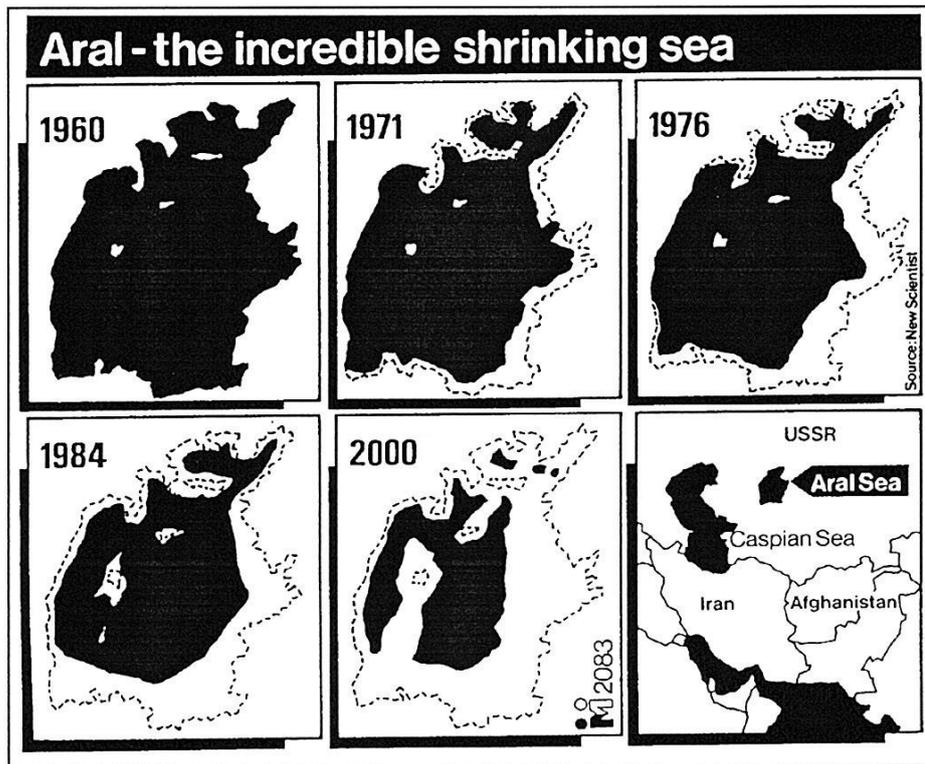


WATER POLLUTION



The Aral Sea was one of the world's largest inland seas (4th largest in 1960) and been in existence for 35 million years; it has been transformed in four decades into the scene of one of the world's worst ecological disasters. Around 50,000 square kilometres of the lake's surface had dried up by 2004 - this is an area larger than twice that of Wales. By 2015 it had shrunk substantially more.

What has caused the Aral Sea to shrink?

The Soviet Union government's desire to produce cotton at any price since the 1970's is the main reason for the disaster. The cotton growing region consumes enormous quantities of water and irrigation schemes were constructed on the Syrdar'ya and Amudar'ya rivers to feed the cotton crop.

About 50% of the Amudar'ya's flow is used for irrigation but because of high evaporation rates much of the irrigation is ineffective. The Soviet Union decided to develop its cotton industry because it didn't have an extensive synthetic fibre industry.

Consequences of the Aral Sea scheme

- Evaporation of irrigation water causes salts to be uplifted in the soil.
- Evaporation of the Aral Sea has left the old seabed encrusted in salt.
- Pesticides which were banned in the West were used in enormous quantities - around 52 kilograms per hectare - much of the chemicals end up as a dust residue on the fields.
- Salt and chemical residues were carried in the wind and these 'salt storms' damaged crops and affected livestock and human health.
- Infant mortality was four times the national average in 1990 and thousands suffered from cancers and other serious diseases.
- The fishing port of Muynak which used to land more than 10% of the Soviet Union's total catch is now largely deserted and 30 miles from the sea's shore, other ports are even further from sea.
- The regional climate has changed because the Aral sea's moderating influence on temperatures has been reduced and rainfall is lower, as less water is available to be drawn up into the atmosphere.

