



# **JOURNAL FOR IRANIAN STUDIES**

## Specialized Studies

A Peer-Reviewed Biannual Periodical Journal

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Year 9, Issue 22, October 2025

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ISSUED BY



# LEGISLATIVE FRAMEWORKS AND ECOLOGICAL THREATS TO THE RED SEA

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## Abstract

The Red Sea's marine environment holds vital significance as a critical commercial corridor for global trade, linking the Mediterranean Sea to the Indian Ocean via the Suez Canal, with its stability directly impacting global economies. It holds a wealth of natural resources, such as natural gas and fish, and hosts a unique ecosystem with immense biodiversity, while also being a major global tourism destination. However, the Red Sea's marine environment faces significant challenges, including pollution from increased shipping traffic, urban and industrial expansion, climate change impacts, oil pollution and unsustainable tourism activities. These factors threaten coral reefs, biodiversity and food supply chains. Despite the existence of relevant international and regional legislation and policies, their effectiveness remains questionable due to varying state capacities for compliance and the need for enhanced coordination, monitoring and implementation mechanisms. This study analyzes the legislative framework for protecting the Red Sea's marine environment, identifying key challenges to compliance and exploring opportunities that effective implementation of these frameworks could offer for regional cooperation and achieving sustainable development goals. In doing so, it provides a critical analysis aimed at formulating practical insights to strengthen the protection and sustainability of the Red Sea's marine environment for future generations.

**Keywords:** Red Sea, environmental legislation, environmental, institutional and economic threats, organizational and institutional dilemma for the Red Sea's environment.

## **Introduction**

The Red Sea is one of the most significant and strategic marine environments worldwide as the waterbody spans the coastlines of eight countries — Saudi Arabia, Egypt, Sudan, Yemen, Jordan, Palestine, Djibouti and Eritrea. Parallel to its ecological value, particularly its coral reefs, which rank among the most climate-resilient globally, the Red Sea serves as a vital economic artery for the region. However, in recent decades, it has come under increasing environmental pressure, including pollution from surging maritime traffic, plastic waste, industrial discharge and unsustainable economic activities such as overfishing and unregulated coastal development. Other exacerbating factors include climate change through rising sea temperatures, elevated sea levels and the growing phenomenon of ocean acidification. Nation states are unable to address these threats independently, given their scale and complexity, underscoring the urgent need for unified regional cooperation and harmonized environmental legislation and policy frameworks. Along with these challenges, concerns persist with regard to the effectiveness of regional legislative frameworks largely due to disparities in national capacities and the need for enhanced coordination, monitoring and enforcement mechanisms.

This study addresses these concerns by examining the current threats, evaluating existing international and regional policies and legislation, and assessing the effectiveness and potential evolution of legal frameworks to mitigate environmental risks in the Red Sea.

## **Definition of Terms**

Addressing environmental policy in the Red Sea requires a clear understanding of several foundational concepts:

### **Coastal Environment**

This refers to land areas adjacent to seas or oceans that are significantly influenced by maritime conditions, including climate, livelihoods and cultural practices. Coastal environments vary in area and form due to tides, river mouths, bays and shallow waters, and are affected by waves, climate change, pollution and air currents. The ecological sensitivity necessitates protective measures to preserve biodiversity and environmental sustainability.

### **Marine Environment**

This encompasses all saline water — seas and oceans — and their ecosystems and living organisms. Covering roughly 70% of the Earth's surface, marine environments are essential for ecological balance, food security, natural resources and climate regulation. However, they face mounting threats from pollution and human activities, hence, demanding concerted conservation efforts.

### **Regional Environmental Protection**

This denotes collective actions, policies and agreements adopted by coastal states to safeguard shared ecosystems.<sup>(1)</sup>

### **Environmental Legislation and Policy**

This includes national laws and international or regional agreements that regulate human activities and mitigate their negative impacts on marine environments.

### **Legal Framework for Marine Environmental Protection**

This framework comprises international agreements and national legislation, notably the United Nations Convention on the Law of the Sea (UNCLOS), which obligates states to protect marine environments. It also includes initiatives under the United Nations Environment Programme (UNEP) such as the Barcelona Convention for the Mediterranean and the Jeddah Convention for the Red Sea and Gulf of Aden. National laws further regulate maritime navigation, industrial activities and marine resource extraction to prevent pollution and ecological degradation.

