Arab Reform Initiative

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FSO Safer potential marine disaster: Yemen's environment worst nightmare

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FSO Safer installation 1988 - location off Hodeidah - Yemen ©Flickr/Piet Sinke

The Republic of Yemen is located southwest of the Arabian Peninsula and has an area of about 550,000 km2, which is bordered by the Kingdom of Saudi Arabia in the north and the Sultanate of Oman in the east. It is also bordered by a long coastal line of approximately 2,250 km,[1] which overlooks the waters of the Red Sea in the west and the Gulf of Aden and the Arabian Sea in the south. About 83% of Yemen's population lives in rural areas with agriculture and fishing as the main sources of their income.

The topography of Yemen is characterized by a diversity of terrain. It is divided into five main regions: mountain heights, plateaus, coastal plains, deserts, and islands. This topographical diversity has given the country a variety of natural environments and a high degree of environmental biodiversity. Yemen has been subjected to several stresses that have caused environmental problems, most of which are linked to the steady increase in population growth, the concentration of population in cities as a result of internal migration, poverty, and unemployment, in addition to weakness in implementing environmental legislation, lack of environmental awareness, desertification, and pollution.

Yemen is one of the poorest countries in the world. It is a low-income country with about 40% of the population below the poverty line. A large segment of the population lives marginally above the poverty line but is vulnerable to economic and natural shocks. Yemen is infested by several internal problems, including corruption, unemployment, water scarcity, and food insecurity.

The impact of the conflict on the environment

Between 2004 and 2010, the Yemeni government was involved in six short intervals of conflict with Houthi militia in the northern governorate of Saada. However, this conflict resumed in late 2014 and early 2015 when Houthi rebels started to spread and gradually take control of the capital of Yemen, Sana'a, and other governorates. This has led to the involvement of a Saudi-led coalition that has launched airstrikes against Houthi targets, and thereafter a civil war has escalated all over the country.

The Republic of Yemen has signed several international agreements related to the protection of the environment including the UN Convention on the Law of the Sea, preventing marine pollution and establishing a legal framework for all marine and maritime activities, and the International Convention for the Prevention of Pollution from Ships (MARPOL). Successive governments have aimed to participate in international efforts in attempts to protect Yemen's marine environment.

Before the war, Yemen's efforts to protect the environment were only improving slowly as a result of the lack of public awareness, non-compliance of private and governmental industrial business with existing environmental laws, and the weaknesses of government monitoring. The blurred vision and lack of commitment to an environmental policy by the successive governments were compounded by the undesirable effects of human activities.

Despite the existence of laws meant to protect the environment (e.g. Law No. 26 of 1995 on the Environment Protection; Law No. 16 of 2004 on the Protection of Marine Environment from Pollution), the government was too weak to adequately implement or enforce them. Moreover, financial support for the government is the most important factor affecting the institutional capacity to protect Yemen's environment. Yemen depends on the donations of international organizations (such as the World Bank, UNDP, GEF, or FAO) for support in tackling environmental issues. The current civil war has worsened the already deteriorated environment and diverted international support from environmental to humanitarian issues. This has negatively impacted the threatened environmental habitats and frozen all efforts and projects for protecting the environment in Yemen.

During wartime, the ability to enforce legislation is weakened due to the State's institutions being absent or running minimum services, as war leads to the mobilization of most of the nation's resources and workforce.[2] All the country's financial resources and attention are allotted to warfare instead of carrying out tasks to protect the environment. This has weakened the implementation of national environmental policies and strategic action plans. It also impacts the institutional staff and financial incentives for those working in the field of environmental protection.