Since the collapse of the USSR, Kazakhstan, one of the countries most impacted by this environmental tragedy has built a dam separating the North and South Aral Sea, which was finished in 2005. This has had the impact of increasing the water levels and fish stocks in the Northern Aral Sea. The Southern Aral Sea is reduced to a western ribbon of salty water in drought years.

NORTH SEA POLLUTION

<ul style="list-style-type: none"> ● CAUSES Raw human sewage Chemical effluents Radioactive wastes Oil spillage Coal spill Power station ash Detergents ● IMPACT Beaches closed by bacteria Algae blooms kill fish Viral epidemic kills 17,000 seals Seabird colonies fail to breed Certain shellfish fatal if eaten 	<p>Enough waste pumped into sea each year to cover 9 square miles to depth of 16 storeys</p>
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The North Sea is just 960km long and 640km wide to some a small arm of the Atlantic and to others vital for trade, economy and survival. The North Sea has become the "Cesspit of Europe". The pollutants, chiefly a foul cocktail of raw human sewage, chemical effluents, radioactive waste, detergents, oil spillage, coal spoil and ash from power stations, do not easily break down and disperse. Many remain in suspension in the waters of the North Sea. Scientists now state that the sea has already exceeded its natural capacity for absorption. Symptoms of pollution include :-

- * Beaches closed due to viral and bacterial contamination
- * A viral epidemic which led to the deaths of over 17,000 common seals.
- * Over-enrichment of sea nutrients, leading to oxygen deficiencies.
- * Exceptional algae 'blooms' which are killing fish and causing millions of pounds worth of damage to fishfarms
- * Seabird colonies failing to breed
- * Official warnings over the dangers of eating certain shellfish.

Arguments rage on over whose is the major blame for pollution and therefore where responsibility lies for action. The UK government currently argues that only 1% of raw sewage comes from Britain and 65% from sewage-dumping in the rivers of mainland Europe. The rivers Rhine, Meuse, Elbe, Weser and Scheldt are the open sewers and parts of each are said to be biologically dead. The dumping of toxic metals such as mercury and lead continue to pose a major threat to food chains..... Cost is the main obstacle cited to any proposed clean-up of the North Sea. For example, finding alternatives to sewage-dumping will involve a capital outlay of £7 billion in Britain alone. Opponents of such spending claim that the corpses of fish which have died natural deaths (collective weight several thousand tonnes) pose a more potent pollution threat than human sewage. Meanwhile Greenpeace urge consumers to help safeguard the North Sea by demanding "environmentally friendly goods" such as recycled toilet rolls, bio-degradable washing products and sanitary towels which have not been chlorine-bleached.

Chemical chaos

- ▶ 7m. known chemicals exist—and thousands more discovered every year
- ▶ 80,000 in common use—every one a potential hazard
- ▶ Some are deliberately released into the environment: pesticides worth \$13,000m are used every year
- ▶ Output of dangerous organic chemicals rose from 1m tonnes per year in 1930s to 250m tonnes in 1985

THE DIRTY DOZEN

12 of the most hazardous pesticides. Identified by the Pesticides Action Network.

- Parathion
- 2,4,5-T
- Paraquat
- DDT
- Aldrin/Dieldrin/Endrin
- Chlordimeform (Galecron)
- Dibromochloropropane (DBCP)
- Chlordane/Heptachlor
- HCH/Lindane
- Ethylene Dibromide
- Camphechlor (Toxaphene)
- Pentachlorophenyl (PCP)

OIL CATASTROPHES

Fig.1

CATALOGUE OF DISASTERS

1 Britain's worst oil spill happened in 1967 when the **Torrey Canyon** grounded off Land's End releasing 31 million gallons of crude oil. 41 high explosive bombs were dropped, setting fire to the tanker and its oil. UK and France received £1.5 million in compensation.

