Health and Ecological Consequences of the Aral Sea Crisis

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Introduction

The shrinking of the Aral Sea in Central Asia is considered one of the most dramatic examples of a natural area destroyed by human activities.

For almost 30 years the use of water for irrigation of the cotton monoculture and the heavy application of insecticides, pesticides, herbicides and defoliants has brought not only ecological, economic and social insecurity to the resident population, but also created a critical situation for human health. However, the real tragedy is in the associated impacts on the health and well being of the local population and the ecological balance in the region.

The Aral Sea, formerly one of the largest inland seas in the world, has become a symbol of what can go wrong when transboundary water is mismanaged. Dramatic environmental degradation has occurred, with consequences for the 3.5 million people living around it, including 1.5 million children. The sea is located in Central Asia and is shared by the Republic of Karakalpakstan in Uzbekistan and Kzylorda region in Kazakhstan.

Karakalpakstan, an autonomous Republic within Uzbekistan, is believed to be the region most affected. This republic is located at the delta of Amu Darya river, with an area of 165,300 square kilometres (sq km), half the size of Italy and four times larger than the Netherlands). The population, numbering about 1.5 million, is primarily central Asian. About half of them belong to the ethnic group of the Karakalpaks, who have their own native language and culture that date back a few thousand years. About 96% of Karakalpaks lives in the polluted area surrounding the Aral Sea.

Environmental Problems

The irrigation of the cotton fields from the Amu Darya and the Syr Darya rivers, contributed a great deal to the disappearance of the Aral Sea to more than half of its original size. As a result, more than 40,000 sq km of the heavily saline seabed are now exposed, and is now being blown out by frequent winds. Parts of what once was the seabed is fast disappearing due to the rapid growth of wild plants. Simultaneously, the pace of degradation and desertification of the ecosystems in the deltas of the Amu Darya and Syr Darya is increasing.

The large-scale irrigation projects, which took away too much water from the Aral Sea, have affected the local economy. It is estimated that some 40,000-60.000 fishermen have lost their livelihoods. The large fish canning factories along the rivers hardly catch any fish anymore. Fishing and related activities used to provide 50% of the Karakalpak income (4).

The large cotton monoculture in the region is probably the main reason for the dying of the Aral Sea and the increased salinity of agricultural soils. But the cotton mono-cultures has also led to toxic pollution. For a long time the region was intensively sprayed with

persistent pesticides like DDT and lindane, often from airplanes that also flew over villages and cotton field workers.

During the period 1980-1992 29,217 tons of pesticides were used in Karakalpakstan, an average of 72 kilograms (kg) per hectare, compared with only 1.6 kg in the United States, 4 kg in Russia, and 54 kg in Uzbekistan. All the pesticides were toxic and created high risks for the health of population (6,8). Furthermore, it is believed that the region has suffered from other polluting upstream activities. For example, Vozrozhdenye Island of this region was also used for chemical and biological weapons tests and production by Soviet military chemists.

But greater effects are still expected to come in the agriculture sector of Karakalpakstan, where the local climate change and increased salinity are starting to demand their toll. Among the environmental problems of the entire Aral Sea basin caused by large-scale irrigation, the increasing salinization of irrigated land and water is the biggest one. Currently, over 70% of the irrigated land in Karakalpakstan is affected by salinity, and problems are worsening. Already agricultural output has declined by 30-50% due to soil salinity, climate change, water deficiency, and reduced labor productivity due to health problems (5). In major irrigated areas in the downstream and midstream portions of the Amu Darya and Syr Darya rivers, the percentage of moderately to strongly saline land has doubled during the last 30 years.

Water Quality

Water pollution is a main environmental problem in this area. As the findings of local scientists have shown, the quality of water from the river and drinking water deteriorated during the last 40-45 years—the amount of minerals increased in the Amu-Darya river within Karakalpakstan (3). Organic and inorganic substances such as nitrogen, phosphorus, pesticides, and phenols are discharged into the river. About 150,000 tons of toxic chemicals have contaminated the water in the last 10 years and continue to pollute soil and water supplies (9).

According to the local scientists, water quality started to change in the 1970s in parallel with environmental degradation in Karakalpakstan. The change in water quality in the Aral Sea basin reduced the number of fish in the river and in the sea, and destroyed most of fauna (2,3).

International experts confirm that most water sources in Karakalpakstan are polluted, and that the pollution is mainly caused by the agro-industry and mining industries.

Most drinking water sources do not comply with water standards in Karakalpkastan (7). The groundwater table in Karakalpakstan is contaminated with a high level of salts and other minerals. The groundwater quality, as measured in total dissolved salts (TDS), ranges from 0.4 grams to 4-6 grams per liter (g/l). WHO's international standard for water mineral content for human consumption of 1.5 g/l TDS as related to palatability (2). The situation is especially dramatic in northern Karakalpakstan, where most schools and hospitals, including the maternity hospital, do not provide safe drinking water.

For the past 40-45 years the population in Karakalpakstan has been using highly mineralized and polluted drinking water. The health of the people continues to be at high

risk because of this chronic exposure to the high level of minerals and multiple toxins in the water for drinking.

The Health Situation

The longer term impact of exposure to environmental pollutants on public health is beginning to be recognized. The population around the Aral Sea suffer from generally poor health, partly due to a breakdown of the health care infrastructure since the collapse of the Soviet Union, and partly due to socioeconomic and ecological factors. The deteriorating health situation is in parallel to the worsening ecological situation and the resulting worsening economical condition of the region. Diseases seem to increase, particularly rates of anemia, tuberculosis, kidney and liver diseases, respiratory infections, allergies and cancer, which far exceed the rest of the former USSR and present-day Russia (2, 3).