The global framework for marine environmental protection is based on the policies and regulations of three key entities:

#### ***The United Nations Environment Program (UNEP)***

It promotes marine conservation through regional seas programs and agreements such as the Mediterranean Action Plan, which implements the Barcelona Convention.

#### ***Intergovernmental Oceanographic Commission (IOC)***

A UNESCO body that fosters international cooperation in ocean science to enhance understanding and sustainable management of marine environments. It coordinates programs in ocean monitoring, tsunami early warning and supports initiatives like the UN Decade of Ocean Science for Sustainable Development (2021-2030).

#### ***International Maritime Organization (IMO)***

A UN agency responsible for developing international maritime law and regulating marine transportation to ensure sustainability, reduce pollution and assess national compliance with relevant legal frameworks.<sup>(2)</sup>

### **Environmental Threats to the Red Sea**

Until recently, the Red Sea and Gulf of Aden region remained relatively unaffected by the environmental changes observed in other parts of the world. However, rapid development — particularly in the industrial and tourism sectors along with the growing oil production and transportation sectors — has triggered a wave of coastal expansion that poses serious risks to natural ecosystems. These pressures have been

further exacerbated by political instability and regional conflicts, which have had a direct and detrimental impact on the marine environment.

The most prominent threats and challenges can be outlined as follows:

### **Environmental Challenges**

The Red Sea's strategic location as a global shipping corridor has led to a significant increase in maritime traffic. This surge contributes to oil spills, which represent one of the most serious threats — especially in critical areas such as the Bab al-Mandab Strait and near the ports of Jeddah and Port Sudan. The gravity of this risk is heightened by escalating regional conflicts and political instability, which draw on the marine ecosystem. Among the most concerning developments are incidents involving the targeting and sinking of oil tankers, resulting in large-scale contamination of Red Sea waters. A notable example occurred when the Houthis attacked commercial ships transiting the Red Sea as part of their maritime campaign in support of Gaza during the Israeli military offensive.<sup>(3)</sup>

Another major threat to the Red Sea is plastic pollution. Plastic waste significantly contributes to the degradation of marine ecosystems. Some studies estimate that over 60% of the waste collected along the Red Sea's shores is plastic. In fact, the figure may be even higher: a 2019 BBC report indicated that up to 90% of the waste in the Red Sea consists of plastic, with plastic fragments found in the stomachs of many fish species. Nevertheless, the Red Sea remains one of the cleanest seas in the world, with relatively low concentrations of floating plastic compared to other oceans.

Industrial and agricultural wastewater also pose serious risks. These discharges introduce nutrient pollutants and heavy metals into the marine environment, threatening the health of coral reefs and accelerating eutrophication. Agricultural runoff is particularly high due to the widespread use of flood irrigation, although some of it is reclaimed for treatment and reuse. Industrial wastewater, while comparatively smaller in volume, is often treated on-site or discharged into public drainage systems. However, it remains the primary source of wastewater and presents a significant environmental hazard due to its high content of organic matter and chemical residues.

Climate change constitutes another critical threat, manifesting in several forms. The first is the rise in sea surface temperatures, which contributes to coral bleaching and the degradation of mangrove forests — both of which are vital to the Red Sea's unique biodiversity. This biodiversity underpins the region's ecotourism industry, a key source of income for coastal countries such as Egypt and Saudi Arabia. The second manifestation is rising sea levels, which threatens densely populated coastal cities like Jeddah, Port Sudan and Aden. It also poses risks to tourism and urban development projects along the Red Sea coast, especially in the absence of proper environmental impact assessments. The third concern is the increasing acidification of ocean waters, which weakens the ability of

marine organisms to form calcium-based structures and disrupts the formation of marine food chains.<sup>(4)</sup>

Finally, there is a notable absence of an effective mechanism for environmental data exchange and monitoring. This is largely due to the lack of an integrated marine monitoring network encompassing all Red Sea countries, as well as the weakness of early warning systems for pollution incidents and natural marine disasters. Additionally, enforcement and regulatory mechanisms remain limited in some countries due to institutional and political challenges.

