

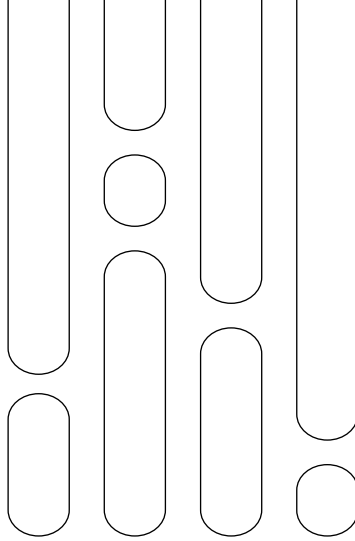
Report

THE ENVIRONMENTAL DISASTER WROUGHT BY THE SINKING OF MV RUBYMAR IN THE RED SEA

March 14, 2024



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The [tragic shipwreck of the vessel MV Rubymar](#) on March 2, 2024, at the southern entrance to the Red Sea has drawn significant global attention, particularly from those concerned with marine conservation. This incident represents a major maritime disaster with far-reaching implications for water pollution and the marine ecosystem. The pollution resulting from the wreckage has the potential to disrupt marine ecosystems, leading to imbalances in biodiversity and environmental stability. Moreover, it poses a serious threat to local economies, particularly in the fishing and tourism sectors, resulting in substantial economic losses. In response to this crisis, there is an urgent need for enhanced regional and international cooperation to address the immediate and long-term impacts of the disaster. Preserving the marine resources of the world requires collective action and a sense of societal responsibility as the consequences of this incident extend beyond the borders of the Red Sea and affect countries worldwide. Pollution knows no boundaries, underscoring the importance of collaborative efforts to mitigate its effects and safeguard marine ecosystems for future generations.

Marine disasters represent some of the most devastating natural events due to their wide-ranging impact on the marine environment. The consequences extend across various domains, including water and beach pollution, which directly affects marine organisms and seabirds that rely on the marine ecosystem for sustenance. These pollutants can harm organisms' mucous membranes and lead to poisoning, posing a significant threat to marine life. Furthermore, marine disasters disrupt ecosystems by altering their composition and functioning. Pollution resulting from such incidents can disturb the biological and environmental balance in seas and oceans, further exacerbating the ecological damage. Additionally, the economic ramifications are profound, with the fishing and tourism sectors in coastal areas bearing the brunt of the impact. These sectors experience significant losses, further exacerbating the socioeconomic consequences of the disaster. Despite the existence of frameworks and mechanisms aimed at addressing marine disasters, current efforts remain insufficient. The Red Sea is particularly vulnerable to such environmental catastrophes, with the severity of the situation escalating with each passing day. Understanding the dimensions and repercussions of this environmental disaster is crucial for

implementing effective mitigation strategies and safeguarding marine ecosystems and coastal communities.

A Sketch of the Incident

On March 2, 2024, the internationally recognized Yemeni government reported the sinking of the British vessel MV Rubymar due to Houthi attacks amid their campaign in response to the Israel-Hamas conflict in Gaza. The ship was struck by missiles in the Red Sea near Yemen's Hanish Island, approximately 25 nautical miles off Mokha's coast. This event exemplifies a series of maritime crises [encompassing political, economic and security implications](#), alongside environmental concerns, amid warnings of an unprecedented catastrophe. The vessel was carrying over 41,000 tons of high-risk IMDG 5.1 fertilizer, along with oil and fuel, when it came under Houthi missile attacks on February 18, resulting in significant damage. Additionally, on February 29, the vessel faced another assault, resulting in its complete sinking and the leakage of an estimated 18 miles through the waterway. There are concerns about further leakage of cargo or fuel due to the ship's age, having been manufactured in 1997.

As per the specialized shipping [website](#) Marine Traffic, MV Rubymar, a bulk carrier registered in the UK and flying the flag of Belize, was targeted by the Houthis. The vessel, measuring 171.6 meters long and 27 meters wide, was carrying 21,000 metric tons of ammonium phosphate sulphate fertilizer along with a shipment of fuel at the time of the attack.

