



A tale of two seas-the Aral Sea

The Aral Sea (Figure 1) was once one of the four largest lakes in the world covering an area of 68,000 sq km (26,300 sq mi) but now it has shrunk to a fraction of its former size. The northern part of the Aral Sea (Figure 2) lies in Kazakhstan whilst the southern part lies in Uzbekistan. The whole of the Aral Sea Basin covers about 1.8 million sq km (Figure 3) and is a closed drainage area. Its western and central parts are covered by plains, whilst the eastern part is occupied by large mountain ranges which merge into the Himalayas and collect snow and ice in winter and release this as river flow in the summer. The rivers in the Aral Sea Basin flow from the mountains onto the plains and most disappear into the sand in the deserts, except for the two largest rivers, the Syr Darya and the Amu Darya which cross the deserts and flow into the Aral Sea.

The Aral Sea was part of the Soviet Union and from the 1930s the planners started to build canals to take water from the two main rivers in order to develop irrigated cotton and rice farming in the area. Cotton growing has been very successful in the area and Uzbekistan is still one of the world's main exporters of raw cotton. However, during the 1960s even more irrigation canals were built, and like the earlier ones, up to 70% of the irrigation water either leaked out of the canals or was evaporated from them. As a result less and less water was flowing into the Aral Sea and the sea began to shrink (see Figure 2).

