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No way for fish

How to prevent Egypt's enlargement of the Suez Canal making it easier for Red Sea creatures to colonise the Mediterranean

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INVASIVE species are a menace. In the Mediterranean, poisonous pufferfish frequently turn up in fishermen's nets. Summer swarms of stinging jellyfish close beaches as far west as Italy. And in the east, rabbitfish are eating most of the algae that native species rely on. Along with some 350 other non-indigenous species of marine life, all three migrants arrived from the Red Sea via the Suez Canal.

Marine experts are concerned that even more invasive creatures will turn up in the Mediterranean now that Egypt has started work on doubling the capacity of the Suez Canal with enlarged, deepened and new waterways. Egyptian officials have said the work will not add to the problems and are due to present an environmental-impact assessment to the European Commission. But Europe's administrators have been lackadaisical about seeking controls to stem the invasion, says Argyro Zenetos of the Greek government's Hellenic Centre for Marine Research in Athens. What, in any case, could Egypt do about it?

There are a number of technologies employed to deter aquatic migration. America's Mississippi River basin is infested with bighead and silver carp imported from China in the 1970s to stock ponds. Voracious eaters, they deprive native species of food. To keep them from getting into the Great Lakes through the Chicago Sanitary and Shipping Canal, stretches of it are electrified. The voltage trails off from a peak of about 2,000 volts in the centre of some electrified sections to zero about 22 metres either side. This gradient creates a zone of increasing discomfort sufficient to cause fish to turn around.

Electrified systems are used in other parts of the world and to keep fish out of the intake pipes at power plants. Smith-Root, an American firm, has electrified a spot in the Puntledge River near Courtenay, British Columbia, to discourage seals from decimating the juvenile salmon that congregate there (bigger animals feel the jolts more than small fish).

Another method is to create a curtain of bubbles. Produits Étang.ca, a Quebec manufacturer, pumps high-pressure air through submerged plastic pipes that have been drilled with microscopic holes. This throws up a dense, turbulent curtain of bubbles. Most fish are spooked and jellyfish avoid bubbles lest they fill their umbrella. A three-pipe bubble curtain for an enlarged Suez Canal would cost less than $1m, air compressors included, reckons Mario Paris, the firm's chief executive.

But bubbles do not stop all species. To make them scarier, Ovivo, another Quebec firm, illuminates bubbles with flashing bright lights and installs underwater speakers to produce loud noises. Although it seems a bit like an aquatic disco the constantly changing lighting and sound sequences are scientifically calculated to be as obnoxious as possible to various aquatic species. The combo works well enough to mostly keep Chinook salmon, a species not typically afraid of bubbles, out of a pumping station that draws water from the Sacramento–San Joaquin River Delta in Tracy, California.

The Panama Canal, which was built in the early 1900s, uses locks to lift vessels to Gatun Lake, an artificial expanse of water that was created to reduce the amount of digging. Being a freshwater lake it provides a barrier which prevents marine species from moving between the Pacific Ocean and the Caribbean Sea. If a competing canal is ever completed across Nicaragua, as the government intends, a natural lake will also be used as a freshwater barrier against migrating species.

The Suez Canal does not use locks as the sea levels at either end are similar. However, few organisms survived passage for about 80 years after it opened in 1869. This was due to a natural barrier, the so-called Bitter Lakes, a former salt pan. The lakes, though, no longer draw enough extra salinity from the ground to hinder the passage of sea creatures.

This leads some scientists to propose recreating a highly saline area. Noa Shenkar, a zoologist at Tel Aviv University, who organised an international workshop last year to discuss such ideas, says pumping brine from a desalination plant could create such a stretch. The typical salinity of the Red Sea is around 40 parts-per-thousand (ie, every kilogram of water contains 40 grams of salt). If some of the Suez Canal was raised to just 44 parts, marine organisms would be repelled or killed, she adds. Chad Hewitt, a marine ecologist at the University of Waikato in New Zealand, suggests digging a section of the canal through another salt pan. If experts conclude Egypt should install some sort of barrier, then turning the clock back may be the answer.

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