Environmental and Economic Consequences of the Incident

Water Pollution

While the environmental [website](#) Green Garageblog highlights the concerns over chemical fertilizers like ammonium sulfate, citing their petroleum-derived nature and associated risks of leaching into local water sources, statements from the Djibouti Ports and Free Zones Authority shed light on the extreme danger posed by the cargo aboard the Rubymar. Environmental expert Abdul Qadir Al-Kharaz, former head of the Yemeni Public Authority for Environmental Protection, emphasized the hazardous nature of the cargo, consisting of 20,000 tons of ammonium phosphate sulfate, an artificial fertilizer. Kharaz warned of the severe environmental repercussions should

these fertilizers dissolve and contaminate the water, impacting its properties and leading to pollution. Concerns were also raised about the remaining undeclared cargo, totaling approximately 20,000 tons, with ambiguity regarding its contents beyond the mention of diesel and fuel oil, which is estimated not to exceed 1,500 cubic meters.

The potential danger of cargo leakage from the sunk ship is heightened by the distinct sea currents of the Red Sea. Characterized by circular water patterns akin to a vast lake, the Red Sea's currents typically flow northward toward the Suez Canal in Egypt during the winter and southward toward the Gulf of Aden in the summer. This circulation suggests that any material deposited or submerged in the Red Sea will remain within its boundaries for an extended duration before currents can carry it beyond the sea's confines.

Concerning [the hazardous fertilizers aboard the vessel](#), should they remain submerged underwater, their impact would likely manifest gradually rather than in a sudden release on a large scale. These substances are anticipated to dissolve into the water column over time, resulting in a significant alteration of its composition. Therefore, this could lead to water pollution and render it unsuitable for sustaining marine life.

Impact on Marine Life

Marine oil pollution poses a significant threat to the marine environment, characterized by the formation of oil films on the water's surface upon leakage. This detrimental phenomenon adversely impacts both plant and animal marine life, often resulting in mass casualties. Moreover, it contributes to the proliferation of abnormal algal blooms. The excess nutrients introduced into the water can fuel the rapid growth of algae, depleting oxygen levels to the extent that marine organisms struggle to survive. As a consequence, biodiversity in the affected area suffers, posing a grave concern for one of the world's most biodiverse regions.

The impact of fertilizer pollution hinges on various factors, including water currents and the manner in which the fertilizer is discharged from the stricken vessel. Fertilizer serves as nutrients for algae, whose proliferation depletes oxygen levels, suffocating marine life and creating "dead zones." Moreover, this type of pollution poses a significant threat to the world's most diverse and extensive coral reefs.

Experts in marine life emphasize a concerning aspect: while some organisms may not succumb immediately to chemical exposure, these substances accumulate within their bodies, particularly in molluscs. Upon consumption, these organisms pass on the toxins, potentially leading to severe diseases in the near future.

Considering the Red Sea's significance as a crucial seafood source for its bordering nations, particularly Yemen where fishing was the second largest export before the ongoing conflict since 2015, the ramifications of this disaster extend beyond environmental concerns. With its unparalleled biological diversity and rare coral reefs, the Red Sea is exceptionally resilient to various forms of pollution. However, an incident like this poses severe economic and social consequences for the fishing community, which constitutes a substantial proportion of the coastal population, especially in Yemen. The repercussions will affect a great number of fishermen, impacting their livelihoods and the region's socioeconomic fabric.

Coral Reef Bleaching

The impact of fertilizer pollution on coral reefs cannot be understated, as it results in elevated nitrogen levels that heighten the vulnerability of these delicate ecosystems to damage. Consequently, the ramifications of the recent incident extend beyond the immediate loss within our regional environment to affect other ecosystems as well. The coral reefs in the Red Sea serve as repositories of invaluable knowledge crucial to the preservation of coral reefs globally. Failure to address the repercussions of this incident may result in missed opportunities to rectify imbalances in other regions. Specifically, the Red Sea's coral reefs hold the potential to facilitate the rehabilitation of less resilient species in areas like the Great Barrier Reef, offering a lifeline for coral reef conservation efforts worldwide. While coral reefs occupy [a mere 0.1% of the world's oceans](#), they are home to an astonishing 30% of marine biodiversity. In the Red Sea, these reefs serve as critical habitats for endangered species like hawksbill turtles and play a pivotal role in sustaining the fishing industry, marine agriculture, and tourism. Notably, countries bordering the Red Sea, such as the Arab Republic of Egypt, derive substantial national income from these sectors, with plans underway to designate approximately 800 square kilometers of coral reef areas as nature reserves. Ranked eighth globally in terms of coral reef area, the Kingdom of Saudi