### **Economic Challenges**

Economic challenges have accumulated, posing an increasing threat to the Red Sea's marine environment. The first issue is the rise of unsustainable tourism activities. Coastal expansion — through resorts, ports and recreational diving — has placed significant pressure on sensitive biodiversity habitats, strained coastal resources and led to increased waste generation. The second factor relates to the acceleration of oil and gas activities. The expansion of petroleum exploration and the growth of maritime transport have heightened the risks of marine pollution and oil spills, with any such incident carrying significant economic costs. The third challenge involves the underutilization of renewable marine resources. For example, the abandonment of ecotourism and sustainable fisheries in favor of potentially polluting activities reflects a missed opportunity for environmentally friendly economic development. The fourth issue concerns the high cost of protecting the marine environment. Implementing clean technologies or marine waste management plans is often viewed as a short-term economic burden due to its financial demands. Finally, there is the unsustainable management of economic activities. Overfishing continues to deplete fish stocks, disrupt ecological balance and weaken marine food chains.<sup>(5)</sup>

### **Institutional Challenges**

At the forefront of these challenges is the multiplicity of authorities responsible for protecting the Red Sea's environment. Within each national government, several ministries and agencies — such as those for tourism, environment, transport, petroleum and fisheries — share overlapping mandates. This often leads to jurisdictional conflicts, especially in the absence of strong regional coordination mechanisms. The problem is further complicated by differing national priorities: while some countries emphasize economic development (ports, oil and tourism), others focus more on environmental protection.

This is also linked to weak technical and human capacities. There is a notable shortage of trained personnel in environmental monitoring, marine surveillance and protected area management. There is also a gap in engaging the private sector and civil society — most current policies lack genuine partnerships with the private sector in funding or implementing sustainability projects. Additionally, some countries suffer from limited participation of civil society and local re-

searchers, which reduces the effectiveness of public oversight and pressure on decision-makers. Most importantly, there is a lack of sustainable funding and over-reliance on externally funded projects rather than national resources, given the limited budgets allocated to the environmental sector in the region's countries. The scarcity of funding and disparities in economic capacities among some countries — showing less willingness to invest in pollution control technologies or monitoring — lead to the absence of sustainability in funded activities and programs.

### **Geopolitical Challenges**

The competition among neighboring regional ports poses a major challenge to those located along the Red Sea. These ports are located in areas of high strategic and geopolitical value, attracting the attention of both regional and international powers seeking to safeguard their economic and military interests. This dynamic has had a direct impact on the security of the region. The influx of investments from various powers along with revenues from leasing military bases have supported the economies of some Red Sea Basin countries already burdened by poverty and economic hardship.

Moreover, the intensity of this competition — coupled with conflicting interests among these powers — has exposed the region to proxy conflicts, which significantly undermine regional stability.

Additionally, ongoing regional and border disputes further complicate the situation. The Red Sea is a geopolitically sensitive area, and any political tension can weaken environmental cooperation and hinder the implementation of international agreements. Despite formal accession and signing of such agreements, actual commitment and enforcement vary across countries due to these conflicts, which cast a shadow over the entire region. Political and economic instability in some coastal countries also obstructs the development of coordinated and effective environmental policies.<sup>(6)</sup>

### **Legislation and Policies Regarding the Red Sea**

Global attention to marine environments began with the London Conference held in 1954 whose most significant outcome was the development of the International Convention for the Prevention of Pollution of the Sea by Oil. As the first international agreement aimed at combating oil pollution in marine waters it had a major influence on the legislation of many countries, prompting most to incorporate provisions into their domestic laws prohibiting the discharge of oil from ships into their territorial waters. In 1972, the United Nations Conference on the Human Environment was held in Stockholm. It was the first global conference dedicated to environmental issues where discussions focused on establishing laws and principles to protect the environment from human harm. One of the key outcomes of this conference was the decision to establish the UNEP. Since then, environmental issues have become an integral part of the international

agenda and the need for legislation to keep pace with the evolving nature of environmental challenges has grown. These legislative efforts aim to address the previously mentioned goals and challenges.

Another milestone was the 1973 London Conference, which resulted in the International Convention for the Prevention of Pollution from Ships (MARPOL). This marked a significant step toward addressing all sources of ship-related pollution. The convention included specific provisions regarding the construction of oil tankers, requiring designs that help reduce pollution — such as the use of segregated ballast tanks (SBTs). These tanks serve as counterweights to maintain the ship's stability and are designated for holding water during return voyages when the tanker is empty.

