

“Louder than Words”

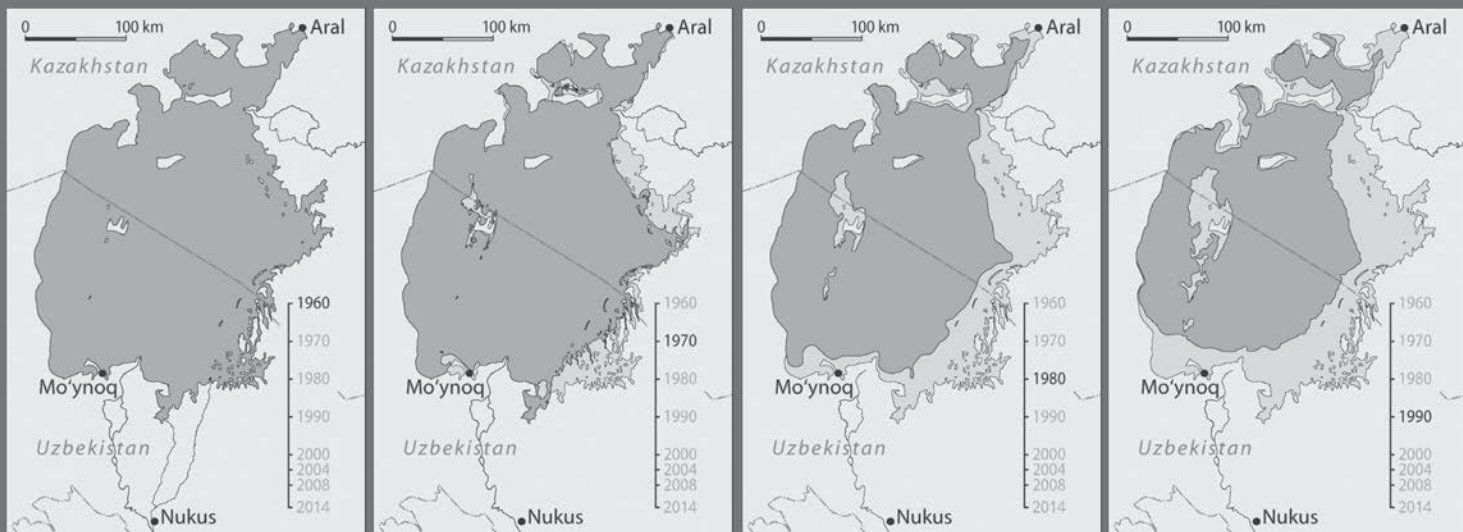
A Profile of the Destruction of the Aral Sea and Its Consequences

By Reuel R. Hanks



The collapse of the Aral Sea is the greatest human-induced ecological catastrophe in history. Worse than Chernobyl, Bhopal, Minamata, London's killer smog, and all the other disasters of the industrial age, the unprecedented decline of the Aral stands as a testament to the folly of myopic "economic planning" and the dangers of totalitarianism. Millions of people living in the vicinity of the sea have had their health and livelihood destroyed, and the damage to the region will continue for generations. The affected region includes not only the immediate basin of the Aral itself, but extends hundreds of miles to the east to include portions of the Fergana Valley in Central Asia and into Xinjiang in western China. In 2014, NASA images indicated that the eastern lobe of the remnant Aral had completely dried up, and it is now referred to as the "Aralkum Desert" (Aral Sand Desert) in Central Asian sources. Perhaps the most shocking aspect of the Aral's collapse was its rapidity. Between 1960 and 1990, approximately 70 percent of the area and half the volume of the sea were lost. No large body of water in modern history has disappeared at such a rate. The explanation for the stunning rate of water loss is found by examining the intersection of history, geography, and economics in Central Asia, beginning in the nineteenth century.

Rusting ships sitting on the bottom of what was the Aral Sea near Muynak, Uzbekistan. Source: ©Shutterstock. Photo by Vivvien.



Series created from an animated map of the shrinking of the Aral Sea and NASA images from the United States National Imagery and Mapping Agency data. Source: Wikipedia at <https://tinyurl.com/6s6x2met>. Image by NordNordWest.