Arabia boasts 6% of the world's coral reef expanse, with its Red Sea coastline hosting some of the most concentrated and pristine coral reef habitats on the planet.

In terms of the economic impact of losing coral reefs, particularly in relation to diving tourism in the Red Sea, one can envisage significant losses when examining data from the World Tourism Organization. [According to statistics](#), in 2019, before the onset of the COVID-19 pandemic, the global number of tourists reached approximately 1.5 billion, with 80% of them opting for coastal destinations worldwide. Among these tourists, beach activities and diving were particularly popular, with European diving enthusiasts comprising around 39% of the global diving population.

Threatening Fish Species in the Red Sea

Despite the annual decline in total fish production from the Red Sea, averaging about 2% annually from 2017 to 2022, the region remains crucial for providing animal protein, ensuring food security, and generating foreign currency through luxury fish exports to neighboring countries. This decline in fish production is attributed to various issues, with marine pollution being a primary concern. Oil spills and chemical leaks from ships contribute significantly to this pollution. These pollutants accumulate in marine organisms like fish, shells, crustaceans and shrimp, eventually entering the human food chain. The long-term effects of these compounds may not manifest until years later. Moreover, marine pollution leads to the death of fish eggs and larvae, particularly those inhabiting surface waters or upper layers of the sea. The Yemeni government has [warned](#) that towing the ship to shallow waters along the Yemeni coast would exacerbate the situation. This action risks releasing destructive oils into the marine environment and contaminating food sources for fish, particularly in coral reefs. Such pollution threatens the food security of citizens in the region, particularly Yemeni fishermen.

Impact on Water Desalination Plants

According to the [Saudi Press Agency](#), the Kingdom of Saudi Arabia holds a prominent position in global desalinated water production, contributing over 1.6 billion cubic meters annually, which represents approximately 18% of the world's total output. The Saline Water Conversion Corporation of Saudi Arabia remains the largest producer

of desalinated water globally. Their annual production stands at 1,006.6 million cubic meters, with 495.3 million cubic meters originating from plants along the east coast, and 511.3 million cubic meters from the west coast. This production accounts for nearly half of the corporation's total exports. In terms of energy, the 27 operational desalination plants collectively generate 24,884,807 megawatt-hours. However, an Associated Press [report](#) suggests that the sinking of MV Rubymar poses risks to the Red Sea's unique circular water patterns. Saudi Arabia's extensive network of desalination plants, boasting over 41 facilities, including approximately 25 along the Red Sea coast, may face severe damage due to this incident.

The potential negative repercussions resulting from the MV Rubymar shipwreck extend far beyond the borders of the Red Sea and the countries immediately affected. While the nations bordering the Red Sea will bear the brunt of the consequences, the interconnected nature of marine environments means that impacts will be felt across wider regions. The Red Sea is not isolated but connected to other vital marine ecosystems, including the Arabian Sea and the Indian Ocean. Moreover, it serves as a crucial gateway to the Suez Canal, a pivotal artery of global trade. Therefore, any environmental damage or disruption in the Red Sea could have far-reaching implications for international trade and marine biodiversity beyond the immediate region.

Frameworks and Efforts to Mitigate the Environmental Fallout

Legal Frameworks and Tools to Handle Environmental Disasters

International environmental agreements play a crucial role in regulating and safeguarding marine ecosystems worldwide. In the context of the Red Sea region, the Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (known as PERSGA or the Jeddah Convention) serves as the primary legislative framework tasked with preserving the Red Sea environment. This agreement provides a comprehensive approach to protecting the marine environment throughout the Red Sea and Gulf of Aden, offering various means to address environmental challenges and promote sustainable practices.