The most important international frameworks can be summarized as follows:

### **The UNCLOS**

The United Nations Convention on the Law of the Sea (UNCLOS) is considered the cornerstone of international maritime law. It obligates signatory states to protect marine environments, particularly in areas beyond national jurisdiction such as the high seas and the deep seabed. Adopted in 1982 and entered into force in 1994, the convention is often referred to as the “Constitution of the Oceans,” serving as the global legal framework governing all activities in oceans and seas. The UNCLOS defines the rights and responsibilities of coastal countries in the exploitation of marine resources and environmental protection and provides the foundational principles that guide Red Sea countries in safeguarding their marine ecosystems.

The convention plays several roles, including:

- **Delimitation of maritime zones:** The UNCLOS defines and clarifies the rights and obligations of states within various maritime zones — such as territorial seas and exclusive economic zones — granting them the sovereignty and jurisdiction necessary to manage maritime resources and protect their environments.

- **Environmental protection obligations:** Signatory states are bound by a general obligation to protect the marine environment and to enact legislation aimed at preventing pollution from various sources, including ships and land-based activities.

- **Promotion of regional cooperation:** The convention encourages states to collaborate on protecting shared marine environment, which is vital for semi-enclosed seas such as the Red Sea.<sup>(7)</sup>

### **The MARPOL**

International Convention for the Prevention of Pollution from Ships (MARPOL) is one of the most important international treaties for protecting marine environments from pollution caused by ships — oil, chemicals, sewage, solid waste and air emissions. Adopted in 1973 and later amended through the



MARPOL 78 Protocol, which merged the original convention with its protocol, the combined agreement entered into force in 1983.

Under the MARPOL Convention, the Red Sea is designated as a “Special Area” according to its annexes, particularly Annex 1 which addresses the prevention of oil pollution. This designation imposes strict regulations on the discharge of pollutants in the region due to its environmental sensitivity and unique biodiversity. For example, the discharge of oil waste or harmful liquid substances is prohibited within 12 nautical miles of the nearest land. Ships operating in the Red Sea are required to use waste treatment technologies and comply with inspection standards and environmental certification requirements.

The convention holds particular importance for the Red Sea and the Gulf of Aden for several reasons:

■ **Geographical and economic significance of the Red Sea:** The Red Sea holds global strategic importance as it encompasses two of the world’s most critical maritime chokepoints: the Suez Canal and the Bab al-Mandab Strait. These passages are vital for international trade, facilitating the transit of thousands of ships annually — particularly oil and gas tankers. This high volume of traffic significantly increases the risk of oil pollution and marine spills. Therefore, the implementation of the MARPOL Convention standards in the region is essential to minimizing the likelihood of environmental disasters.

■ **Protection of unique ecosystems:** The Red Sea is rich in coral reefs, seagrass beds and mangroves — ecosystems that are highly sensitive to oil and chemical pollution. As such, the MARPOL provisions concerning the discharge of ballast water, oily waste and garbage from ships play a vital role in preserving the region’s unique biodiversity.

The MARPOL Convention seeks to establish binding international standards and mechanisms to prevent marine pollution from ships. Its significance for the Red Sea region lies in its role as the first line of defense against pollution resulting from heavy maritime traffic. This helps ensure the sustainability of the marine environment and protects the economic interests of coastal countries. Accordingly, strengthening regional cooperation under MARPOL can lead to:

■ **Enhanced monitoring of foreign vessels.**

■ **Reduction of pollution incidents and economic costs:** Implementing MARPOL protocols lowers the risk of major pollution incidents that could harm coastal tourism or fisheries. Avoiding environmental disasters also helps minimize economic losses.

■ **Strengthening national and regional capacities:** The accession of Red Sea countries — Egypt, Saudi Arabia, Yemen, Sudan, Djibouti and Eritrea — to the MARPOL Convention encourages the development of port facilities for ship waste reception. This contributes to improving the efficiency of regional ports and aligning them with global standards.<sup>(8)</sup>

### **The Basel Convention**

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes (1989) focuses on regulating and controlling the conditions for transboundary movements and disposal of hazardous wastes. It complements other key environmental treaties, including the Stockholm Convention (2001) on Persistent Organic Pollutants and the Rotterdam Convention (1998) on the trade of chemicals and pesticides. The importance of the Basel Convention for the Red Sea lies in its role in preventing the transfer of hazardous waste into the region and ensuring its safe disposal. This helps protect human health and maintain the integrity of the marine ecosystem. As a global agreement, the Basel Convention supports regional marine environment protection efforts through its regional centers and by promoting cooperation among coastal states in managing cross-border waste.