Figure 1 The Aral Sea

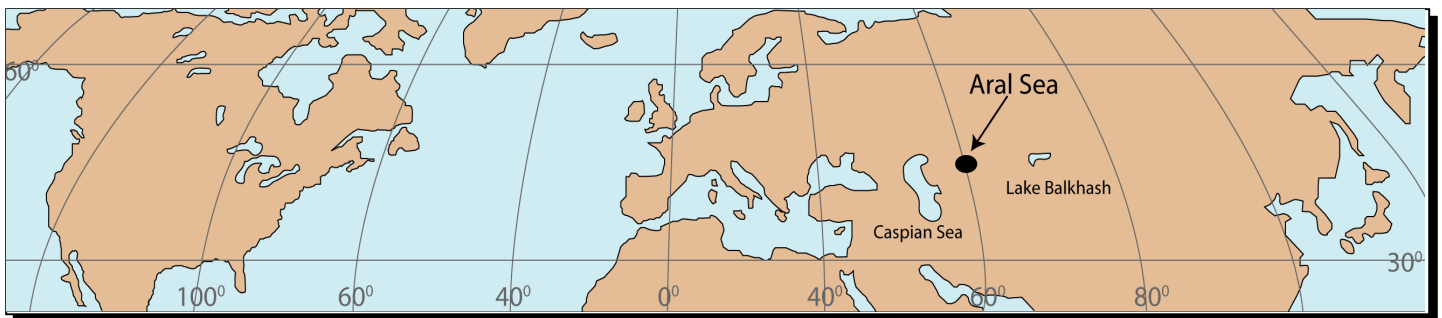


Figure 2 The shrinking Aral Sea

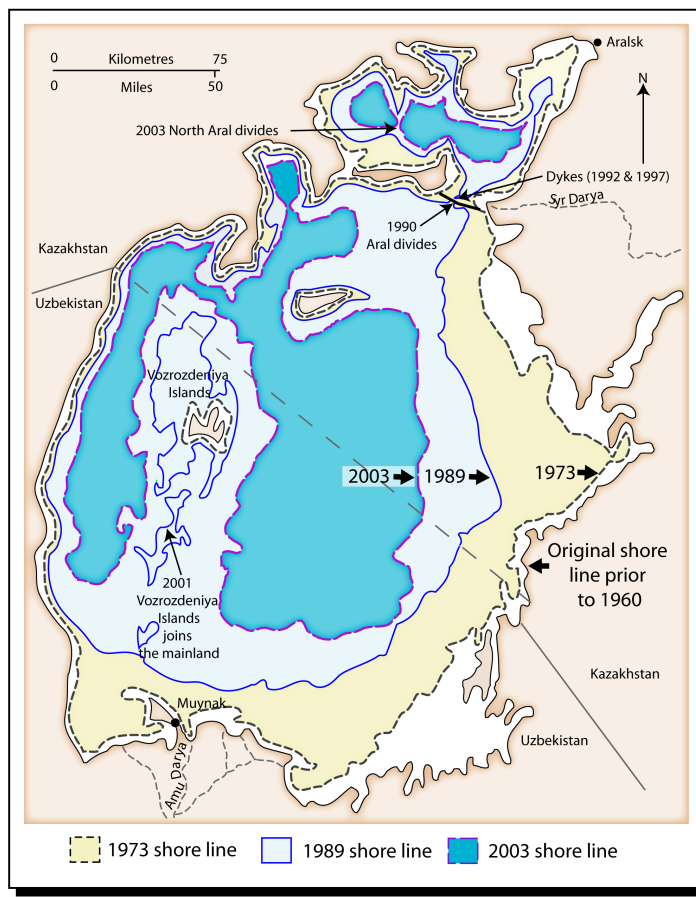
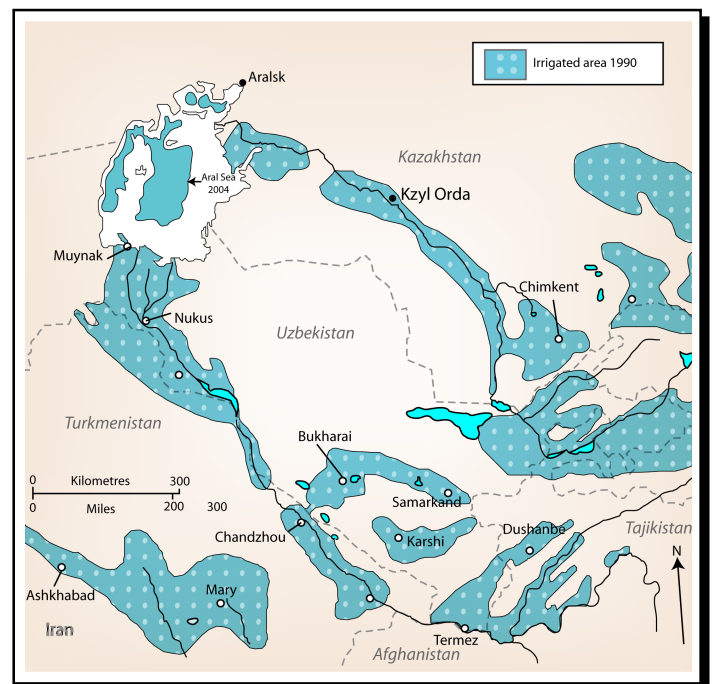


Figure 3 Aral Basin



The shrinking of the Aral Sea

- From 1960-70 the Aral's sea level fell by 20cm per year. In the 1970s the rate of fall grew to 50-60cm per year and in the 1980s to 80-90cm per year
- From 1960 to 1998 the surface area of the sea fell by 60% and its volume by 80%

- In 1987 the continued shrinkage of the sea split it into two the North Aral Sea (also called the Lesser Sea or Small Aral Sea) and the South Aral Sea (also called the Greater Sea or Large Aral Sea)
- In 2003 the South Aral Sea further divided into two, an eastern basin and a western basin
- By 2004 the Aral's surface area was only 17,160 sq km (6,630 sq mi) that is about one quarter of its original size
- By 2007 the Aral had shrunk even further to 10% of its original size
- Part of the South Aral Sea by 2009 had extremely high rates of salinity
- The high salinity meant that far fewer fish could live in the sea

Results of the shrinking sea:

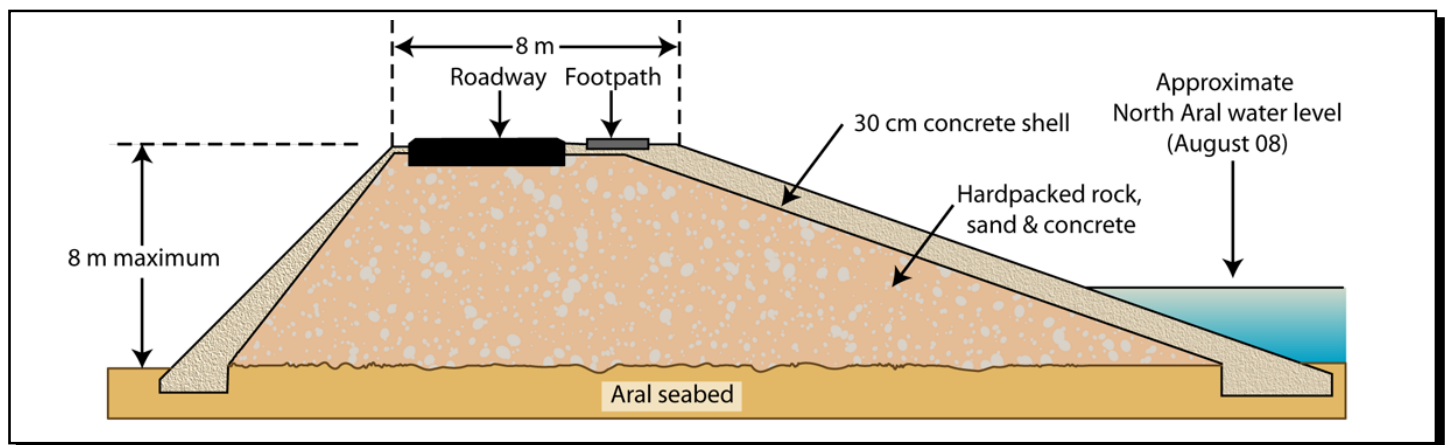
- The Aral Sea used to support a prosperous fishing industry, employing up to 40,000 people, in which species such as bream and barbel were caught. As the sea shrank the water became even more polluted and saline, and so fewer species of fish could survive. Soon fishing boats had to be laid up or scrapped and unemployment became a problem amongst fishermen. There were few jobs available in the new irrigated cotton and rice farms so some people had to move away. As people moved away local shops and services such as hospitals and schools found it harder to survive and some were forced to close or amalgamate because there were fewer local people
- As the sea shrank further fishing ports closed as they found themselves further and further from the shoreline Aralsk used to be a major fishing port but by 2007 it found itself 100km from the waters edge. Many more people became unemployed and some were forced by the government to move to other parts of the Soviet Union in order to find work
- The sea bed exposed by the shrinkage of the lake dried out and affected the local climate which has become colder in winter and hotter in summer. The dried out sea bed also contained many chemical residues from the pesticides and fertilisers used on the cotton, as well as sewage residue, and these were whipped into huge toxic dust storms by local winds. By 1990 as much as 70 million tons of salt rose into the atmosphere from what was once the Aral Sea bed. The dust storms were so huge that they measured 400km by 40km and could be seen by satellites from space.
- The toxic dust led to high rates of respiratory diseases, especially tuberculosis amongst people in the area. Cancer also spread more widely particularly cancer of the throat. Other health problems included the growth of anemia amongst many local people as well as kidney, eye and liver problems. There were also high rates of infant (75 per 1,000) and maternal (12 in every 1,000 women) mortality in the area which have been linked to the dust storms.
- Plants and animals which used to live in the area, including the famous wild horses could no longer find enough food as the environment changed, and so many died or migrated to other areas away from the Aral sea.