Average life expectancy in the Kzyl-Orda region of Kazakhstan has declined from 64 to 51 years. Women and children are the most vulnerable. Maternal and infant morbidity and mortality are significantly higher in Karakalpakstan and Kzyl-Orda than in other parts of Uzbekistan and Kazakhstan (2). A high rate of anemia is found in almost all groups of women in Karakalpakstan—in 87% of teenagers, 91% of non-pregnant women, and in 99% of pregnant women. Anemia, the region's greatest health problem, has been increasing for the last 20 years. In the 1980s only 17-20% of pregnant women had anemia. The level worsens during pregnancy—about 70% of pregnant women in Karakalpakstan have severe anemia by the third trimester. Most of these women have complications during pregnancy and delivery, including hemorrhages. Some 87% of newborn babies are also anemic (2). Untreated anemia in pregnancy and young children poses a high risk for weak immune systems and a risk for brain damage.

High levels of reproductive pathologies (infertility, miscarriages, complications during pregnancy and in birth) have been observed in this region for more than 20 years. In a survey of 5,000 couples, 16% experienced infertility. Among infertile couples, male infertility increased from 30-40% in the 1980s to 65% in the late 1990s. Miscarriages rose to18% in 1998. The rate of birth abnormalities, another serious consequence of pollution, is also increasing. One in every 20 babies is born with abnormalities, a figure approximately 5 times higher than European countries.

Investigations have shown significantly high levels of organochlorine pesticides like HCB, -HCH, pp-DDE and pp-DDT in the plasma of pregnant women, again far higher than in European countries (1). The high levels of such pesticides, detected in most samples of Karakalpak women, pose severe risks for both mothers and their babies. The effects include changes in reproduction and fetal development, disturbance of endocrine function, neurobehavioral changes, soft tissue cancers, dermatological damage, immunosuppression, and changes in liver function. These findings have led to the conclusion that, due to the severe pollution of all natural resources in Karakalpakstan, the entire population has been chronically exposed to the chemicals for a long time. The negative environmental factors (pesticides, high mineralization of water, imbalance of elements such as iodine deficiency) could be one of the main factors in the formation of negative health consequences for women and children in the Aral Sea region and, in combination with medical and social factors, result in the high level of pathologies, including maternal and infant morbidity and mortality.

NGO – Center Perzent

Work at the community level is important to help people realize the severity of the he situation and develop mechanisms to solve the problems.

Center Perzent, The Karakalpak Center for Reproductive Health and Environment, was established in 1992 as a nongovernmental organization to improve the status and health of women and children in the Aral Sea region. It developed research and service programs on the linkages between environmental factors and health. It has also pioneered educational programs on environment, health, organic farming, healthy nutrition, as well as water and hygiene. Its activities reach more than 200,000 people in 7 Karakalpakstan districts.

The Center's sustainable agriculture program includes backyard gardening using organic farming methods and drip irrigation for crops that grow in salty soil. This program oriented local people on how to adapt to salty soil and water deficiency.

In collaboration with the local authority, Center Perzent established a safe motherhood center in Kanlykol, a rural area near the Aral Sea. The main components are research, educational activities, and practical help for every pregnant woman in the area. Each year more than 1,000 pregnant women receive consultation and practical assistance at this clinic.

A nongovernmental clinic on reproductive health was established at Center Perzent in 1998 that offers specific services on reproductive pathology (infertility, miscarriage, etc.) to identify the causes of the problem. About 4,000 women receive assistance every year. The clinic also offers a setting for research on reproductive health and behavior, sexual education, and practical individual consultation. Periodic visits are made to villages to provide services to women residing in outlying rural areas.

Center Perzent also initiated the Safe Drinking Water Program, which monitors drinking water quality and mans hotlines to identify drinking water problems in the rural communities rural area. This program also provides educational campaign on water, health hygiene, and water saving technology.

International Agencies and Local Communities

Despite the activities of international and local organizations, there has been little positive change for local people. Indeed, the situation continues to worsen even though international agencies and institutions have been involved in the Aral Sea crisis for decades. Numerous conferences have been held, millions of dollars spent, and many declarations and promises made to save the Aral Sea, but no concrete results can be seen from these efforts.

The drought of 2000 -2001 has severely impacted the health condition and economy in Karakalpakstan, deepening the Aral Sea crisis and resulting in further losses in the agriculture sector. Almost all rice and cotton plantations have been seriously affected by the drought with consequences to the whole ecosystem, the economy, and the social condition of the people, resulting in increased unemployment, migration, and health risks. There is a question on human rights for water and nature in this part of the world.

Behind these terrible data is the life of Karakalpaks with their history of thousands of years, their own language, culture, and traditions. There is a saying in Central Asia that "where there is no water, there is no life," which is becoming the reality today for millions of people in the region.

The prognosis for the next decade is uncertain. The fate and future of 1.5 million Karakalpaks is at risk if the problem of regulating and distributing water is not solved urgently. This question becomes most essential with the current situation in Central Asia and Afghanistan.

The Aral Sea crisis has not only led to wide scale environmental degradation, but also economical, social, and medical problems. It has become a human crisis. There is an emergency to extend practical help to people in this region, first of all in solving the water problem. It is necessary to create an international coordinating body at the UN level to monitor water distribution in Central Asia. Every nation should follow a limit in the use of water for irrigation and development and practices that will ensure safe water for drinking. These rights should be protected on an international level. There is an acute necessity of taking wide-scale measures to relieve the negative impact of environmental factors on human health and to consolidate efforts to render practical support to improve the situation.

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