European Journal of Interdisciplinary Research and Development
Volume- 52 June- 2026
Website: www.ejird.journalspark.org ISSN (E): 2720-5746

THE ARAL SEA DISASTER AND ITS EFFECTS ON NEARBY COUNTRIES AND CITIES

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Abstract
This article examines how the shrinking of the Aral Sea has affected the countries of Central Asia, looking at the environmental and economic consequences of the crisis and focusing on the measures taken to mitigate its effects.

Keywords: Aral Sea, water scarcity, irrigation, desertification, environmental degradation, economic impact, Central Asia, regional cooperation.

Introduction

Once one of the largest bodies of water on Earth, the Aral Sea is located at the center of Central Asia, bordering between Uzbekistan and Kazakhstan. In the 1960s, it provided valuable fishing products, moderated the region's climate and supported the lives of thousands of people who lived along its shores. However, that same sea has almost disappeared. Satellite images, taken over the past several decades, show a shrinking lake, which is turning into a desert now known as the Aralkum.

The cause of this catastrophe was not a natural drought or change in climate; instead, it was intentional human actions and decisions during the Soviet era. During the 1960s, Soviet planners diverted the two rivers that supported the Aral Sea, the Amu Darya and the Syr Darya, into a network of irrigation systems designed to turn the arid plains of Central Asia into a vast cotton-producing factory. Uzbekistan, in particular, was forced to become one of the world's leading exporters of cotton, a crop often known as “white gold,” even as it quietly drained the region's most important water source. The irrigation project succeeded in its narrow economic goal, albeit at a high cost. Over the following decades, the sea lost around 90 percent of its volume, splitting into smaller remnants.

The sea's crisis area directly covers Uzbekistan, Kazakhstan, and Turkmenistan, and reaches indirectly to Tajikistan and Kyrgyzstan through the rivers that once fed it. For Uzbekistan, a country that shares a significant portion of the Aral Sea's former basin, the consequences of this disaster have not been distant. They have impacted nearly every aspect of life in the surrounding regions, especially Karakalpakstan and the Khorezm provinces, where the land, the air, and the health of ordinary people have all been changed by what is now called one of the worst man-made environmental disasters in history. But it affects not only Uzbekistan, also other countries. Across the water in Kazakhstan, the port city of Aralsk was left stranded up to 100 kilometers from the diminishing shoreline; its fishing industry fell as much as Moynaq's.

Environmental and Economic Damages

In 1960, the sea covered roughly 68,000 square kilometers and held about 1,093 cubic kilometers of water. By 2010, however, its surface had fallen to around 14,000 square kilometers and its volume to 98 cubic kilometers, a loss of nearly 90 percent of its water. In its place now stands Aralkum, a desert of roughly 60,000 square kilometers, about 4 million hectares, that did not exist 60 years ago and is considered the youngest desert on Earth.

The most visible effect of the Aral Sea's disappearance has been environmental. As the sea shrank, it left tens of thousands of square kilometers of exposed seabed, covered with a mixture of salt, sand and agricultural pesticides (DDT) that had been washed into the water during the Soviet period. Wind picks up this toxic dust and carries it across the region, sometimes into farmland, villages and even cities. Local residents describe salt storms that can cover an entire town in a fine white powder, a phenomenon almost unheard of before the sea began to shrink. As dust permeates into the soil of nearby farmland, it gradually poisons the agricultural land that the irrigation project was designed to expand. A 2022 World Bank study calculated that these storms alone cost Karakalpakstan more than 44 million dollars annually in economic damage, equivalent to about 2 percent of the region's entire GDP.

Salt-laden dust settling directly on crops and farmland, combined with rising soil salinity from inefficient irrigation canals, has forced farmers into a costly cycle of “washing” their fields with additional water before planting and again before harvest just to keep the salt concentration low enough to grow anything at all.