2 In 1968, the **World Glory** spilt 323,000 barrels of oil off the UK west coast through hull failure.

3 October 1970 saw the **Pacific Glory** collide with another tanker, the **Allegro**, off the Isle of Wight with 6,000 tonnes of oil being spilt into the Channel.

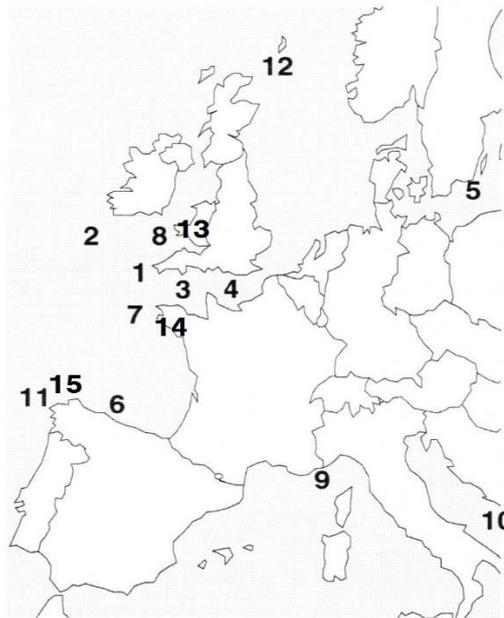
4 In March 1971 the Liberian tanker **Panther** ran aground on Goodwin Sands off Dover carrying 25,000 tonnes of oil but luckily none spilt.

5 In March 1976 off Sweden the **Othello** ditched 322,000 barrels of oil in collision.

6 In May 1976, 100,000 tons of crude oil were released around the Spanish coast after the **Urquiola** ran aground.

7 The **Amoco-Cadiz**, a super-tanker, broke in two three miles off the Brittany coast spilling 230,000 tonnes of oil in March 1978

8 The **Christos-Bitos** ran aground off the Welsh coast in October 1978 with the oil successfully pumped on to waiting tankers.



In July 1988 Lake Lagoda, north of Moscow suffered a gigantic slick from a tanker collision. The **Exxon-Valdez**, in March 1989 ran aground in Prince William Sound, Alaska, spilling 40,000 tonnes of oil which polluted 100sq.miles of coast, devastating wildlife.

1990 saw a fire aboard the **Mega Borg** in the Gulf of Mexico with 71.500 barrels lost as the oil spread over 40 km from the tanker.

An enormous oil slick at **Kuwait** in Jan 1991 was deliberately caused by Iraqi invaders in an attempt to delay possible land-sea invasion by the UN Joint Forces as part of Operation Desert Storm. Estimated oil released was 6-8 million barrels.

9 In April 1990-Jan 1991 huge oil slicks from the tanker **Haven**, which sank off Genoa, polluted tourist coastlines from Corsica to Nice.

10 In May 1992 a **Russian** tanker collided with a freighter releasing 14,600 barrels on to the southern coast of Greece.

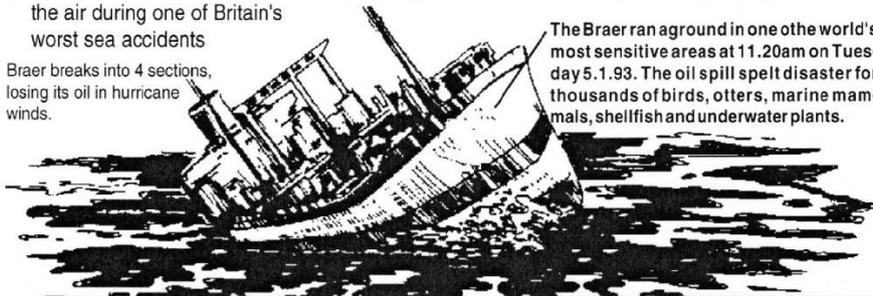
11 in November 1992 the Greek tanker, **Aegean Sea** ran aground in stormy weather near La Coruna, Spain spilling 586,00 0 barrels of oil as the ship broke in two.