PERSGA serves as the executive body of the agreement, working closely with the Mutual Aid Center for Cooperation in Emergency

Situations based in Hurghada. Together, they ensure the availability of essential equipment and expert assistance to respond promptly to emergencies or maritime disasters affecting any of the countries in the Red Sea region. The organization's overarching vision focuses on preserving a pristine marine environment, promoting the sustainable utilization of resources, fostering social development, and fostering economic prosperity across the region.

PERSGA is a multinational governmental entity committed to safeguarding the marine environment in the Red Sea and the Gulf of Aden. Comprising member states including the Kingdom of Saudi Arabia, the Arab Republic of Egypt, the Republic of Sudan, the Hashemite Kingdom of Jordan, the Republic of Djibouti, the Republic of Yemen and the Federal Republic of Somalia, the organization operates under the legal framework established by the 1982 Jeddah Convention.

Since the Cairo Declaration in 1996, the organization has been formally designated as the body responsible for safeguarding the marine environment in the region. Hosted by Saudi Arabia in Jeddah, the organization's headquarters have served as a focal point for regional environmental initiatives. Additionally, Egypt has been hosting the headquarters of the Maritime Emergency Mutual Aid Center (PERSGA/MEMAC) in Hurghada since 2006, further enhancing collaborative efforts in emergency response and environmental protection.

The legal foundation for PERSGA originates from the Protocol Concerning Regional Cooperation in Combating Marine Pollution by Oil and Other Harmful Substances in Emergency Situations (1982), which is an annex to the Jeddah Convention. This protocol mandated the establishment of a center for mutual aid during emergencies in the Red Sea and the Gulf of Aden. Officially inaugurated in 2006 with the participation of environment ministers from member states, the center serves as a crucial resource for coordinating responses to maritime crises. In 2009, a subsequent protocol was enacted under the Jeddah Agreement, focusing on regional cooperation for the exchange of experts and equipment among member states during maritime emergencies. The center has devised a comprehensive regional program aimed at mitigating navigational hazards and marine pollution, bolstering the safety of international shipping

within its jurisdiction, and implementing measures to minimize the impact of marine pollution incidents.

The legislative framework also encompasses the adoption of the 1990 International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC), which plays a pivotal role in coordinating international efforts to address oil pollution incidents. Numerous international bodies are tasked with addressing liability and compensation issues related to marine pollution, including the International Oil Pollution Compensation Fund (IOPC Fund) established in 1992 and the International Group of Protection and Compensation Associations (IG). These entities collaborate to strengthen the implementation of international instruments for oil pollution compensation, such as the International Convention on Civil Liability for Oil Pollution Damage of 1992, the Supplementary Fund Protocol of 2003, and the International Convention on Civil Liability for Bunker Oil Pollution. Moreover, mechanisms for claiming compensation, establishing robust communication and information systems, and enhancing response capabilities in emergencies have been put in place. These efforts aim to prevent maritime accidents and facilitate efficient responses in the event of emergencies. Additionally, the legal and administrative frameworks concerning environmental issues resulting from marine pollution in the region are being formulated, along with the development of regional guidelines for responding to oil spills and other hazardous chemical incidents.

Since the 1990s, numerous countries in the Red Sea region have instituted regular seawater monitoring initiatives, focusing on fundamental variables in coastal waters. PERSGA has been working diligently since 2004 to establish a sustainable regional monitoring program for seawater. Significant progress has been achieved, including the training of technicians and the provision of monitoring equipment and devices to member countries. Presently, the organization is actively pursuing the effective participation of all member states in the regional monitoring program. This involves ensuring a consistent flow of monitoring data into the organization's information repository, activating national emergency plans, and deploying expert field teams across the region's beaches to conduct pollution monitoring and collect periodic samples. The primary

objectives of the organization's regional monitoring program are to enhance national capacities within member states by providing human resources and equipment for monitoring activities and to narrow the gap between countries in implementing monitoring programs. Furthermore, the program aims to furnish documented information to support the development of appropriate national legislation and assist decision-makers in making scientifically informed decisions with stakeholder involvement.