The economic impact has been just as significant. Moynaq, which used to be the Aral's southern shore, was once the source of nearly 98 percent of Uzbekistan's fishing industry, which collapsed entirely once the water disappeared in 1979. Moynaq's fishing fleet now sits rusting in the desert sand, a landmark that attracts visitors. Estimates suggest that somewhere between 40,000 and 60,000 fishermen lost their jobs, and many families left the region in search of work elsewhere, a slow but steady depopulation that has almost emptied communities across Karakalpakstan. When similar agricultural jobs along the Amu Darya and Syr Darya are included, the number of people who lost their livelihoods climbs toward 100,000. Soil salinization, worsened by both the salt dust and poor irrigation management, has reduced crop yields across farmlands in Uzbekistan, forcing farmers to rely on chemicals simply to maintain output. This has placed additional strain on a national economy that even today remains heavily dependent on agriculture and cotton exports.

Kazakhstan, which occupies the sea's northern shore, witnessed the same losses as Uzbekistan. The Kazakh port city of Aralsk experienced the same consequences as Moynaq: between 1957 and 1987, the annual catch collapsed from about 48,000 tons of fish to zero. Local fishing industries were processing less than 400 tons of fish a year by the 1990s, and the collapse of both the fishing and agricultural trades pushed unemployment sharply upward across Kyzylorda.

Turkmenistan, situated in the southwest of the former seabed, has also experienced a number of consequences similar to Uzbekistan's. Salt and dust storms sweep across its northern province, and its share of the Amu Darya has shrunk. Kyrgyzstan and Tajikistan, whose mountains produce the meltwater that feeds the Syr Darya and Amu Darya, depend heavily

on hydropower and often need to release water in winter, when downstream nations like Uzbekistan and Turkmenistan need it held back for summer irrigation, creating regional tension among several countries. In Tajikistan, the poverty level reached as high as 83 percent of the population at one point in the 1990s, leaving the country unable to prioritize long-term regional water planning over immediate domestic needs.

Possible Solutions

In 2005, with 64 million dollars in financing from the World Bank, Kazakhstan completed the 13-kilometer Kokaral Dam across the Berg Strait, blocking the smaller North Aral Sea from the larger, more severely drained southern portion that lies mostly in Uzbekistan. Consequently, water levels rose by 4 meters within around seven months, a change World Bank engineers had expected to take a decade. Salinity in the North Aral fell from about 30 grams per liter to around 8, allowing fish to return through the Syr Darya. The fishing catch climbed to 1,360 tons by 2006, then to 7,106 tons by 2016, and now stands at about 8,000 tons a year, an almost six-fold increase in a decade.

Uzbekistan has pursued a different approach to combat the problem. In 2015, the government approved a five-year program to address the consequences of the Aral disaster with a budget of 3.9 billion dollars, covering water management reform, healthcare, and ecosystem restoration in the affected coastal area. International supporters have provided additional funding as well. The United Nations alone has run Aral-related development projects in Karakalpakstan worth millions of dollars, including an earlier initiative from 2012 to 2016 worth close to 3.8 million dollars, both aimed at addressing poverty, food issues, and water quality in communities left behind by the diminishing sea.

In 1993, recognizing that no single country would be able to solve a problem stretched across five borders, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan founded the International Fund for Saving the Aral Sea. This institution helped to ease tension between upstream and downstream states. Tajikistan's Rogun Dam project on the Vakhsh River and Kyrgyzstan's Kambarata-1 project on the Naryn River both remain sources of regional tension, but analysts argue that lasting recovery for the basin will depend less on any single dam and more on cooperative approaches: modernized irrigation to reduce the water lost to Uzbekistan's cotton fields, and continued investment in ecological restoration such as Kazakhstan's, which has already been proven to work.

Conclusion

The Aral Sea disaster shows how quickly a resource once thought permanent can vanish, and how unevenly its cost falls on the people who depend on it. Uzbekistan and Kazakhstan experienced the most direct losses, but Turkmenistan has also suffered, and decisions made upstream in Kyrgyzstan and Tajikistan still shape how much water ever reaches the basin. A crisis created by treating a shared river as an unlimited resource cannot be solved by one country alone.

The sea as it existed before the 1960s is almost certainly gone. What remains achievable, however, is stabilizing the water still flowing into the basin, protecting nearby communities

from its dust and degraded land, and building regional cooperative initiatives that have proven difficult but not impossible.