HOW CAME A SEA TO DIE?

Central Asia is primarily an arid region, and excluding northern Kazakhstan, three-quarters of the remaining area is desert, receiving less than ten inches of precipitation per year. The Aral Sea is straddled by two foreboding and extensive deserts: the Kyzyl Kum (“Red Sand”), lying to the southeast, and the Kara Kum (“Black Sand”), lying to the southwest. The northern reaches of the Aral Basin are enclosed by dry steppe lands that receive only twelve to thirteen inches of precipitation annually. Summer temperatures in the region frequently exceed 100 degrees Fahrenheit, and strong westerly winds blow across the region during the remaining three seasons. In a typical year, the Aral loses millions of gallons of water to evaporation and seepage, receiving virtually no input from the surrounding territory. What sustained the Aral from the end of the Pleistocene until the 1960s was water that originated hundreds of miles away in the ring of mountains lining the southeastern boundaries of Uzbekistan, Kyrgyzstan, and Tajikistan: the Tien Shan and their associated subranges. Snowmelt in these peaks gives rise to Central Asia’s two great streams, the Amu Darya (the largest of the two) and the Syr Darya.

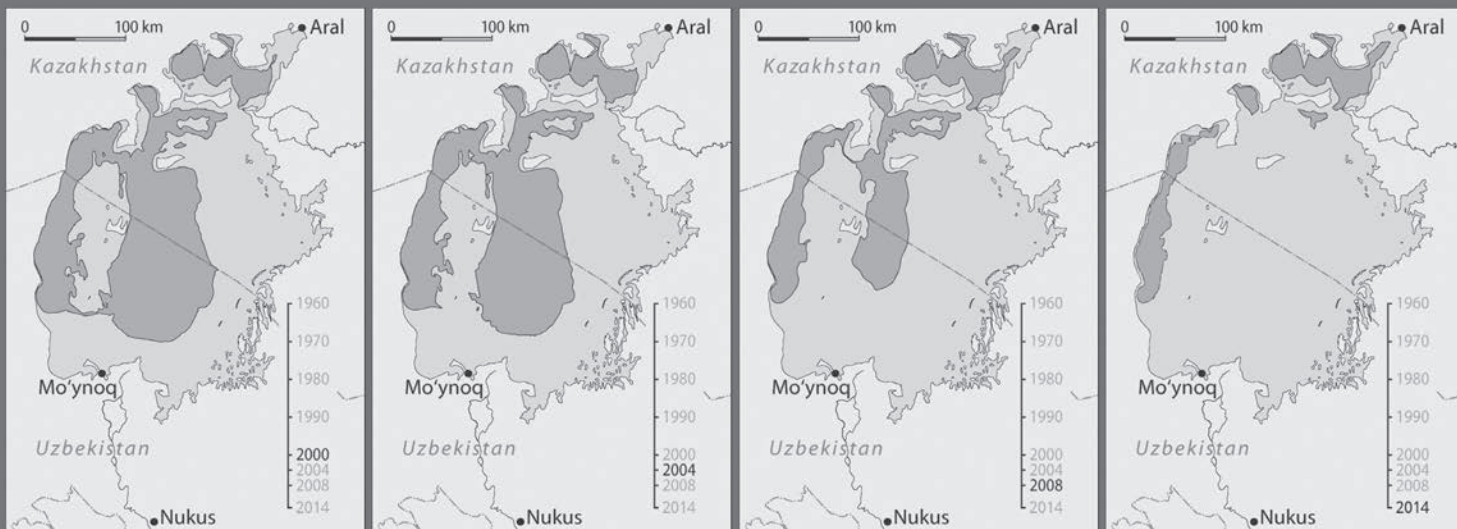
The delivery of water to the Aral Sea by these two great rivers allowed the Aral to balance its losses and maintain an equilibrium for thousands of years.