Making changes

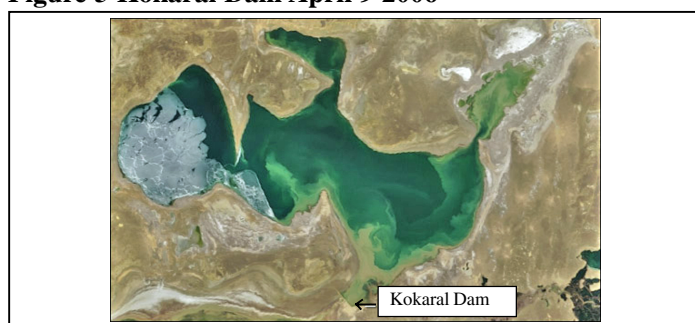
In 2003 the Kazkh government used some of the money it made from its oil exports to begin construction of the Kokaral Dam (Figure 4).

Figure 4 The Kokaral Dam



This is a concrete dam, funded in part by the World Bank, which separated the two halves of the Aral Sea (Figure 5).

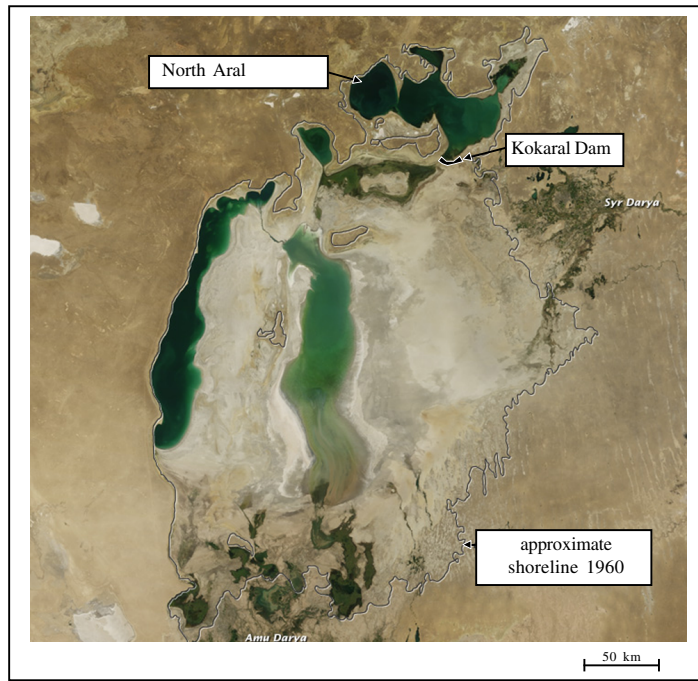
Figure 5 Kokaral Dam April 9 2006



Work on the dam was completed in 2005 and this has allowed the water level in the North Aral to rise as more fresh water flows in and less flows out. Since 2005 the level of the North Aral has risen by 10 metres, which was much faster than local people expected. At the same time the salinity of the North Aral is also declining making it a much better environment for a wider variety of fish. Again local people were surprised at how quickly a wide variety of fish returned to the sea. Another part of the process is the drive to improve irrigated farming, by measures such as lining irrigation canals with concrete to reduce water loss and by improved drip irrigation in the cotton fields to reduce the amount of water used..