The convention contributes to protecting the Red Sea environment through:

- **Hazardous waste reduction:** Member states must minimize transboundary movements of hazardous waste and ensure that any such transfers occur safely, protecting both human health and the marine environment.

- **Safe disposal framework:** The convention provides a legal structure to guarantee the proper disposal of hazardous and other wastes, reducing the likelihood of their entry into Red Sea waters.

- **Human Health and ecosystem safeguarding:** This is done through shielding the marine environment from the harmful effects of hazardous waste, thus supporting long-term ecological sustainability and public health.

- **Regional cooperation enhancement:** The Basel Convention reinforces regional initiatives — such as the Jeddah Convention — by establishing centers for technology transfer and knowledge-sharing in hazardous waste management, enabling coordinated action among coastal states to protect the Red Sea.

- **Effective implementation mechanism:** As operational platforms for enforcing the convention, Basel's regional centers strengthen stronger compliance and awareness of its significance and facilitate support in affected areas, including Red Sea countries.<sup>(9)</sup>

### **Regional Legislation and Frameworks on the Red Sea**

A review of regional legislation governing the marine environments of the Red Sea and Gulf of Aden reveals that it centers on the Jeddah Convention of 1982. This convention paved the way for the establishment of the Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA) in 1995 — the executive arm responsible for implementing and monitoring the activities and programs under the convention's framework.

The organization is mandated to carry out a range of tasks, including:

- **Coordinating regional efforts to develop strategies and protocols for marine environmental protection and oversee the implementation of the 1982 Jeddah agreement and its associated protocols.**

■ Conducting marine environmental monitoring, promoting biodiversity and raising environmental awareness by enhancing national capacities through training, workforce development and technical expertise.

■ Organizing training programs as well as preparing and executing environmental regional action plans aimed at confronting shared environmental challenges.

■ Collecting environmental data and developing systems for monitoring, while encouraging public participation in marine resources protection.

■ Advancing regional initiatives focused on biodiversity conservation, fisheries management, coral reef protection and marine pollution control.

■ Enhancing international cooperation through connecting the region to global initiatives and programs related to oceans and marine environments.

■ Encouraging scholarly papers to support maritime decision-making in member states.

As the Red Sea region faces shared transboundary threats such as marine pollution, depletion of marine resources and overfishing, the Arab League Educational, Cultural and Scientific Organization (ALECSO) initiated the Programme for the Environment of the Red Sea and Gulf of Aden (PERSGA) in 1974 in collaboration with the UNEP as part of the Regional Seas Programme. To support this initiative with a legal framework, the Regional Jeddah Conference of Commissioners for the Protection of the Marine Environment and Coastal Areas of the Red Sea and Gulf of Aden was held from February 13-February 15, 1982 in Jeddah. The conference led to the signing of the Jeddah Convention of 1982 with key objectives. These included protecting the regional marine and coastal environment, preventing and combating all forms of pollution, preserving ecosystems such as coral reefs, mangroves, and seagrass beds, coordinating emergency response among member states and promoting scientific and technical cooperation and information exchange.

The conference also issued the “Action Plan for the Conservation of the Marine Environment and Coastal Areas of the Red Sea and Gulf of Aden.” Like other international and regional agreements, the Jeddah Convention is legally binding for member states, but it does not contain specific procedures or standards for individual issues. Therefore, the mechanism for developing and adopting accompanying protocols allows countries to agree on targeted measures for specific environmental concerns.

The convention, its protocol and the action plan entered into force in August 1985. The contracting parties to the Jeddah Convention are Jordan, Djibouti, Saudi Arabia, Sudan, Somalia, Egypt and Yemen.

In accordance with Article III of the Jeddah Convention, the PERSGA was established under the Cairo Declaration to oversee the implementation of the convention and its protocols. The PERSGA has developed several complementary protocols, each addressing a specific area of the convention:

- Protocol concerning regional cooperation to combat oil and other harmful substance pollution in emergency cases.

- Protocol for the protection of the environment from land-based activities. This includes industrial and domestic wastewater.

- Protocol on the conservation of biological diversity and the establishment of a network of protected areas. This is to preserve biodiversity and safeguard marine ecosystems.