Modest Efforts to Save MV Rubymar

Following the initial strikes on MV Rubymar, Yemen's internationally [recognized](#) government swiftly established an emergency response unit to address the situation of the stranded and leaking ship. Concerns were raised regarding the ship's precarious condition, prompting the government to elevate its preparedness level and immediately notify both the International Maritime Organization and PERSGA, headquartered in Jeddah. Requesting assistance from both entities to mitigate the potential environmental catastrophe resulting from the ship's cargo leakage, the Yemeni government also announced its intent to pursue legal measures against the vessel's owners to aid in resolving the environmental crisis.

Despite the Yemeni government's proactive measures and the regional organization's initiatives, the practical response at the regional and international levels has been notably lacking. UN experts arrived to assess the situation of MV Rubymar only after its sinking. Ambassadors from the European Union, the United States, Britain and China, along with [UN environmental representatives and experts](#), convened with environment ministers from Djibouti and Yemen to evaluate the situation and explore available options. While the regional organization in Jeddah may have taken action in line with its protocol, it has not publicly disclosed its efforts.

The efforts made thus far seem inadequate given the gravity of the incident at hand. Even more concerning are the ongoing attacks by the Houthis on other vessels, which could exacerbate the environmental disaster and risk one of the world's most unique marine environments. The economic and health repercussions will undoubtedly impact the countries bordering the Red Sea.

Saving the Safer Oil Vessel

Safer, [a colossal oil tanker deteriorating off the coast of Yemen](#), posed a significant risk with over a million barrels of oil onboard. A potential leak could have resulted in an unparalleled environmental, humanitarian and economic disaster, given the vessel's 47-year service history. Remaining stranded on Yemen's shores for eight years, Safer loomed as a major hazard, poised to potentially trigger the fifth-largest oil tanker leak in history. Through a coordinated effort, the United Nations managed to avert the catastrophic scenario that imperiled marine life in the Red Sea. However, the vessel still presents an ongoing environmental threat due to residual sticky oil that requires final cleaning to mitigate its danger.

Financial resources are paramount in the UN operation, particularly in addressing the environmental threat posed by the Safer tanker. [It is worth noting](#) that Saudi Arabia has played a significant role in mitigating this threat by contributing to the necessary funding to execute the UN's rescue plan. This plan involves transporting oil from the Safer tanker and managing its deteriorating hull post-draining to prevent any harm to the marine ecosystem. Saudi Arabia's involvement has been instrumental in advancing international efforts to implement the plan and resolve the crisis surrounding the Safer vessel.

Potential Alternatives and Solutions

- Urgently convene a meeting of environment ministers from Red Sea-bordering countries and relevant regional stakeholders to coordinate efforts and devise strategies to address the disaster. Enhance regional and international endeavors to safeguard the Red Sea from escalating environmental threats, while considering evaluations of existing bodies in Red Sea-bordering nations. Explore avenues for developing or establishing more effective and responsive mechanisms. This is in addition to facilitating swift cooperation to allocate urgent resources, a critical component in addressing environmental crises, and support UN-led rescue operations through financing initiatives.
- Formulate a comprehensive plan to establish sustainable early warning systems and implement a network for continuous automated monitoring along the Red Sea coastline. Provide backing for the establishment of an integrated, unified regional database

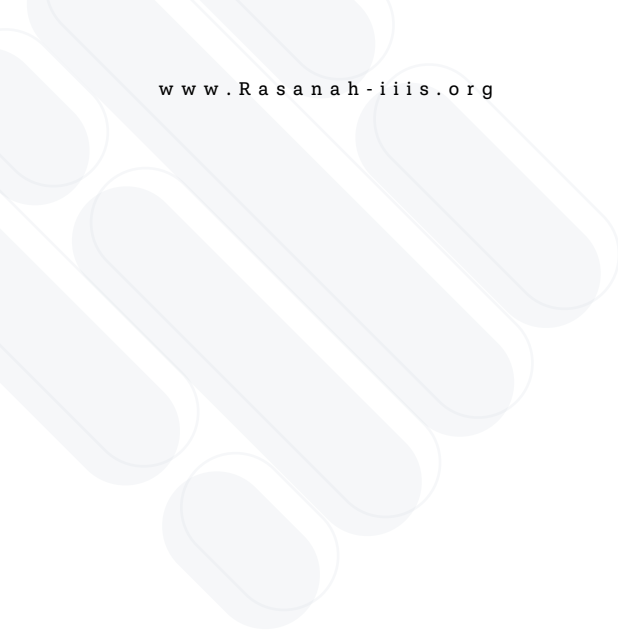
encompassing biological, chemical and physical variables, alongside socioeconomic data.