Recovery in North Aral

Figure 6 Recovery in North Aral



The improving conditions in the North Aral have meant that there are now over 80 fishing boats operating in the sea and in 2009 over 2400 tons of fish were caught in the North Aral. This raises the question of sustainability, and the current estimate is that 10,000 tons will soon be caught each year. The improving conditions in fishing have attracted investment in a new 10 million dollar fish processing plant in Aralsk and another is under construction in nearby Karaterin. The plan is to export fish to Russia and central and eastern Europe. The revival of the fishing industry has attracted some people back to this part of the Aral Sea. This in turn has helped local services such as shops, schools and hospitals to set up or to expand. Similarly as the fishing industry redevelops so there is additional income to invest in the local agriculture which still relies heavily on cotton.

There are plans to diversify agriculture in Kazakhstan by the introduction of crops such as alfalfa and melons as well as maize and sorghum. This will help to support those farms which now use technology which is old and in need of modernisation. The main drive will be to improve the irrigation works to reduce water loss and also to plant many more drought resistant trees to help to improve the local climate. The rearing of sheep and goats is a traditional occupation in the area but as pasture disappeared so did the animals. There are now plans to re-introduce sheep farming on a large scale supported by pastures irrigated by the rising water of the Aral Sea.

Continued decline in South Aral

Just as the North Aral has prospered as a result of the Kokaral Dam the South now finds that it receives even less fresh water than it used to. The sea here is still shrinking and leaving vast areas of dried out former sea bed. There were a number of islands in the South Aral and these are now no longer islands. This means that the protected nature reserve on one of the islands which used to be home to horses, wild deer and eagles now has very few animals which have all been forced to scatter to places with more water. Some trees and bushes have been planted in the former sea bed to improve local climate conditions.

Uzbekistan is reported to now be more interested in exploring for oil and gas than in the drying sea bed of the South Aral Sea. The idea is that the income from oil and gas will pay for the improvements to agriculture required to sustain the cotton growing industry of the area. Cotton farms need money to improve the irrigation works on which they depend. These improvements include better lining for the canals to prevent water seeping away into the soil and more fertiliser to replace the nutrients taken from the soil by the demanding cotton crop.

Danger of water wars?

The UN Secretary General Ban Ki-moon has urged the leaders of the Central Asian States (Uzbekistan, Kazakhstan, Kyrgyzstan, Tajikistan and Turkmenistan) to work together to balance the water needs of their various countries. The International Fund for Saving the Aral Sea (IFAS) is an organisation set up to rescue the Sea, however the 48 million people currently living in the Aral Sea basin will increase to 75 million by 2025. This is going to put a big strain on water resources in the area, especially as 60% of people in the area live by irrigated farming, which is often very wasteful of water. It will be a major challenge to balance the conflicting demands for water from homes, farms, cities and factories across states who have been at war with each other in the past.

The Aral Sea shrank from 66,100 sq km to 10,400sq km in 2008. In 2010 the eastern part of the South Aral Sea almost completely dried out, leaving two bodies of water, the North Aral Sea and the Western South Aral Sea.

What future for the Aral Sea?

Given the very serious problems with the Western South Aral Sea there seems little hope of saving this major part of the Aral. It seems likely that as it continues to dry out and become even more saline even fewer fish will be able to live there and even more wildlife will either die out or be forced to move in search of a better environment. As the sea dries out the continued desertification of the local climate will become even more acute with colder winters but especially hotter and drier summers. In this way the desert will advance once more. However the outlook for the North Aral Sea is much brighter. The Kokaral Dam may shortly be joined by a second dam using a \$126 million loan from the World Bank to Kazakhstan. This dam will continue to raise the level of the North Aral Sea with the intention of bringing sea level back to the port of Aralsk is still currently some 40km from the waters edge.

In future the Aral Sea Basin will need planning as a whole with the following aims to :

- develop management strategies to give sustainable water use
- develop management strategies to give sustainable land resource uses
- improve the information base needed to plan the development of water resources in the area
- mitigate the effects of the deterioration of the environment, by such approaches as planting trees and creating shelter belts
- improve conditions for people and animals living close to the Sea

Further Reading

UNESCO:

Water related vision for the Aral Sea Basin for the year 2025

The Kazakh Miracle: Recover of the North Aral Sea

(<http://www.ensnewswire.com>)

Miraculous Catch in Kazakhstan's Northern Aral

(<http://www.goworldbank.org/j4ufhm4sq1>)

Aral Sea Foundation (<http://www.aralsea.org/>)