With the increase in maritime traffic and offshore oil extraction, the need arose for a specialized center capable of coordinating rapid responses to pollution incidents and providing equipment and technical expertise to affected countries. As a result, the Emergency Marine Center (EMERSGA) was established in Hurghada, Egypt, in 2006 with support from the IMO and the Global Environment Facility (GEF). In parallel with these efforts, memoranda of understanding were signed with relevant regional and international organizations, including the ALECSO, the Regional Organization for the Protection of the Marine Environment (ROPME), the Islamic Educational, Scientific and Cultural Organization (ICESCO), the UNEP, the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities and the IMO. In addition, a Regional Action Plan for Marine Emergency Preparedness was developed in cooperation with the IMO and adopted by PERSGA member states.<sup>(10)</sup>

## **Legislative and Regulatory Challenges in the Red Sea**

### **The Challenge of Harmonizing International and Regional Legislation**

International and regional agreements serve as primary sources from which national legislators derive legal principles. At the same time, they represent some of the most effective tools for establishing the foundations of national environmental laws. The agreements ratified by countries in the region provide a framework for standardizing methods of assessment, risk analysis and evaluation of threats to various components of the ecosystem. These agreements have clearly influenced the environmental laws and regulations of the region. It is well established that, despite their international or regional nature, the general legal principles contained in such agreements become part of a country's domestic law once the agreement is ratified and published in its official newspapers. At that point, these principles become legally binding and are applied in the same way as other national legal provisions. In fact, they complement domestic laws related to the subject matter of the agreement. In cases of conflict between the provisions of the agreement and national law, the agreement takes precedence.

However, in practice, the effective implementation of these agreements often requires the enactment of national laws and regulations that operationalize their provisions — particularly in the case of framework agreements. It is important to clarify that the provisions of an agreement do not carry legal weight unless

they are formally enacted and enforced. This requirement can delay or hinder the agreement's ability to achieve its intended objectives.<sup>(11)</sup>

### **The Challenge of Regional Cooperation**

Given the abovementioned multifaceted environmental challenges and the geographical characteristics of the Red Sea — as a semi-enclosed body of water — the waterbody is particularly vulnerable to pollution and its accumulation, especially due to limited water exchange with the open oceans. These challenges are beyond the capacity of any single country to address alone, making it imperative to take effective collective steps to protect the Red Sea's environment. The existence of legal texts and international commitments does not, in itself, guarantee the protection of the marine environment unless these texts are translated into practical measures supported by robust institutional and regulatory capacities. Global experience shows that even the most precise and stringent laws remain insufficient without institutions capable of enforcement and mechanisms for monitoring and oversight that ensure actual compliance on the ground.

In this context, there is a noticeable regional shortfall in effective cooperation and coordination. For example, there is no regional environmental data bank to facilitate the exchange of expertise and information. Such a platform would help consolidate scattered environmental data from various countries and research institutions into a unified system, making it more accessible and preventing duplication of efforts aimed at supporting decision-making. Moreover, the availability of accurate and up-to-date data plays a critical role in helping policymakers adopt evidence-based decisions regarding the management and protection of marine resources and the monitoring of environmental changes. By tracking long-term environmental indicators — such as water quality, coral reef health, marine biodiversity, and pollutant levels — and promoting scientific research, researchers and academics gain access to reliable, ready-to-use data. This facilitates environmental studies and enhances the quality of published research on the Red Sea.<sup>(12)</sup>

### **Institutional Gaps and Lack of Enforcement Mechanisms**

Despite the vital role played by the PERSGA — particularly in conducting studies, training personnel and coordinating among member states — it lacks strong executive powers or binding authority to compel countries to take strict measures. This is compounded by the absence of a specialized regional arbitration mechanism for environmental disputes, which limits the effectiveness of law enforcement. Therefore, there is a pressing need to strengthen the institutional role of the PERSGA to encompass aspects of maritime security and legal enforcement.

