syria [3,4,6,8]. Iraq is getting drier as a result of dust storms [5].

Iraq's average precipitation ranges from 100 to 250 mm annually, and it is declining. Precipitation records indicate that the past four decades are classified as drought years, with a few wet years. Moreover, Iraq's average temperature is rising. Its climate is increasingly threatened by dust storms, which occur in all parts of the country, generally prevalent in the spring and summer, with varying degrees of intensity. Iraq's dust storms suspend very small particles that remain in the air for many hours, sometimes for several days, and these events affect the central and southern regions of Iraq more than the northern areas [5,8,9]. The annual occurrences of dust storms and dusty days have increased from about 70 a few decades ago to more than 200 recently, with projections reaching 300 in the next few years. This could mean that Iraq soon becomes a 'dust bowl', and as a result, Iraq's climate is becoming drier [4,10]. There is a correlation between the increasing dust storms and reductions in precipitation.

Sources of dust in Iraq are both local and regional. The local sources include deserts, dried marshes, river bed sediments, and dry lakes in the central and southern areas of the country. Drought and dried-up rivers and marshes result from a sharp decrease in annual precipitation, as well as dams and other water projects in upstream states, which have significantly reduced the water flowing into Iraq. Dust storms from local sources do not extend over long distances. The regional sources are located in the Arabian Peninsula, Jordan, and Syria, but also in Africa. Iraq's climate is influenced by winds that occur beyond its borders at different times throughout the year. These winds cause dust to rise; they also bring heat and cold, along with dust from outside Iraq that can linger in the air for several days. 'As the force of the wind passing over loosely held particles increases, particles of sand first start to vibrate and then saltate ('leap'). As they repeatedly strike the ground, they loosen and break off smaller particles of dust, which then begin to travel in suspension' [11]. In other words, strong surface winds lift into the atmosphere large amounts of sand and dust from bare and dry soil or loosely held sands and transport them downwind, 'affecting regions hundreds to thousands of kilometres away' [8].

Iraq is also affected by sandstorms. Sandstorms do not last long, and sand particles quickly settle in their new places. In contrast, dust storms sometimes take several days to settle, and they travel very long distances. Dust particles are smaller than sand particles, small enough to be lifted aloft as high as 6,100 m by currents of turbulent air. The type of dust storms that hit Iraq can sometimes be very severe, resembling sandstorms in intensity when accumulated on the ground. It is like a layer of soil. It is no coincidence that the Kurdish name for dust storms is 'kholbareen,' which literally means 'the fall of soil' [12].

Studies have shown that dust storms create serious environmental, health, agricultural, infrastructure, transportation, social, and economic problems. Dust storms ‘remove vast amounts of topsoil,’ reduce ‘soil fertility and [cause] damage to crops, a reduction of solar radiation and in consequence the efficiency of solar devices, damage to telecommunications and mechanical systems, dirt, air pollution, increase of respiratory diseases and so on’ [13-15]. Dust storms can result in rapid desertification, which is already occurring in Iraq. This means that fertile lands are shrinking, while dried and uncultivated areas are expanding [16]. Dust also affects soil fertility. It removes ‘the nutrient-rich lightest particles’ and ‘damages young crop plants’ [11].

Dust storms have impacted food security in Iraq, which is already at significant risk because of the falling water levels in rivers, the complete drying up of some rivers, the sharp drop in groundwater, and an alarming decrease in precipitation across the country [16]. Dust storms harm food security by destroying agricultural infrastructure, reducing the productivity of fertile topsoil, and directly affecting production [4]. The result of one study indicates that the losses of agricultural productivity and vegetation cover in Iraq through dust storms *in a year* are equivalent to US\$ 0.1 billion [17].

Dust storms lead to the suspension of many public services such as schools and airports, affect household welfare and the well-being of people, and cause numerous health problems, especially for the elderly and those with respiratory diseases [5,18]. During a severe dust storm in central and southern Iraq in 2025, nearly 4,000 people were admitted to hospitals across Iraq with breathing difficulties. Basra, the southernmost Iraqi city near the Kuwait border, had the highest number of people affected by the storm, reaching 1,000, and Muthanna Province reported at least 700 cases. Patients were placed on oxygen and received other treatments. No deaths were reported as a consequence of the dust storm. But, one death was reported as a result of a severe dust storm in 2022 [19-21].

Dust storms can greatly impact military and security operations and surveillance. The intense dust storms during the Eagle Claw hostage rescue operation in Iran in 1980 were a critical factor in the mission’s failure. Additionally, the 2003 Operation Iraqi Freedom, led by the United States, faced considerable cha

llenges from dust storms [22]. Moreover, during their stay in Iraq from 2003 onward, U.S. troops experienced occasional jamming of their M4 and M16 rifles and a failure to fire dependably because of the high levels of dust [10]. This effect on weapons is a significant concern for Iraq, as it has massive security issues in many areas, particularly near the border with Syria. It requires constant surveillance and military operations day and night. The emergence of ISIS from 2014 to 2017 exemplifies the fragility of security along the Iraq-Syria border and the necessity for intelligence gathering and military actions to confront the threats.