In the nineteenth century, a fateful change came to Central Asia’s agricultural geography. Cotton had been grown in the region’s oasis centers for centuries, but its production had been limited for the most part to satisfying local demand for textiles. In the 1860s, the American Civil War resulted in the loss of the American South’s massive output of cotton fiber, and the textile mills of Great Britain and other manufacturing hubs were in need of new suppliers. In fact, the American variety of “long-stemmed” cotton was imported to the region and became the dominant variety grown by Central Asians. Coincidentally, Russian forces took control of much of Central Asia with the capture of Tashkent in 1865, finalizing a conquest that had begun over a century earlier. During the final decades of the Russian Empire, St. Petersburg’s newly acquired colonial lands emerged as a major source of cotton fiber to both local and global markets.



The Aral Sea Basin. Map compiled from: Gaybullaev et al., 2012; Micklin, 2007; landsat satellite imagery from USGS/NASA; digital elevation model from USGS EROS. Visualization by UNEP/GRID-Sioux Falls. Source: United Nations Environment Program at <https://tinyurl.com/8w99zef>.

The gains in cotton production were achieved not so much through greater productivity of either farmers or existing agricultural land, but by expanding into previously uncultivated territory. This required additional irrigation water, and as a consequence, the number of channels drawing off the waters of the Amu Darya and Syr Darya were increased. Under Soviet governance, after 1922 the process of expanding the land growing cotton accelerated exponentially. Massive water diversion projects were completed that brought more land into cultivation, but that also siphoned off additional millions of gallons of water from the rivers that fed the Aral Sea. The Karakum Canal, initiated in 1954 and ultimately reaching over 850 miles in length, at its height was drawing an annual average of three cubic miles (a unit of volume defined as a cube with sides in miles of length) of water from the Amu Darya. The focus on cotton, a profitable export crop, resulted in a decline in Central Asia’s agricultural diversity, which was once a region famous for its numerous orchards, vineyards, and fields of grain. Under Soviet planners, cotton became *beloe zoloto* (“white gold”), but the “gold”



Incredibly, although the losses to the Aral were quite evident by the mid-1960s, Soviet planners continued to increase the acreage devoted to cotton production well into the 1980s.

was obtained at a high cost to the environment, and agriculture in Central Asia increasingly became a “cotton monoculture” devoted to delivering ever-greater quotas of fiber to state factories and overseas buyers.

The death spiral of the Aral Sea began in 1961. The cumulative effects of the drive to bring more land into cotton cultivation were vividly expressed that year at the discharge stations the Soviet government had installed on the Amu Darya and Syr Darya, near where each emptied into the Aral. The station on the Amu Darya, located at Timerbay in the Uzbek Soviet Socialist Republic (SSR), recorded an annual discharge into the sea of 29.2 cubic kilometers (seven cubic miles). To the north, the station on the Syr Darya at Kazalinsk in the Kazakh SSR recorded no discharge at all for the year! The previous year, the Syr Darya had discharged twenty-one cubic kilometers (five cubic miles) into the Aral and the Amu Darya had contributed 37.8, for a total of 58.8 cubic kilometers (fourteen cubic miles) for 1960. In a single year, the discharge into the Aral had plummeted by over 50 percent, and with one exception (1969), the total amount of discharge would not reach or exceed the 1960 figure for the following three decades. Incredibly, the total volume of discharge from the rivers barely reached eight cubic kilometers (two cubic miles) in 1974, and by 1989 had collapsed to only 4.3 cubic kilometers (one cubic mile), less than one-tenth the amount that had flowed into the Aral Sea only thirty years before. The Aral Sea, the world’s fourth-largest lake in 1960, had been sucked dry by the Soviet obsession to produce “white gold” at any cost.

Incredibly, although the losses to the Aral were quite evident by the mid-1960s, Soviet planners continued to increase the acreage devoted to cotton production well into the 1980s. The majority of these increases was not achieved by switching land to cotton from another crop, but by bringing additional land into production. Thus, yet more water was extracted from the feeder streams, compounding and accelerating the Aral’s retreat. For example, between 1960 and 1985, the amount of irrigated land in the Uzbek SSR, the Soviet Union’s biggest cotton grower,

