

## **Solidarity for the Aral Sea. What are the effects of the largest environmental disaster of the last century?**

**Piotr Rzymiski, Piotr Klimaszyk**

The history of the Aral Sea, also known as the Aral lake or just Aral, is one of the most spectacular examples of what ignorance of government can lead to. Professor Nikolai Aladin tells about one of the greatest ecological disasters of the last century and perspectives for the future.

Even 60 years ago, Aral lake was the fourth largest continental reservoir on our planet. It was called the sea because of its huge surface area (68 500 km<sup>2</sup>), but in terms of hydrochemistry it was obviously a lake. Its water was supplied by two rivers – Amu-Daria from the present Uzbekistan and Syr-Daria from the side of Kazakhstan. In times of prosperity, it was one of the most important places of fishing in the former Soviet Union, it fed people and gave them an employment. Today, only the memory remains after a period of prosperity.

In the 1920s, the USSR authorities decided to transform semi-arid areas along the course of both rivers into agricultural land – mainly cultivations of cotton. Ten years later, the construction of irrigation channels for the Kara-Kum desert began. They were carried out with primitive methods and against good practice in hydrology - 70 % the drained water soaked into the sand or evaporated, never reaching the crops. It is not understood that Soviet hydrologists could not foresee this. The amount of water reaching Aral lake was constantly decreasing. Very quickly water inflow couldn't compensate the water loss through evaporation. The surface of the reservoir began to decrease. From the 1960s, the water level dropped by about 20 cm per year, in the '70s by about 60 cm, and a decade later - by as much as 90 cm per year. Until the end of the last century, the water level dropped by 26 m, and more than 80% of the original surface of the reservoir became a land. The two largest fishing ports, Moynak on the Uzbek side and Aralsk in Kazakhstan are dozens of kilometers from the current shoreline. Thanks to the involvement of such people as prof. Aladin, a dam that accumulates Syr-Daria's water in the northern part of the lake (called Little Aral) was built, and to improve more the situation the construction of a new dam is considered.

**Professor, for many years, with great determination, you are propagating in the World knowledge about the ecological catastrophe that met the Aral Sea. You are this year's guest of the Polish Limnology Society, in September you will come to Mikorzyn for the International Conference "Lakes & Reservoir: Hot Spots and Topics in Limnology". Your lectures are full of knowledge and strong emotions, they move the public, they pay attention to the problem how easy it is to destroy nature. Also thanks to your efforts a dam that accumulates water in the northern part of the lake was build. What is Aral Sea for you?**

Problems of the ecosystem of Lake Aral are particularly important to me - I have already devoted to Aral more than 40 years of my life. I have already talked about the disaster that afflicted Aral from countless international scientific conferences and socio-political meetings. In addition to informing about what has happened there for the nature and the local population, I always try to point out solutions that can at least partially repair the damage. I am fighting for the financial resources necessary to achieve these goals. My fellow scientists call me sometimes a steadfast knight of Aral.

### **How did it happen that you started to study of the Aral Sea?**

When I was still a student, I attended a lecture of an aged professor who told us about the water ecosystems of the USSR. He said, among other things, that Aral waters are characterized by very high transparency. It caught my attention because I was interested in diving since childhood. In turn on

another lecture I learned about the problems associated with lake desiccation, which aroused my scientific interest. After defending PhD in 1978 I decided to rest, and as a reward to make trip over the Aral. The main aim of the trip was to relax, but also satisfy the curiosity of the scientist. In fact, this trip was funded by my father, because the salary of the young doctor at the university was rather symbolic. After reaching Aralsk city, I noticed the degradation of the environment and realized the drama that met the human population settled around the lake. In addition to the pleasure of contact with nature and scientific passion, there was another factor motivating me to act - I wanted to help these people in their misery.

**Was it that time you decided to organize a scientific expedition with the appropriate equipment and research project?**

Yes, but it was not easy. On all sides I was let out to know that I should not go there because it is a military zone on which various training grounds and barracks are located. The militia always came to me. The explanation that the purpose of my visit was to have a tourist character was of course suspicious. However, I have a pretty mischievous character - the more I am forbidden to take something, the more I want it.

