



STABILIZING THE ECOLOGICAL SITUATION IN THE ARAL SEA REGION, MITIGATING THE NEGATIVE IMPACT OF ENVIRONMENTAL PROBLEMS CAUSED BY DRYING UP THE ARAL SEA

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Abstract

This article describes the ecological problems of the Aral Sea region and the history of the Aral Sea drainage, its causes and the problems that arose as a result of its negative consequences and solutions to mitigate their impact. Statistical information and other data on water distribution are provided.

Keywords: Aral Sea, Amu Darya, Syrdarya, UN, Aral Sea, Red Book.

Introduction

Nature refers to all that has to do with the origin of mankind and human activities. It includes the entire universe – the world, people, the universe, and all micro, macro, and mega systems. It is composed of inanimate and living creatures. Nature acts on the basis of its own laws, exists independently of human intentions. While we humans are part of nature, we cannot change its basic rules – we can only adapt to it and use its elements according to our needs.

Today, a huge number of species of animals are breeding in Karakalpakstan and Uzbekistan

endangered. Among them are the Aral sterlet, the Amu Darya pike sterlet, the Aral Sea white fish, the white carp, the Ustyurt mountain sheep, the Turkmen kulan and the gazelle – all listed in the Red Book. According to the information presented on



the website "Kun.uz, the most endangered animal in Uzbekistan - the lynx - also disappears over time.

The Aral Sea is the 4th largest salt lake in the world in terms of territory, and until recently its area together with the islands was almost 68,000 km, and its water volume was 1000 km¹. The average depth was around 50.5 m. It is located in Central Asia, in the northern part of Kazakhstan and in the southern part of Uzbekistan. The sea used to be a space for many species of fish and a source of food for many people. The products of the Aral Sea accounted for 6/1 of the total fish supply of the former USSR. The sea had its own unique flora and fauna. Humans had food, work, and a clean ecology. As industrialization came to the region, the lake gradually began to become polluted. The drying up of the Aral Sea is described as one of the worst natural disasters on the planet.

If we take a look at the main causes of drying up of the Aral Sea, we can explain them as follows:

✓ The Soviet Union decided to cultivate large tracts of land. This case dates back mainly to the 1960s. Of course, for this, it was necessary to change the Amu Darya and Syrdarya rivers, from which the Aral Sea takes water. At this point it is worth paying attention to something, the Aral Sea is a sea that does not receive water from any water source, that is, water does not flow into it from nowhere. This means that if the passage of these two rivers to the Island is blocked, the Aral Sea will be cut off from the integral water resource, of course, there is also rainwater, but only rain will not be enough to maintain the volume of water in the lake. After the construction of the water-distribution canals, as experts say, the Aral Sea grew smaller, but at that time some experts believed that the lake was a mistake of nature. They thought that the loss of the island would not harm the environment, so no one opposed the project. He was strongly attached to the idea of growing cotton all over the countryside. The Soviet government also planned to grow rice, melons, wheat on the recently fertile lands. Unfortunately, the canals were poorly built. Of this stubble, 75% of the water has been absorbed into the ground, and this has not stopped the project either. Because such a watering rate was also considered lucky. In 1988, Uzbekistan became a world leader in cotton² export.

¹ https://uz.wikipedia.org/wiki/Orol_dengizihttps://uz.wikipedia.org/wiki/Orol_dengizi

² <https://www.gazeta.uz/oz/2019/02/08/orol-tarix/>



In 1991, the Soviet Union collapsed. However, its former member states continued to use rivers that draw water from the island. Although many years have passed, the canals have not been repaired. The Aral Sea area was getting smaller and smaller. As of now (as of April 2025), the total area of the Aral Sea is about 3,500 square kilometers. This means that only 5% remains of the 68,000 km² in the 1960s. The Northern Aral Sea (on the territory of Kazakhstan) currently covers an area of 3,065 km² and has a water volume of 22.1 billion cubic meters. This indicator has increased by 111 km² compared to 2022. The southern Aral Sea (on the territory of Uzbekistan) is almost completely drained, and only a few small reservoirs have survived. In 1990, the level of salt in water was 36.7%. That's even higher than the Dead Sea (33.7) and 10 times more than ocean water³.

In addition, the drying up of the island did not fail to have a significant impact on the health of the people around it. The Aral Sea crisis has created not only an environmental problem, but also serious social and health problems. In particular, the adverse health effects on the millions living in the Aral Sea areas are clearly proven by scientific studies. For example, respiratory diseases: when the Aral Sea dries up, the Arolkum desert that emerged in its place spreads 100–150 million tons of salt and dust annually through the wind. These particles have sharply worsened air quality, causing an increase in the incidence of bronchitis, asthma and chronic respiratory diseases⁴. Next, mental and nervous health: Depression, memory loss, mental instability, and other psychological problems have also become more common as a result of environmental changes. This condition is especially observed in young people and women⁵. And then there is the child health and mortality rate: in the 1990s, child mortality in the Aral Sea was 60–110 cases per 1,000 births, which was twice the average of Uzbekistan at that time⁶. Over the past few decades, the Aral Territory has shrunk by 80% in cash. It is a barren, poisonous desert in the places where the water drains. The pistachios and chemicals that hit the island remain in the soil, and now the toxic dust is flying through the air. The ecosystem of the lake has been depleted, and the health of the inhabitants living

³ https://tidsskriftet.no/en/2017/10/global-helse/vanishing-aral-sea-health-consequences-environmentaldisaster?utm_source

⁴ https://uza.uz/oz/posts/orol-dengizi-qurishi-salbiy-oqibatlarini-tugatishning-ikki-yolibor_192572?utm_source

⁵ https://encyclopedia.pub/entry/21700?utm_source

⁶ https://tidsskriftet.no/en/2017/10/global-helse/vanishing-aral-sea-health-consequences-environmentaldisaster?utm_source



around the island has also been greatly affected. Toxic dust has been the cause of diseases of the lungs, cancer, digestive disorders and many others.