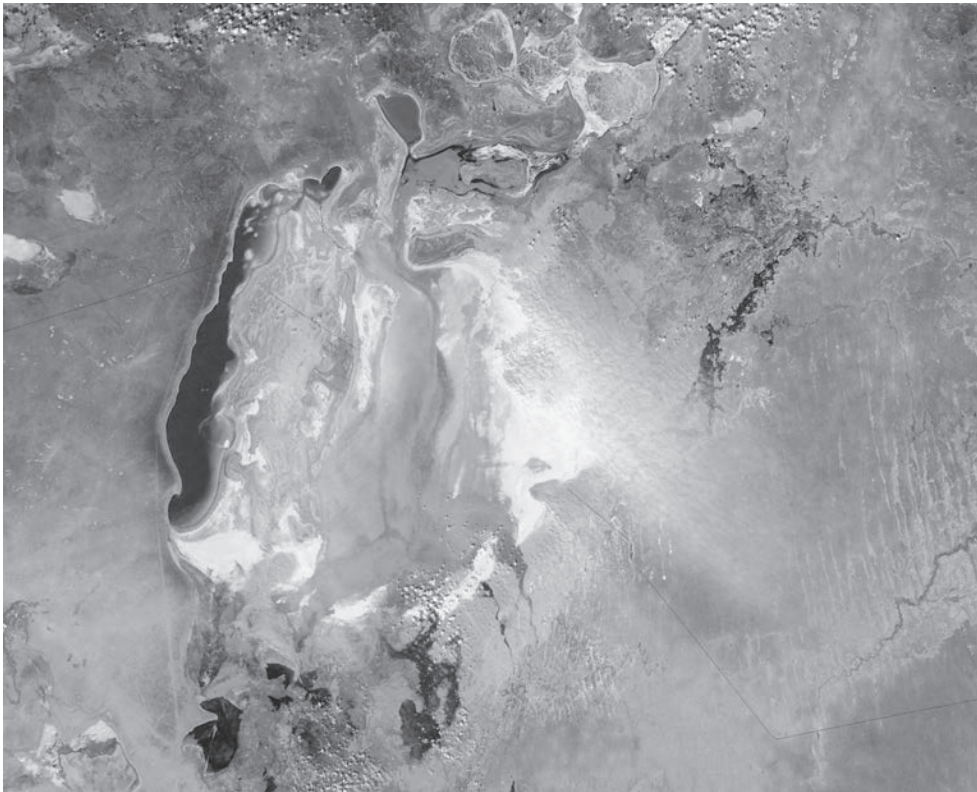
rose by 33 percent. In the neighboring Turkmen SSR, the percentage of irrigated land increased by an astonishing 123 percent, with virtually all the newly watered farmland devoted to cotton. In terms of output, this strategy paid off for Soviet managers. Gross yields of raw cotton fiber in the Uzbek SSR rose from 2.95 million metric tons in 1960 to 5.16 million metric tons in 1985, an increase of 75 percent. In the Turkmen SSR, yields skyrocketed an amazing 217 percent in the same twenty-five-year span.

Harvesting the cotton required labor contributions from all sectors of society, including factory workers, soldiers, and university students. The Soviets had few mechanical cotton harvesters even well into the 1990s, so most of the crop was picked by hand. But there was also a shortage of farm labor during harvest season, so groups of urban dwellers were dragged into spending several weeks on collective farms, performing the back-breaking labor of picking cotton. As a Fulbright Scholar teaching in Tashkent in the fall of 1995, I arrived at the university one morning to find the campus completely deserted except for a handful of administrators. After several inquiries, I was informed that all the students, numbering several thousand, had been placed on buses and sent to local farms to



Children working in an Uzbekistan cotton field. Source: Screen capture from *Child Labor for Cotton in Uzbekistan*, a film by the Responsible Sourcing Network on YouTube at <https://tinyurl.com/4rdddzam>.

The winds picked up the salt dust from the bed, resulting in frequent “salt storms” that ravaged the region and sometimes traveled hundreds of miles eastward to devastate crops in the Fergana Valley.