**So, despite all adversities, it must have succeeded!**

Preparations for the first trip required a lot of efforts and lasted over a year. The people who lived in the vicinity of the lake, whom I met earlier, gave me great support. The scientific expedition took place in 1980 - it began in Aralsk city, which at that time was still connected with open water by channel. Larger ships were already trapped in the port, because the channel was too shallow for them. Using a smaller boat, we circumnavigated the whole lake - it took us 2 months. We have collected thousands of samples of water, bottom sediments, plant and animal organisms living in the lake. As soon as I got home, I missed Aral lake. I decided to devote to it all my scientific life - to explore it and do everything to restore its former magnificence.

**The changes over the decades in the region of Aral have a huge dimension. However, the desiccation of the lake initially was slow and hardly noticeable. When did the local people actually feel the effects of drying of the lake?**

Already during the first of my trip in 1978, people living on the shores of Aral complained about the declining fish population in the reservoir. Decrease of fresh water supply and evaporation caused, apart from lake shallowing, also a gradual increase in salinity. Freshwater species of fish began to die out, and the halophilous or brackish water did not appear, because the lake is not connected to any sea. The fish was stocked with flounder and for some time it even formed the basis for harvesting, but further salinity growth to the level eliminating all fish species.

**Fishery was one of the most important occupations for entire generations living near the Aral. The sudden loss of its resources had to be a huge shock for the local people.**

Yes, that's true, but the local people has adapted to the changing conditions. Instead of fishing, they began to breed camels, sheep and horses. They are tough people, they used to difficult conditions, nomadic nature.

**The drying lake exposed the bottom - layers of salt, lake sediments, but also a load of various chemical substances that flowed into Aral through rivers from agriculture lands. Are these substances raised by the wind and transferred in the form of dust storms over long distances do not cause health hazards for local communities?**

Yes, cotton and other crops were cultivated using intensive chemistry. In Soviet times, these chemicals were very cheap and used in huge quantities. In the production of cotton mineral fertilizers, various pesticides and even a defoliant known as the Orange Factor was used. All this were transferred via rivers into Aral and accumulated over the years in the sediments of the lake. When the lake dried all these chemical substances were blown out by the wind. One can imagine that prolonged exposure to such factors can be dangerous to health. In Kazakhstan, even a scientific unit was set up to monitor this problem. Due to the lack of funds, its activities are very limited. Personally, I do not know scientific articles that would clearly confirm the negative impact on the health of the local population. This does not mean, of course, that there is no such influence.

**On one of the islands, the Russians set up a testing ground for various types of weapons: chemical, biological and other. The military area was abandoned very quickly after the decree of Boris Yeltsin. Today, you can reach the former military base with a dry foot. Do you think that this is a safe place?**

Indeed, on the island of Renaissance (Vozrozhdenia) there was a testing ground where various types of weapons were tested. After the collapse of the USSR, its demilitarization was planned. The order issued by the Russian President Boris Yeltsin caused, however, that the army left the training ground quite quickly and chaotically. To this day, there are barracks buildings and laboratories with part of the research equipment. Certainly it is a dangerous area and can be an ecological bomb with a delayed ignition. This can be seen even after the work of an international expedition carried out in 2002 - over 100 tons of anthrax abandoned by the army were secured and neutralized. What else is there, we have no idea. In addition, the connection of the former island with the mainland made it possible to migrate the local fauna and the potential spread of microorganisms that were tested on the polygon.

**How salty is Aral now?**

The salinity is very diverse. In the 1960s, the salinity of water did not exceed 10 ‰ (10 grams of salt per 1L of water). Until the 1990s, when the lake was shrinking, but it was still one lake, the salinity increased to about 30 ‰ - above this value the salinity is considered to be typically marine. Moments later, the lake split into several smaller pools, which due to different morphology and different water supply behaved differently. The northern part called Little Aral, where Syr-Daria inflow, changed the slowest, and after the Kokaral dam was built to limit the outflow towards the south, the water level began to rise, the salinity re-lowered, fish appeared that survived the critical period in the river. Much worse situation is in the southern part of the former lake. Here, Amu-Daria only periodically supplies the lake (during maximum flows, when the snow melts in mountainous regions in the spring). When the inflow decreases, most of the water evaporates. In two separate water bodies, so-called Eastern and Western Great Aral the salinity is huge - over 100 and 220 ‰ respectively. In such conditions, there are no water vertebrates and invertebrate fauna is limited to a few species of halophilous crustaceans of the genus *Artemia*.