Moreover, the organization lacks subsidiary mechanisms for regional coordination similar to those used in the Mediterranean under the Barcelona Conven-

tion. That framework operates through specialized regional centers distributed across Mediterranean countries, each responsible for managing and implementing activities in a specific environmental domain. Establishing similar mechanisms in the Red Sea would help ensure balanced implementation of the Jeddah Convention.<sup>(13)</sup>

### **Weak Early Warning Systems and Slow Legislative Updates**

Environmental risk monitoring in the Red Sea remains below the required level, with several areas still lacking legislative coverage. There is no comprehensive marine environmental code that addresses all components of the integrated ecosystem and its threats. This calls for continuous legislative review in light of emerging environmental developments such as the blue economy, blue carbon, plastic pollution, underwater noise and fisheries management. Additionally, it is essential to enhance joint maritime surveillance capabilities among regional states through mechanisms such as patrols, early warning systems and information exchange. Advanced technologies should be leveraged, as the legal framework provides an opportunity for countries to collaborate in using modern tools like satellites and drones to monitor illegal activities and detect water pollution — strengthening enforcement capacity.<sup>(14)</sup>

### **Absence of Accountability Mechanisms**

There are no deterrent tools or regional environmental courts to uphold the principles of responsibility and accountability. No compensation is required from those who cause environmental harm. It is therefore crucial to establish environmental compensation principles in line with the “polluter pays” doctrine. Countries that have not yet established environmental courts or prosecution units should be encouraged to do so, as these specialized bodies would alleviate many of the challenges litigants face in ordinary courts. The formation of such courts would naturally involve environmental experts, ensuring scientifically sound understanding of environmental disputes and more accurate rulings. Likewise, environmental prosecution units staffed with specialists would be better equipped to apply environmental principles during investigation, enforcement and damage assessment — leading to fairer compensation in environmental violations.<sup>(15)</sup>

In addition to the lack of accountability, there are also no incentives. While penalties are a necessary component of legal enforcement, introducing rewards and incentives can help establish complementary social values that encourage compliance. Regional states should give this issue greater attention and incorporate it into environmental legislation — embedding principles of incentives and rewards for environmentally compliant behavior as a balanced counterpart to punitive measures and as a pathway to more effective enforcement.<sup>(16)</sup>

In sum, addressing environmental threats in the Red Sea suffers from gaps in effective cooperation — particularly in legislative and regulatory domains.



There is an urgent need to translate regional cooperation principles into actionable plans for pollution control and biodiversity protection. Coral reefs, in particular, represent one of the most inspiring success stories in the Red Sea. In May 2025, the entire Red Sea coral reef area was declared a protected natural reserve, marking a major step toward sustainable development. This designation enables countries to advance their blue economies — such as sustainable tourism and fisheries — within their exclusive economic zones, striking a balance between development and environmental protection.<sup>(17)</sup>

## Conclusion

The mere existence of national legislation and international or regional agreements concerning the protection of the marine environment in the Red Sea is clearly not sufficient to achieve the desired level of protection. The effectiveness of this legal framework remains contingent upon the presence of strong regulatory institutions and strict enforcement mechanisms that ensure actual implementation. Institutional and administrative shortcomings often lead to the paralysis of legal provisions, rendering them incapable of addressing the rapidly evolving environmental challenges driven by human pressures, economic activities and escalating climate threats. Thus, the absence of effective institutional and regulatory capacities constitutes a fundamental gap that weakens the ability to safeguard the marine ecosystem in this vital region.

Accordingly, any serious approach to protecting the marine environment in the Red Sea must begin with a comprehensive review and modernization of existing legislation to align with scientific and environmental developments. It must also incorporate robust enforcement and oversight mechanisms that reflect the nature of emerging challenges. This effort requires strengthening national and regional institutional structures and equipping them with the human, financial, and technological resources necessary to perform their roles efficiently. In addition, long-term strategic plans should be devised based on principles of transparency, accountability and public participation.

Regional coordination among Red Sea coastal states is essential for addressing shared risks, especially given the transboundary nature of marine pollutants and activities that impact ecosystems. Involving the private sector and civil society in protection efforts enhances implementation effectiveness and fosters a sense of collective responsibility toward marine resources. Furthermore, integrating modern technologies in monitoring, tracking, and analysis provides a solid scientific foundation to support decision-makers and improves response mechanisms to environmental crises.

Finally, legislation and agreements are a necessity but insufficient condition for marine protection. Their effectiveness depends on being supported by capable institutional and regulatory systems, along with practical policies that can adapt to environmental developments. Therefore, protecting the marine environment in the Red Sea ultimately hinges on serious political will, regular legislative review and the activation of strict mechanisms that ensure real-world enforcement — guaranteeing the sustainability of this vital resource for present and future generations.

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