

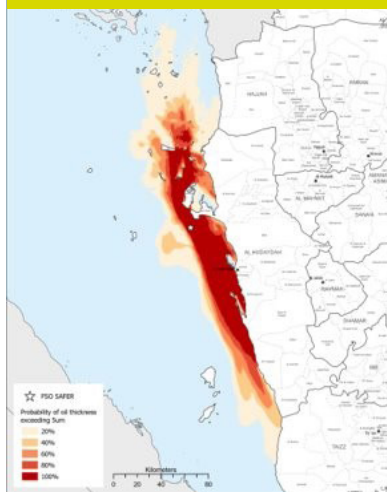
YEMEN FSO Safer: Impact assessment April–June 2021



The coastline of Yemen's Red Sea and of its neighbouring countries is at risk of an environmental disaster that could happen any day – with substantial humanitarian and economic impacts. It is increasingly likely that there could be an immense oil leakage from and/or an explosion of the FSO Safer, a floating storage and offloading unit anchored in the Red Sea, 60km north of the port of Al Hodeidah. If disaster strikes, the Safer could release four times the amount of crude oil that was spilled in the Exxon Valdez catastrophe of 1989 (UNEP 16/07/2020), which had major impacts on the environment and on people and their livelihoods in affected areas.

An explosion on the Safer between April–June could lead to ...

Oil spill²



Affected population

- Up to 1.6 million people's livelihoods could be impacted by the spill and subsequent cleanup operations, through damage to coastal industries and factory and port closures, as well as damage to fisheries and marine resources.

Economic impact

- Port operations interrupted: the operations of Al Hodeidah and Saleef ports would be affected. The ports would likely have to close for two to three months, limiting fuel and food imports and putting the jobs of port workers at risk.

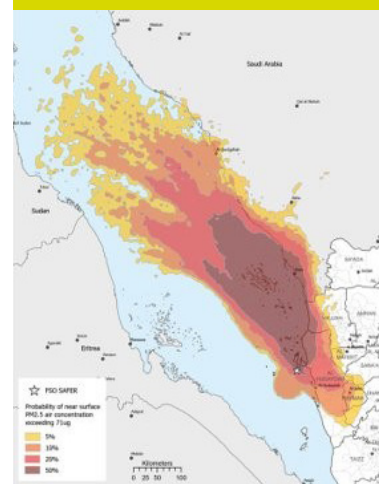
- Fuel imports and supply routes altered: the disruption of port operations would further reduce the already restricted fuel supply through Al Hodeidah if the fuel standoff between the Houthis and the Government of Yemen continues. This would impact electricity production, health services, and transportation provisions across the

country. The ports would see heavy oil contamination. Vessels that have been waiting for months in the coalition holding area but which have not yet been allowed into the port to unload would have to be cleaned. More fuel might be brought in through Aden and Mukalla to offset the shortfall, altering fuel supply chains in the country; more fuel would likely be sold through the black market and prices would likely rise.

- Food imports and supply routes altered: bulk food imports through Al Hodeidah and Saleef have been consistent and are at healthy volumes in the current quarter. The redirection of food imports to Aden and/or Mukalla could lead to congestion and delays in those ports; onward transport of wheat to mills would increase out of these two ports, with capacities unknown. Food prices would likely rise.
- Fisheries operations disrupted: 50% of fisheries would likely be blocked from fishing by the oil spill. The livelihoods of 31,500 fishermen would be at risk, and 235,000 workers in the fishing and related industries (ice making, packaging, and transportation) could lose their jobs. The spill would presumably have devastating impacts on the livelihoods of fishermen, workers, and their families, in an industry in which 21% of fishing communities are already considered poor and 71% very poor (Oxfam 12/2017). Cost to fishing industry: USD 750 million – USD 30 million per year for 25 years.
- High general impact and cleanup costs: estimated cost of cleanup – USD 20 billion. A release of oil into the water would have far greater and longer-lasting impacts than the release of particulates through fire.

A fire on the Safer between April–June could lead to ...

Air pollution³



Affected populations

- Up to 5.9 million people in Yemen and 1 million in the Kingdom of Saudi Arabia (KSA) could be exposed to very high air pollution levels, with harmful effects seen 24–48 hours after a fire starting on the Safer.

- Governorates affected in Yemen would likely be Hajjah, Al Hodeidah, Sa'dah, Dhamar, Sana'a, Al Mahwit, and Raymah. In the KSA, Jizan would likely be affected.

- Up to 967,000 IDPs are living in areas in Yemen that could be covered by a smoke plume.

Health impacts

- There would be a significant health risk to vulnerable populations (such as adults and children with lung problems and adults with heart problems) and the elderly, with aggravation of pre-existing heart and lung problems likely. The pollution would create an additional hazard for COVID-19 patients with breathing problems. With access to health services generally reduced by the limited availability of facilities, and with increasing and often unaffordable transportation costs because of fuel shortages, these vulnerable groups would probably face difficulties getting adequate treatment.

Economic impacts

- An estimated 9.9 million people in Yemen and 1.5 million in the KSA could face the risk of crop losses and related consequences such as limited supply to markets and price rises as a result of soot deposition.

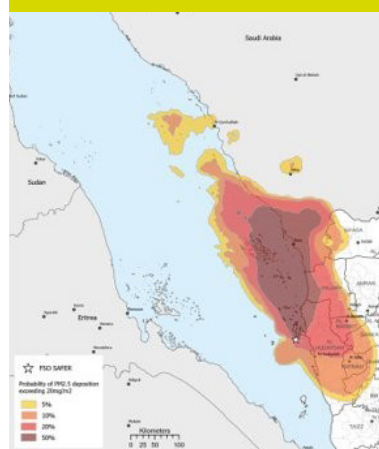
- Governorates affected in Yemen would likely be Hajjah, Al Hodeidah, Dhamar, Sa'dah, Sana'a, Al Mahwit, Raymah, and Amran. In the KSA, Jizan would likely be affected.