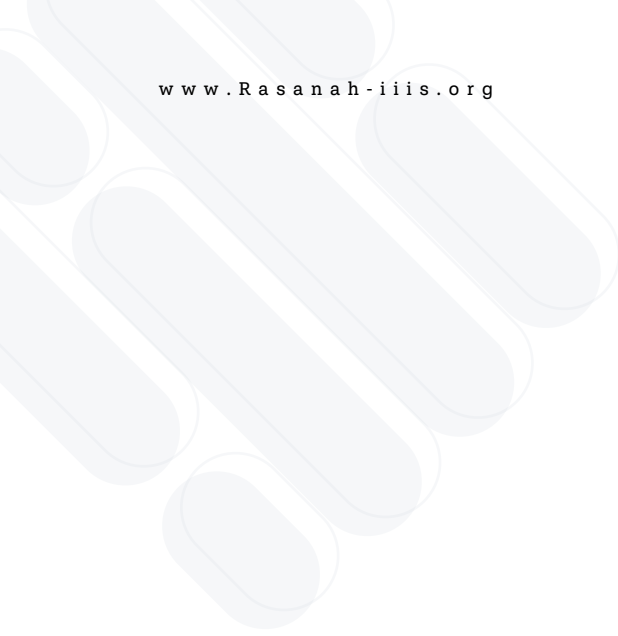
- Foster collaborative regional and international endeavors to address this calamity, driven by a shared societal responsibility to safeguard the invaluable marine resources of the global community. This commitment is particularly critical given the significance of the Red Sea as one of the world's paramount and distinctive ecosystems.

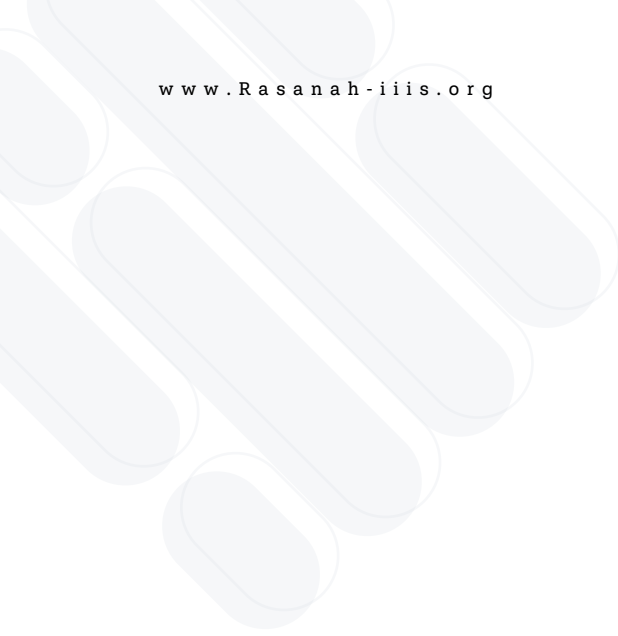
- Enhance the refinement of mathematical models, involving alternative approaches rooted in precise mathematical computations, to effectively tackle marine pollution incidents stemming from diverse pollutants. This initiative aims to streamline the dissemination of accurate information essential for managing such incidents adeptly.