The drying up of the Aral Sea has become not only an environmental crisis, but also a major socio-economic problem. In connection with the drying up of the sea, thousands of people lost their jobs, which led to a sharp increase in the unemployment rate in the region. These are:

- o Fisheries industry crisis; In the 1960s, up to 40,000 tons of fish per year were caught in the Aral Sea⁷.

- o Decline in agriculture; Irrigated lands suffered from salinity, Productivity declined⁸.

- o Unemployment and migration: In the 1990s, the unemployment rate in the Aral Sea was over 40%, and the population faced forced migration⁹.

The Aral Sea crisis has gained international attention as one of the major environmental disasters of the 20th century. Various approaches, assistance and solutions to this environmental tragedy have been put forward by the world community. Since 1995, various UN bodies — including UNDP, UNEP and UNESCO — have been working in the areas of water conservation, health, education and

Stub¹⁰ In the 1990s, the World Bank, together with the government of Kazakhstan, launched the Save the Aral Sea program. In ¹¹2018, the UN General Assembly declared the "Aral Sea area an area of environmental innovation and technology". The Aral Sea crisis is a vivid example of the problems that have arisen between the states of Central Asia as a result of uncoordinated policies on the use of water resources. This situation is exactly in line with the theoretical concept called the "Tragedy of the Commons". The theory of the "tragedy of the commons" was put forward by Garrett Hardin in 1968. It states: "If everyone continues to use a common resource for their own benefit without limits, that resource will eventually be lost to the whole community."¹²

⁷ <https://www.annualreviews.org/doi/10.1146/annurev.earth.35.031306.140120>

⁸ <https://www.unep.org/resources/report/drying-aral-sea>

⁹ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1125035/>

¹⁰ <https://www.undp.org/uzbekistan/news/aral-sea>

¹¹ <https://www.worldbank.org/en/news/feature/2018/11/07/the-rebirth-of-the-north-aral-sea>

¹² www.annualreviews.org (<https://www.annualreviews.org/doi/10.1146/annurev.earth.35.031306.140120>)



The Amu Darya and Syr Darya rivers are the main sources of water for the Central Asian states - Uzbekistan, Kazakhstan, Tajikistan, Turkmenistan and Kyrgyzstan. Each country pursues its own economic interests:

- Expanded irrigated land area
- Built drainage canals at alarming rates
- Preferred cotton and rice crops with high water consumption. As a result, each

The pursuit of self-interest by the state led to the depletion of the total water reserves. The volume of water flowing into the Aral Sea has decreased by 90% and the sea has dried up. As a result, the ecosystem in the Aral Sea region was completely destroyed, public health, economy, living conditions were seriously damaged, conflicts over water arose between the states.

Statistics of use of the waters of the Amu Darya and Syrdarya of the countries of Central Asia (2024).

Water quotas on the Amu Darya river:

- O'zbekiston: 16 milliard m³
- Turkmaniston: 15.5 billion m³
- Tojikiston: 6,9 milliard m³

Water quotas allocated by the Syrdarya:

- O'zbekiston: 8.8 billion m³
- Tojikiston: 1,9 milliard m³
- Kazakhstan: 0.92 billion m³

Multilateral cooperation - "Tragedy of the Commons", i.e. to get rid of the problem of the tragedy of the Common Wealth, can be an important and necessary path to the Central Asian states. This disambiguation page lists articles associated with the title Disambiguation. As a solution to this, it is proposed to create a regional water base. Common platform for real-time monitoring of water levels and consumption between countries. It is also possible to conclude agreements that set the same standards for all water-sharing countries. For example, the 1992 Water Distribution Agreement is being renegotiated in the new climate. In addition, a unified policy for the management of transboundary waters should be applied. This is because each state manages water for its own interests, which leads to a regional crisis (for example, the Rogun hydroelectric power plant project in Tajikistan). As for such problems, it is necessary to establish the work of an independent regional agency, i.e. an organization that allocates water resources and resolves disputed issues (for



example, ICWC - an enhanced version of the International Water Coordination Commission).¹³ For statistics, it is worth mentioning that according to UN reports, agreements for transboundary waters eliminate more than 90% of ¹⁴conflicts.

In general, the Central Asian states must take immediate measures to overcome the water crisis. Otherwise, in the future, not only agriculture, but also

Health, demographic stability and regional security are also at risk. Based on the above statistical data and graphic analysis, it can be noted that there is a lack of balance among the Central Asian states in the use of water resources of the Amu Darya and Syrdarya. As each country strives to meet its agricultural, industrial and drinking water needs, it is using a common resource — water — in an overabundance and uncoordinated way. This is a case in line with the theory of "Tragedy of the Commons" and jeopardizes the sustainability of the resource. The Aral Sea tragedy is the saddest consequence of this situation. Environmental and social problems in the region are deepening. In this regard, it is necessary to further ensure equitable distribution of water resources, strengthen regional cooperation and introduce advanced water-saving technologies. Only through mutual trust and coordination Central Asia can preserve common water resources and achieve sustainable development. *Solidarity is the only solution here!

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