12 Jan 1993 the Liberian registered tanker, **Braer**, ran aground in hurricane winds and heavy seas onto Quendale bay, S.Shetland with a cargo of 85,000 tonnes of Norwegian crude whilst en route to Canada. The tanker captain elected to use the Fair Isle channel for shelter in the storm rather than take the northern route. Seawater polluted fuel lines and the tanker was cast adrift.....

BLACKDEATH TAKES HEAVY SHETLAND TOLL

The oil slick from the stricken tanker, Braer, polluted coastal waters, beaches, farms, wildlife and the air during one of Britain's worst sea accidents

Braer breaks into 4 sections, losing its oil in hurricane winds.



The Braer ran aground in one of the world's most sensitive areas at 11.20am on Tuesday 5.1.93. The oil spill spelt disaster for thousands of birds, otters, marine mammals, shellfish and underwater plants.

85,000 tonnes of North Sea crude lost in sea around southern Shetland.
 Quendale bay - polluted beaches, sand dunes and grassland. Oil spray carried inland by storm, polluting grazing land, sheep and crops. Roads in the area dangerous because of oil on road. Evacuation plans for animals and people set on standby. Roads closed.
 Sumburgh Head - massive seabird and seal colonies polluted.
 Loch of Spiggie - home to 400 whooper swans (7% of British popn) damaged by air spray of oil.

Sea mammals and cetaceans - large numbers of common and grey seals inhabit waters inshore together with dolphins and porpoises (700 estimated in area) all put at risk from slicks and detergent sprays.
 Salmon Farming - employs 1,000 islanders affected by oil pollution to cages.
 Tourist industry severely dented by oil slicks. Loss of thousands of twitchers (bird spotters) holidays due to slicks.
 Oil whipped into deadly mousse by storm force winds - in combination with detergents - kills most wildlife.

3,000 islanders employed by fishing industry - jobs put at risk. In immediate area of Garths Ness, the accident site, there were 2,000 shags, 200 eider ducks, 160 gull-mots, 50 rare northern divers all at risk and dying.



900 otters at risk from oil slicks-exact damage not yet known.

13 On 15 February 1996, the Liberian oil tanker the **Sea Empress**, loaded with 130,000 tonnes of crude oil, grounded on rocks at the entrance to Milford Haven port (Wales, Great Britain). The vessel could only be freed five days later, after having lost more than half of her cargo. Despite the application of dispersant and the mobilisation of six sea response vessels, the pollution affected more than 100 kilometres of coastline. Fishing was banned for several months in the surrounding area.

14 On 12 December 1999, the Maltese tanker the **Erika** was caught in a storm and broke in two off the coast of Brittany (France), with 31,000 tonnes of heavy fuel oil onboard. Nearly 20,000 tonnes polluted over 400 km of French coastline, with significant consequences for the fishing and tourist industries. The fuel which remained imprisoned within the wreck was pumped out in the summer of 2000.

15 On 13 November 2002, the Bahamian oil tanker the **Prestige**, en route for Singapore carrying 77,000 tonnes of heavy fuel oil, requested assistance due to damage to her hull, off the coast of Cape Finisterre (Galicia, Spain). The crew was airlifted to safety and the vessel was taken in tow. After 6 days of towing in search of a port of refuge, the vessel broke in two and sank in 3,500 m deep waters. Over 60,000 tonnes of fuel drifted at sea. Unprecedented response operations succeeded in recovering a third of this fuel at sea.

During the following weeks, the remaining fuel polluted more than 1,000 km of Spanish and later French coastline, triggering the largest response operation ever seen in Europe. Despite efforts to seal the wreck, the seeping continued, forcing the Spanish authorities in the summer of 2004 to organise and carry out a pumping operation on the wreck, 3,500 m below the water surface, a technological first.

1. Design a diagram to illustrate the problems of the Aral Sea
2. What might be done to remedy the problems of the Aral Sea?
3. What are the dangers of sea pollution?
4. Describe the impact of oil tankers spilling their cargo at sea.
5. Research the Environmental impact of pollution and write a newspaper article on the topic.