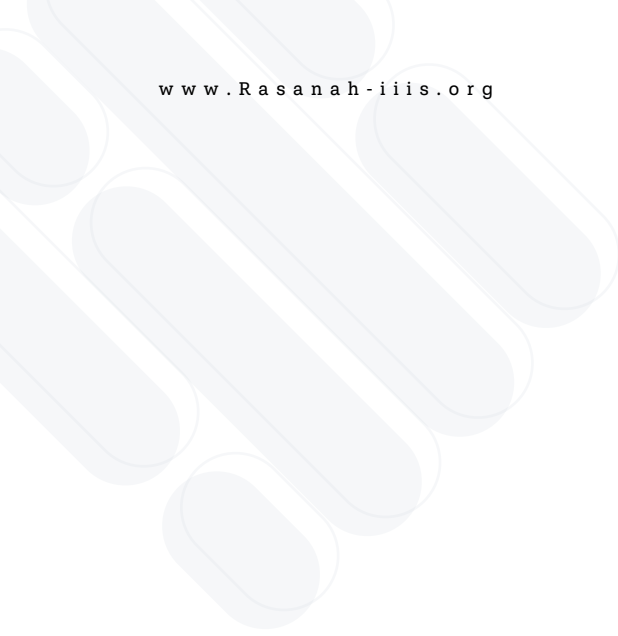
- Strengthen capacities in conducting studies to assess the cost of environmental degradation, utilizing the latest methodologies and parameters. This effort aims to enable countries affected by marine disasters to seek compensation in alignment with the scientific frameworks outlined in relevant international agreements.

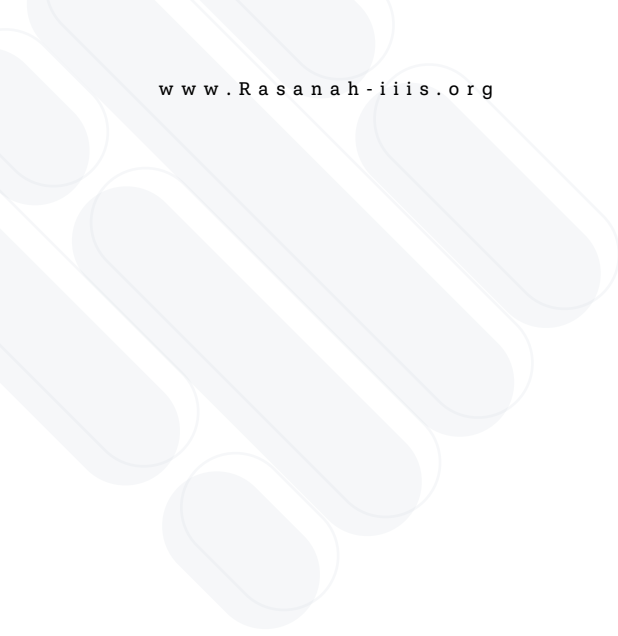
- Enhance the utilization of modern environmental and socioeconomic surveys and monitoring techniques for coastal areas in the region's countries. This includes refining monitoring methodologies, sharing experiences among regional nations, and bolstering collaboration to gather data from ongoing monitoring efforts, enriching a regional ecosystem database. Additionally, cooperate with pertinent international bodies to safeguard maritime navigation and update maps delineating crucial habitats and anthropogenic hazards, including sensitivity maps identifying risks associated with oil spills and other pollutants.