FSO Safer: A disaster waiting to happen

The ongoing conflict in Yemen distracts attention from environmental pollution incidents that have occurred or are likely to occur in Yemeni territories. The most important pollution case disturbing Yemen and its neighbouring coastal communities (Saudi Arabia, Sudan, Eretria, Djibouti, Somalia, Egypt, Jordan, and Palestine) is that of the FSO Safer Oil Tanker, anchored 8km opposite of Ras Isa on the western coast of Yemen, 60km north of Al Hodeidah city. The single-hull tanker was built in 1976 by Japan and used for 10 years as an ultra-large crude carrier (ULCC) under the name of "Esso Japan".[3] In 1986, the 3.1-million-barrel capacity tanker has been converted into a floating storage and offloading unit (FSO) Safer.[4] FSO Safer was used to receiving about 100,000 barrels of crude oil daily from the Marib oil fields before it off-loaded to export tankers. This tanker is located in and close to the most important and environmentally sensitive marine habitat of Yemen. Coral reefs, mangroves, sandy shores, and saltpan habitats are well known to be some of the most important characteristics of these coastal areas. These include the 3.5 km2 of mangrove dense forest in the north of Kamaran Island, which was declared a natural reserve in 2009.[5],[6]

Currently, about 1.1 million barrels of crude oil are stored in the rusted FSO Safer, although it has not been maintained since the war started in 2015. It is reported that the Safer E&P Operation Company (SEPOC), the owner and operator of FSO Safer, reduced the maintenance expenses in 2013 as it was planning to build terrestrial storing tanks that would be operational by the end of 2015 and dispose of the 45-year-old tanker[7] . FSO Safer is therefore considered out of class since 2016 as a result of the necessary maintenance and inspections not being performed.[8])

Any accidental leakage would cause an oil spill that could expand and reach the neighbouring marine and sensitive coastal habitats. The oil spill is estimated to be four times greater than the 1989 accidental oil spill caused by the Exxon Valdez in Alaska, USA.[9] When oil is spilt from the tanker, it would spread over the sea surface forming a thin film called an oil slick. Sea temperature and the nature of oil control its thickness as well as the speed by which it spreads.[10] Part of the oil slick will evaporate, particularly the light fractions with a low molecular weight; other

portions will dissolve in the water or emulsify and disperse in the water column as water droplets. The rest will reach the coast and cause a severe environmental problem.

The environmental impact of the FSO

The coastal line of Yemen is characterized by a variety of habitats that support the coastal communities as they have major ecological and economic importance. The huge amount of the predicted oil spill could cause a humanitarian and ecological disaster, affecting the biodiversity of about 115 Red Sea Yemeni islands, coral reefs, mangroves, sandy and muddy beaches, fisheries, and other land and marine habitats, as well as hundreds of thousands of Yemeni coastal communities.[11] Floating layers of oil slick will prevent oxygen exchange between air and water (an important factor for marine life) and influence the light penetration that is crucial for producer organisms that depend on photosynthesis for primary productivity, further impacting the consumers who depend on those producers in the food chain. When the oil slick reaches the shores of the mainland or the scattered Red Sea islands, it will severely damage the coastal marine habitats including mangroves and coral reefs.

Several organisms will be affected when they absorb the toxic metals associated with oil in the water or become totally covered with it. Approximately 3,441 species (millions of marine specimens) of the Yemeni coastal organisms could be endangered by the expected oil pollution; not to mention the enormous number of specimens in the coastal areas of neighbouring countries. About 283 species of phytoplankton, 139 species of zooplankton, 300 species of coral reefs, 485 species of algae, 283 species of macroalgae, 9 species of seagrass, 21 species of halophytes, 168 species of echinoderms (including 20 species of sea cucumber), 625 species of molluscs, 53 species of crustaceans, 4 species of endangered sea turtles, 969 species of fish, and 102 species of sea birds are threatened by the oil spill that could spread on the Yemeni coastal sea surface of the Red Sea.[12]