Challenges to local solutions and regional cooperation

As clarified above, dust storms arise from dry and unstable soil surfaces in arid regions such as the deserts of the Arabian Peninsula and Africa, travelling long distances. Therefore, it is understood – and indeed practised – that soil stabilization through planting vegetation and trees that withstand heat and drought is crucial for combating dust storms and mitigating their impacts. Iraq has vast deserts, as do its neighbours, and they are sources of dust in Iraq and the neighbouring countries. Any solutions lie in regional cooperation. This means that all states work together to reduce carbon emissions since rising carbon in the atmosphere leads to declining precipitation in dry or semi-arid lands, thus turning the land into a source of dust [4].

In a speech to the Group of 77 and China at the United Nations in 2025, Iraq's Permanent Representative to the UN, Abbas Kadhim Obaid, urged members to support his country in its efforts to combat dust storms. The Group is currently chaired by Iraq. Mr Obaid stated that dust storms have negative impacts on achieving the Sustainable Development Goals, which are set to be achieved by 2030, particularly in the developing countries of Asia and Africa. He emphasised that there needs to be global and regional cooperation to address the problem. This may require financial and technological support, as well as facilitating the transport of necessary resources to the affected areas [23].

There are a few measures in place to tackle the sources of dust at home, but there are no measures or plans to address it at the regional level. The measures taken at home can in no way match the scale of the problem. Iraq claims that it has converted many hectares of land from sandy terrain to agricultural fields, equipped with modern irrigation systems, and some water storage projects have been built to enhance water management [24,25]. Several other projects have been implemented, such as building about 50 oases in the country's western desert, about 10 artificial forests, and 23 pastures [26]. These measures are being taken since Iraq is committed to Land Degradation Neutrality (LDN) established by the United Nations Convention to Combat Desertification. It consists of 19 principles to meet Goal 15 of the 2030 Sustainable Development Goals (SDGs). Goal 15 calls for the restoration and promotion of the 'sustainable use of terrestrial ecosystems, sustainably managing forests, combating desertification, halting and reversing land degradation, and halting biodiversity loss' [27].

Another measure consists of planting millions of trees across the eastern edge of the deserts in Iraq: 'more than 200 million trees...palm trees, plants, herbage, and grasses that are resistant to the severe desert-like conditions...to be planted over an area of at least 3,000 sq. km, irrigated by groundwater through closed irrigation systems powered by solar energy.' Note the point of closed irrigation systems. This reflects a general need to conserve water and reduce evapo-transpiration. This mega project requires a great deal of effort at both local and national levels to be successful [28]. Yet there are always many problems which can impede such initiatives. Among them are administrative and

financial corruption; security challenges such as potential sabotage and attacks by anti-government groups, rebellious movements, or angry tribes; a lack of state funding for the project and its maintenance; and a lack of care, logistical support, and so forth.

Corruption is rampant in Iraq, often hindering reform and improvement in governance. The sectarian power-sharing among the various sects and groups of Iraqi society, the lack of a strong and independent judiciary, nepotism and patronage in government institutions – including law enforcement agencies – and the unaccountability for cases of embezzlement and larceny often by high-ranking officials and individuals with political connections, have all led to a state where government plans and funds are mismanaged and misused, with personal advantage taking precedence over the public interest. Successive Iraqi governments have attempted to address corruption with little success [29,30].

Large-scale corruption in Iraq affects its ability to allocate funds for public infrastructure and projects that benefit all. In 2022, a larceny case was revealed, implicating public officials and individuals with strong political connections; US\$ 2.5 billion in cash was withdrawn from an idle government account. The money disappeared into foreign banks and shadowy real property (and buildings) purchases. It was estimated to constitute *only 1 per cent* of the total lost to corruption since the fall of Saddam Hussein's regime in 2003 [31]. Corruption also means abandoning projects midway or lacking maintenance after they are completed. Many public parks and green strips alongside the roads are neglected, and many have vanished altogether, resulting in a significant waste of public funds [32]. No social benefit means more social misery.

Another key element that is crucial for the success of government projects, including anti-dust storm efforts, is stability. A lack of stability often leads to the failure of these projects. Iraq has faced significant security issues over the past several decades, and it still does. War and conflict in the past, along with extremism and terrorism in the present, create an unwelcoming environment for government projects in the troubled areas. The northwestern part of Iraq, which the tree planting project should cover, has witnessed many battles with Islamic State of Iraq and Syria (ISIS) groups over the past ten years, and the area is still not cleared of extremists or ISIS terrorists [33]. These groups pose challenges to government plans and actions, and they do everything they can to sabotage them.