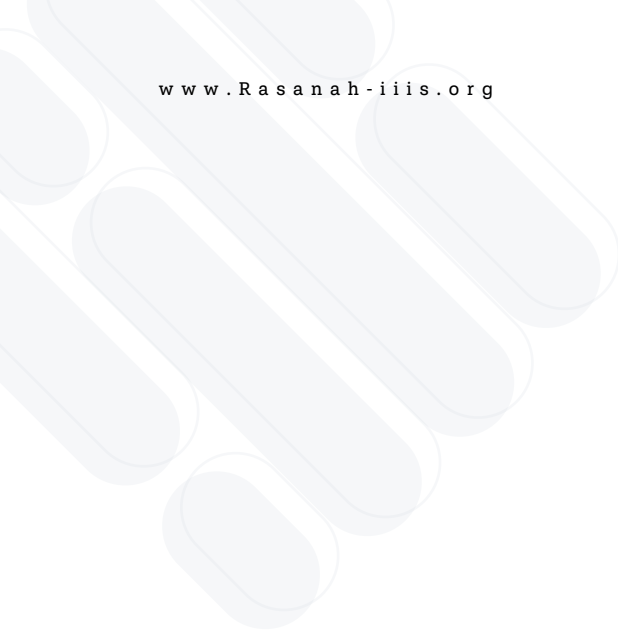


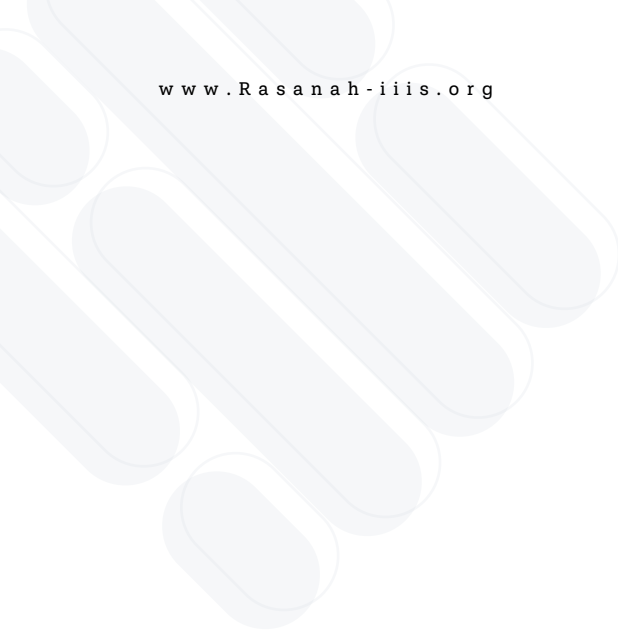


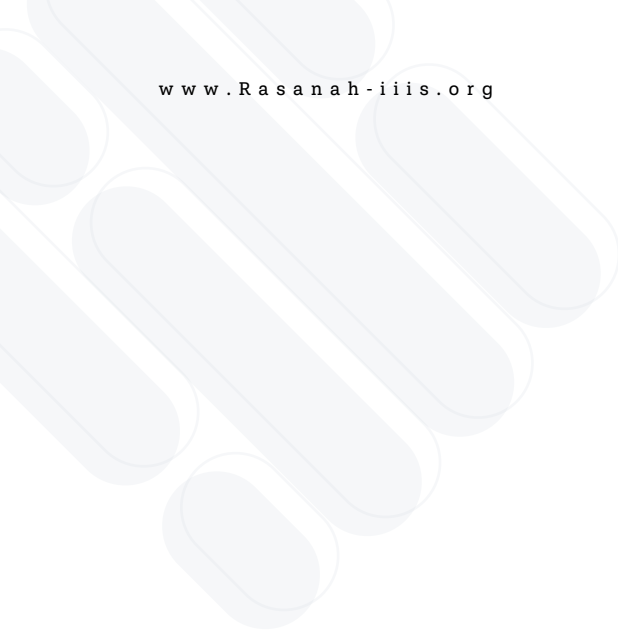


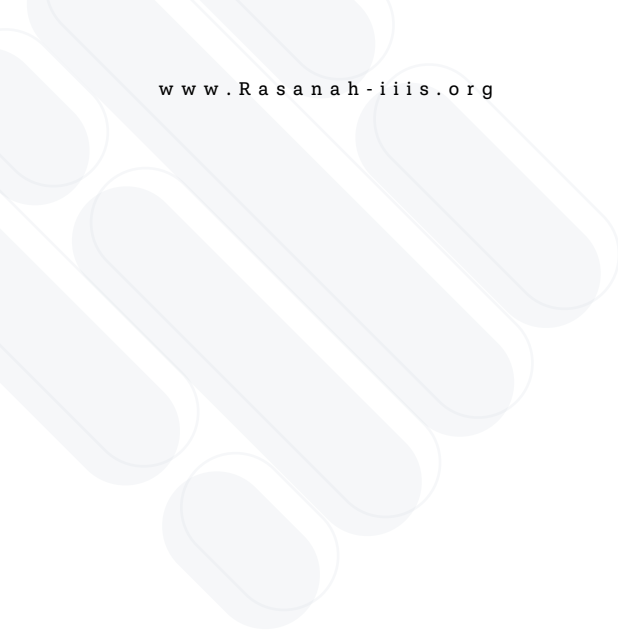














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