- Around 500km² of agricultural land in Yemen could receive depositions of pollutants that would impair plant growth of crops grown for both subsistence and profit. In this time period papaya, citrus, and mango fruits would be covered by soot, and the quality of corn, tomatoes, sesame, watermelon, and sweet potatoes that are still growing would be diminished. Around 3.25 million farmers might experience crop losses through impaired growth or fruit damage, reducing their income and potentially threatening their livelihoods for a year. The estimated loss in agricultural production could be USD 70 million.

Environmental impacts

- 8,523 water well points and numerous wadis (river valleys) could potentially be contaminated. ACAPS intends to look at the potential impacts on water catchment and irrigation areas in future assessments.

Ground deposition⁴



THE RISK FROM FSO SAFER

The FSO Safer is a vessel that was used to store and export oil from Yemen's inland oil fields around Marib. In 2015, the vessel fell under the control of the de-facto authority in the north of Yemen (also known as the Houthis) and has since been neglected. Requests by the UN for an inspection of the vessel have repeatedly been rejected by the Houthis. The most recent agreement permitting a UN team to begin checks was reached with the Houthis in November 2020. This inspection was initially planned for January or the beginning of February 2021, but has been delayed indefinitely (*The Maritime Executive* 28/01/2021; *NYT* 02/02/2021).

The lack of maintenance of the Safer – with its estimated cargo of 1.148 million barrels of Marib light crude oil – makes two scenarios increasingly likely:

- 1. Oil spill:** corrosion and lack of maintenance of the FSO unit for an extended period of time could lead to some of the oil leaking into the sea. Any leak in the engine room and water flowing in uncontrollably could destabilise and potentially sink the entire structure, likely causing a severe oil spill (*Mashora Group* 08/2020).
- 2. Explosion and a fire on board the FSO unit:** this could be caused by accidental ignition of gas that has accumulated in the cargo tanks, and consecutive leakage of most or all of the oil into the sea (*UNEP* 16/07/2020).

DEVELOPMENT OF ACAPS' IMPACT ASSESSMENT

An impact assessment based on oil spill and atmospheric dispersion modelling was conducted as part of a partnership project¹ between ACAPS and the companies Catapult and Riskaware.

In early 2020, Catapult and Riskaware carried out modelling of the geographic coverage, direction, and travel time of a worst-case scenario for an oil spill and atmospheric dispersion of pollutants from a fire on the Safer (*Riskaware* 2020). The models used publicly available global datasets of current and historical meteorological data to obtain prevailing weather and marine current conditions for the four quarters of the year. Worst-case scenarios for the spill or a smoke plume (deposition of particulate matter on the ground and near-surface – 0–100 metres above the ground – particle matter air concentration) for each of these time periods were generated by the model, in which the oil spill and atmospheric dispersion incidents were considered to be independent. The update presented here is the modelled probability of worst-case economic and humanitarian impacts in the second quarter of 2021.

To estimate the economic and humanitarian impacts, ACAPS applied indicators specifically developed for the task to each of the four scenarios obtained from the modelling. These indicators are based on:

- humanitarian data available from **ACAPS' core dataset**
- information and analysis of past ecological disasters and conflict events in Yemen
- consultation with humanitarian experts (health, agriculture, water, and economy experts) in Yemen to test and refine assumptions.

SEASONAL VARIATIONS OF IMPACTS

In November 2020, ACAPS published a humanitarian and economic impact assessment for the period October–December, highlighting the potential impacts should the risk of an oil spill from or explosion of the FSO Safer materialise. The expected impacts assessed here are a result of the seasonal prevailing weather and marine current conditions that influence the extent and direction of oil spill and smoke plume dispersion.

Compared with the assessments that covered prevailing current and weather patterns in the October–December 2020 quarter (published in November) and the January–March 2021 quarter, impacts in April–June would be more severe for agricultural production, livelihoods, and port operations, worsening the current fuel shortage and its consequences on service delivery and prices for food and fuel in the country. Key figures are:

	Oct–Dec 2020	Last quarter (Jan–Mar)	Current quarter (Apr–Jun)
No. of people affected in fishing industry	31,500 fishermen, 235,000 workers	6,300 fishermen, 47,000 workers	31,500 fishermen, 235,000 workers
No. of farmers affected by crop losses	185,000	185,000	3.25 million
Impact on Al Hodeidah and Saleef ports and consequences of port disruptions	Closed for 2–3 weeks Food and fuel import shortages Potential diversion of fuel and food imports to Aden and Mukalla Rise in fuel and food prices	Closed for 2–3 weeks Food and fuel import shortages Potential diversion of fuel and food imports to Aden and Mukalla Rise in fuel and food prices	Closed for 2–3 months Food and fuel import shortages Potential diversion of fuel and food imports to Aden and Mukalla Rise in food and fuel prices
No. of people exposed to very high pollution levels, with harmful effects	6.2 million in Yemen, 350,000 in the KSA	4.3 million in Yemen, 1.5 million in the KSA	5.9 million in Yemen, 1 million in the KSA

¹ The work was funded by the FCDO/UK government.

² This is the modelled probability of worst-case impact of a spill during this period, using three years of historic meteorological and marine current data. Actual events could unfold very differently depending on actual conditions.

³ These models have been produced using three years of historic meteorological and marine current data. Actual events could unfold very differently depending on actual conditions.

⁴ These models have been produced using three years of historic meteorological and marine current data. Actual events could unfold very differently depending on actual conditions.