Iraq can hardly be free of groups and factions that threaten stability and the implementation of law and government policy. It can take a very long time before the country can become stabilized. This is owing to the uneasy relationship among Iraq's various components and interference from outside powers. Iraq's various components – ethnic, religious, and political groups, tribes with power and influence in their territories, tribal confederations, and unresolved longstanding animosities – can all result in weak administration and a lack of cooperation between the government and the people [34].

Iraq's internal divisions mean there is a lack of a central authority capable of implementing laws throughout the entire country. Iraq's fragmentation dates back to its formation in 1921 when British imperial policy merged three regions into modern Iraq without any historical ties, thus creating a non-homogeneous entity. The former Ottoman empire had also encountered these inherent difficulties. Many coups, external wars, and oppressive regimes characterize modern Iraq. There are numerous actors in Iraq, all of whom, with varying degrees of power, influence their own areas or the decision-making process within the government. They determine how or whether to implement certain laws and government policies, disputing where overall political authority lies and lacking agreed procedures for resolving such disputes. The actors may include tribes and powerful families, where ultimate power resides with tribal or family leaders, local lords surrounded by militiamen, or influential leaders of various fragmented military forces within the Iraqi state. This situation often creates problems for executing state plans and projects, particularly in rural and remote areas [35,36].

The fragmented nature and fragility of Iraqi society also affects its diplomacy and foreign policy, making them weak and ineffective at times. The sectarian nature of the government, in which power is shared, albeit unequally, among Shia, Kurds, and Sunni factions (there are many smaller factions within each of these groups), often works against a strong foreign policy and in favour of infiltration by foreign powers into Iraq's internal affairs. This frequently leads to a division of interests among the participating factions in the government and differing orientations in foreign policy [37].

Iraq's regional and international relations are also affected by the country's long history of war and conflict both within itself and with neighbouring countries. Iraq fought an eight-year-long war, from 1980 to 1988, against Iran, which led to the death, maiming, and injury of millions of people on both sides and great damage to its economic infrastructure. Iraq also defied the international community in 1990 when it invaded Kuwait and chose to remain defiant to major powers that requested Iraq withdraw. Iraq was heavily crippled by years of economic sanctions from 1991 to 2003, which reduced Iraq's foreign policy to negotiations over selling oil in return for food under the watch of the United Nations. Iraq could not easily recover after the fall of the Ba'ath regime under Saddam Hussein in 2003, especially as the Shias became the dominant force in Iraq, something the Sunni-majority Arab Gulf states, Jordan, and the new Syria did not desire [38,39].

The history of the region in cooperation and working together is generally gloomy. The Arab countries have had more relations with Western states than with each other and have engaged in more trade with the outside world than among themselves. There have been many political, economic, and humanitarian issues in the past and present where the Arabs could not reach a common agreement with practical outcomes. The latest political and humanitarian crises in Gaza are a clear example. Thus, Iraq's inability to cooperate with its neighbours on dust storms and other environmental problems is not entirely its fault. Nevertheless, it must act on these issues as much as it can [40].

Conclusion

Dust storms are increasing in almost all areas of Iraq, with a huge impact on the population's health and human activities. Iraq's dust storms usually occur as suspended dust in the air, which sometimes lasts for several days. Dust storms affect the middle and south of Iraq more than its north. They originate in Iraq, from its vast deserts and dried areas alongside the rivers and dried lakes and marshes, as well as the neighbouring countries to the west. Dust storms constitute a new existential threat to Iraq; therefore, Iraq must take urgent and appropriate action at both the national and regional levels. Yet, as a developing country, Iraq is impeded by many problems.

Some problems concern the government's agenda and its priorities. We pointed out that Iraq's efforts to combat dust storms do not match the scale of the problem. We identified the challenges to addressing dust storms at the national level and to cooperating at the regional level. The government's plan to grow trees along the eastern edges of the deserts and in the arid regions would probably not succeed if the security situation did not improve in those areas, if the clans, tribes, and families that control these areas did not fully cooperate with the government, if financial and administrative corruption did not end, if legal accountability for mismanagement, theft, and embezzlement were not upheld, and if the fragmentation of Iraqi society into many opposing sects, groups, and factions continued as it is now. Significant and sustained efforts by the Iraqi government must confront all this.

Dust storms can be mitigated, and their frequency and intensity will decrease if the situation at home is improved and if the challenges are addressed. Regional cooperation is another vital step to take. Iraq and its neighbours, particularly its western neighbours where some of Iraq's dust storms originate, all have a stake in tackling the growing threat of dust storms to their nations' populations and environments. Improvements at home can lead to greater influence abroad and more effective diplomacy and foreign policy. Collaborating with neighbours can occur alongside efforts at home to combat dust storms.

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