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How to clean up an oil spill

Methods designed to remove oil from water can do more harm than good



Nov 8th 2021



THE *SAFER*, a 45-year-old oil tanker, has been rusting off the west coast of Yemen since 2015. It lies 9km from the port of Hodeida, which is under the

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clean-water supply of around 9m people, according to [a study](#) published last month by researchers at Stanford University and the University of California, Berkeley. If the worst happens, how might it get cleaned up?

Nature does most of the work on its own. In the first 12 hours following a marine oil spill, up to 50% of the lightest compounds transform into vapour and evaporate. The heavier gloop left behind is then weathered by waves, sunlight and oxygen, and eventually broken down into smaller pieces that dissolve or drop to the seafloor. Micro-organisms also love munching on oil. But this biodegradation can take years. Because of this, human intervention is necessary. Clean-up efforts encourage bacteria to grow by adding nutrients such as phosphorus and nitrogen, though this process is still slow, requiring other methods to deal with what remains.

Floating barriers, called booms, are the first line of defence. They act as a wall above and below the water's surface, containing the oil and stopping it from reaching the shore. But booms are ineffective in choppy or icy waters. In a storm, waves can easily crash over them, tear them apart and wash them ashore. Another method involves setting oil on the surface ablaze. The decision whether or not to burn requires a tradeoff: it will emit carbon dioxide and cause air pollution. But if left alone, the oil could spread over a larger area, causing damage more widely and making it harder to clean up.

Skimming devices are a more high-tech option. The tools are designed to separate oil from water and release the clean water back into the sea. But they tend to suck up more water than oil. In 2010, when [the Deepwater Horizon rig](#) was spilling its oily entrails into the Gulf of Mexico, officials called in *A Whale*, a Taiwanese-owned super-skimmer ship. It could supposedly collect up to 21m gallons (95m litres) of contaminated water per day, but sucked up virtually no oil during two weeks of tests.

The ship's owners blamed the less-than-slick performance on large quantities of chemical dispersants poured into the water. These are the fourth method of dealing with a spill. They break the oil down into smaller droplets that easily mix with water. But they too are an imperfect solution. Not only do they make other clean-

used in the Deepwater Horizon spill, was 50 times more toxic to corals in the Gulf of Mexico than oil alone. And thousands of clean-up workers who were exposed to it have suffered health problems, including coughing, skin irritation and burning

in the eyes, nose, throat or lungs. Several countries, including Britain and Sweden, have banned the stuff.

Once lots of oil seeps into water, it is all but impossible to remove it effectively. The proportion that is recovered is often just 10-15%, according to the International Tanker Owners Pollution Federation, a shipping-industry body. Just 21% of the oil released by Deepwater Horizon was either burned or chemically dispersed (a further 17% was pumped up through broken pipes). That is slightly better than the Exxon Valdez spill in 1989, where around 14% of the oil was recovered. Researchers and start-ups are, however, picking up the slack. Vinayak Dravid, of Northwestern University in Illinois, has developed a reusable carbon-based sponge capable of absorbing more than 30 times its weight in oil. A soap composed of iron-rich salts, created by researchers at Bristol University in 2012, also has potential. It can

magnetise the oil droplets dispersed in water, making them easier to retrieve. Robots like the Seaswarm, developed by scientists at MIT, and microscopic submarines could also one day help to do the job.

But the prospect of a spill from the *Safer*, even with new technologies in the works, is grim, and efforts to prevent it have gone nowhere. Talks between Houthi rebels, the UN-recognised government of Yemen and the UN itself have foundered. In 2019, the UN got approval to inspect the *Safer*, a request which was cancelled at the last minute by the Houthis. Talks have started again, but no-one has been able to visit the tanker. [Yemen's war](#) has turned the country into one of the most wretched places on earth. Pouring oil on troubled waters, in this case, would only make things worse.

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