Social and economic impacts of the oil spill

The agricultural and fisheries sectors are the main sources of the Yemeni economy and livelihood. Both are some of the most promising sectors that create job opportunities and economic growth for poor communities. The western coastal plain of Tihama (parallel to the Red Sea) is a nationally important agricultural area. Alkharraz reported that more than 3 million farmers in Tihama will be affected due to the oil spill that may pollute their agricultural lands.[13] Moreover, a large proportion of Yemen's population depends on the fisheries sector and would be socially and economically jeopardized if the disaster occurs. There are more than half a million Yemenis working in the fisheries sector, including 83,000 fishermen represented in 135 fishing societies. It is estimated that more than 18,500 of workers (including approximately 17,000 fishermen) in the fishing sector would lose their jobs when the disaster happens.[14] According to Holm Akhdar (Green Dream), approximately 126,000 Yemeni fishermen and coastal communities will lose their jobs and the source of income as a result of destroying the habitats of 850,000 tons of fish stock in the Yemeni Red Sea waters.[15] ,[16] The tourism sector will also suffer drastically as a result of this pollution disaster, and thousands more jobs will be lost. All this will lead to increased unemployment, exacerbated famine, and the collapse of the coastal communities' economic conditions.

The high cost of treatment

Once the disaster occurs, much effort, money, and time are needed in order to isolate the oil slick from reaching coastal habitats and treat and restore these habitats. At sea, ships and aircrafts could be used to spray the chemical dispersants on the oil slick to speed up the natural process of emulsification. It is worth mentioning that low-toxicity dispersants must be used in order to avoid poisoning marine life. However, this process is effective neither against heavy oil nor for large spills that require more ships and aircrafts.[17]) Floating oil spill could be contained or deflected by using floating booms and then pumped out where it accumulates. The third method to treat the oil spills at sea is to deploy so-called "slick-lickers", a continuous belt covered with an absorbent material that dips through the oil slick and extracts the oil from the sea. However, this method is also not useful for large quantities of oil. Before the current war in Yemen, Safer E&P Operation Company (SEPOC) had a chartered helicopter and two tugboats whose

tasks included participation in spraying dispersants in case of oil pollution accidents. All these vessels left the country once the war started, and the chemical dispersants were disposed of after they had expired.[18]

When oil reaches the shore, governmental related authorities should quickly put in place other emergency measures to avoid a disastrous situation. Toxic properties of the oil may cause damage to the coastal organisms and smother them. Cleaning beaches to remove oil slicks is very costly and requires a large number of specialists and volunteers. The techniques for cleaning beaches depend on the nature of the shore (rocky, sandy, or muddy), and the physical removal of oil only results in partial cleaning, producing a large volume of oil-contaminated debris. Removal of contaminated beaches means that many coastal habitats where thousands of coastal organisms live will be destroyed. Bioremediation methods could also be applied using oil-degrading bacteria.

Treating oil spills, either at the sea or when they reach the shoreline, is very costly, and many countries, like Yemen, cannot afford it, even during peacetime. At present, the war has drained most of the country's financial resources, including those supposed to be directed to face any unprecedented accidents. Alkharraz Environmental Consulting Centre has estimated that the total cost of cleaning and restoring the damaged coastal habitats and its biodiversity could exceed USD 51 billion. Alkharraz, former Chairman of Environmental Protection Authority (EPA), also said that the FSO Safer tanker was insured for an amount of USD 100 billion to face any future accidents. However, Yemen has not paid the insurance instalments since the war started, resulting in the loss of the insurance amount that could help face this potential disaster.

Moreover, FSO Safer and its surrounding endangered habitats are situated in a critical area of confrontation between the two conflicting parties. Therefore, any emergency actions to be taken, in the event that a future accident occurs, will be difficult as no one will risk going to the contaminated areas. This difficulty can be inferred from neither party allowing UN specialist teams access to the tanker to evaluate its condition and find a better way to avoid any possible disaster, and by their preventing access to an oil tanker to suck the oil from FSO Safer. The two warring sides have alleged to give the necessary permissions, but there is still a dispute over who should receive the money of sold oil. Delays in reaching the

damaged sites could lead to extending oil pollution to neighbouring countries, which would increase the area of aquatic environment that could be damaged by the oil spills.

Therefore, it is urgent to direct all efforts to avoid a disaster that could result from the deteriorated unmaintained condition of FSO Safer. Immediate action should start by transferring the stored oil in the tanker to another tanker and then beginning to maintain the FSO Safer as a matter of urgency. The UN and other international organizations should put pressure on the parties in conflict in order to force them to comply with the national and international efforts to avoid a disaster waiting to happen.

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