**You mentioned Kokaral dam. It was built in the late '90s, first with simply methods, from materials available on site. Although it was initially unstable and washed away by water. After all, thanks to the financial support of the World Bank, the involvement of many people of good will and your enormous support, the construction of a solid, durable dam was completed in 2005. Some call it the Aladin Dam. On the one hand, its existence cumulates the water of the Syr-Daria river in the northern part of the lake, lying entirely in Kazakhstan. Northern Aral systematically becomes more and more pristine, begins to burst with life again. On the other hand, the dam limits the water**

**supply to southern part of the lake – Great Aral lying in Uzbekistan. Does the existence of the dam create any tension between these two countries?**

After the collapse of the Soviet Union, the former Asian Republic of the USSR, located in the Aral lake basin, created the Aral Protection Fund. At the government level between Kazakhstan and Uzbekistan, there were no tensions - the project of a dam was approved by both countries. Amu-Daria is responsible for the hydrology of the southern part of the basin. Water from the Amu-Daria river is heavily exploited by Uzbeks, and the fate of the southern part of the reservoir is in the hands of the Uzbek government. It is also worth noting that the construction of the dam did not restore the water table in North Aral to the level from the 1960s, and Aral city is still more than 60 km from the lake shore.

**Is the possibility of restoring the Northern Aral to the status from early 60 of the XX century real?**

Yes. We have prepared two different scenarios of actions. The implementation of it should allow to raise the water level and bring the lake closer to the city of Aralsk. Both are associated with huge costs and the government of Kazakhstan is unable to bear them. The construction of the first dam consumed about 120 million US dollars. The majority, about 70 percent, came from a subsidy from the World Bank, the rest was put out by the government of Kazakhstan. We estimate that the costs of currently planned treatments will be even higher. However, if you manage to complete the investment, then according to the calculations of hydrologists, the water would return to Aralsk within 5 years. It is worth adding that right now is the best time to start the next reclamation works. Global warming speeds up the melting of glaciers in the Tien Shan and Pamir mountains, and rivers run relatively much water. It is therefore worth redirecting it and gathering it in the part of the lake where it ensures its stable functioning.

**And what about the southern part of the former lake? Is there any chance of its reconstruction at all?**

The restoration of water in the whole lake's basin, meaning the return to the state from the early 1960s, is impossible today. The amount of water brought by Syr-Daria and Amur-Daria is too small. There is, however, a chance to rebuild the water reservoir south of the present Kokaral dam. With a relatively small effort another dam can be build. It allows to collect water in the central part of the former lake basin - the Central Lake Aral would be created.

**What do people in the world think about the catastrophe that affected the ecosystem of Lake Aral?**

In addition to the destruction of the environment, the disaster that affected Aral cost the local community a lot of suffering. The misery of local communities cause of the interest of people who do not fully understand the environmental effects of the disappearance of this lake. As I said before, the mission of my life is to pay attention to the problems of Aral, but also to the problems of the other great lakes of central Asia: the Caspian lake and the Lake of Balkhash. I am talking about these topics during my speeches which I have had on all continents except Antarctica. I am a co-founder of the help program for these lakes, the so-called ABC (Aral, Balkhash, Caspian). Of course, our activities are currently focused on Aral, because here the scale of degradation is enormous, but we do not stop monitoring the others. I believe that in the near future we must develop a global solidarity program with the Aral lake and people who live in this area, to effectively solve environmental problems and help the local community. The inspiration for thinking about such a program was also Poland.

**Why?**

I know that Polish people can unite around great ideas. In the 1980s, I observed your struggle for independence, the emergence of Solidarity under the leadership of Lech Wałęsa and other people. In this organization there were people representing various political systems and values – united by the idea. Today, Aral needs such kind of solidarity between people all over the world. I look with particular hope towards young people, I would like to instill them in sensitivity to the problems of the nature, environment. To achieve success, sometimes you have to go against the current, against the usual schemes, and this is the domain of young people. In youth, there is hope for Aral and the whole Earth.

**Thank you for the conversation.**