A pale beige plume of dust blows from the sediments of the South Aral Sea toward the southeast, along the Kazakhstan-Uzbekistan border. Source: NASA Earth Observatory at <https://tinyurl.com/4ap57e8n>.

assist in harvesting the cotton crop! Following this unexpected break in the academic calendar, my students returned after three weeks with their hands scratched and bloodied—and quite eager to take their places in the classroom. Only a few were able to bribe the appropriate officials and avoid this “patriotic” duty. Most of my students had been required to perform this task since they were in high school. Nearly everyone in the Soviet Central Asian republics, outside of the Kazakh SSR, was invested in one way or another in the production of cotton, but few were directly aware of the damages Soviet agricultural policy had inflicted until after the collapse of the USSR in 1991.

CONSEQUENCES

The collapse of the Aral Sea devastated three elements of life in Central Asia: the ecology of the Aral Basin and beyond, the health of the local population, and the economy of western Uzbekistan and southern Kazakhstan.

Environmental Devastation

Soviet wildlife biologists inventoried the animal species in the Aral Sea basin in 1960, including insect species. By the mid-1980s, more than 80 percent of the species identified living in the Aral's ecosystem twenty years before had disappeared. Migratory waterfowl that stopped over at the Aral Sea during their journey from the subtropics to Russia had rerouted their path to Lake Balkhash in eastern Kazakhstan by the early 1990s, with many avoiding the Aral since the sea was essentially dead by that time. Indeed, virtually all species of fish living in open water in the Aral had died out, with only a few hardy species continuing to survive near the mouth of the Amu Darya, where enough fresh water seeped through to lower the salinity to tolerable levels. The fish the Aral was famous for producing—the beluga sturgeon, highly valued for both the prized caviar it produced and its delicate flesh—had vanished by the early 1980s. Bottom feeders, sturgeon are particularly sensitive to changes in water quality and salinity, and as the

Aral became increasingly salty, the sturgeon, an animal that under ideal conditions might live for 100 years, perished.

As the waters disappeared, the seabed was exposed, leaving behind a crust of salt and dust. Walking across part of the dry bed of the Aral near Muynak, Uzbekistan, in 1997, I was astonished by the thick layer of salt and small shells of sea creatures, which made a loud crunching sound in an otherwise deathly silent place. The Aral basin lies in the path of the westerly winds in Central Asia, and as enormous stretches of seabed became exposed (at least 50,000 square kilometers, or 19,305 square miles by 1990), the winds picked up the salt dust from the bed, resulting in frequent “salt storms” that ravaged the region and sometimes traveled hundreds of miles eastward to devastate crops in the Fergana Valley. The dust also contained pollutants such as heavy metals and other chemicals. Those who endured one of these storms describe an experience like “being on fire,” as the salty particulate matter penetrated the sinuses and eyes, resulting in intense burning pain.

Impact on Health of the Population

In the early 1980s, somewhat more than two million people lived in the immediate vicinity of the Aral Sea. As the environmental conditions dis-

integrated, so did the health of many of those living in the Aral basin. After Mikhail Gorbachev initiated the policy of *glasnost*, or “openness,” in 1985, Soviet media began reporting on the plight of the population in Karakalpakstan, the region of western Uzbekistan surrounding the Aral, a topic that had been previously forbidden. Interviewing doctors and health officials in the region, a few brave journalists revealed the unfolding health tragedy there. Rates of nose, throat, and lung cancer in Karakalpakstan were several times the national average in Uzbekistan. Health care providers attributed this directly to the high salt and polluted particulate content of the atmosphere near the dry seabed. The infant mortality rate (IMR), relatively high across the entire Central Asian region compared to the Soviet national average, was close to 100 in some districts of Uzbekistan and Turkmenistan, figures found only in some sub-Saharan countries at the time.

Other health problems are linked to the decline of the Aral. High rates of jaundice, hepatitis A, and other maladies of the liver were reported in western Uzbekistan in the 1980s. At least part of the explanation for these inflated rates lay in the source of drinking water that much of the population was using. As the Aral evaporated, the level of the water table in the Aral basin dropped accordingly. In some locations, the water table may have sunk fifty feet, resulting in nearly all wells going dry or being contaminated by saltwater incursion. Local people turned to the only source of water that was readily available—the water in the irrigation canals that lined the cotton fields around them. Unlike the Aral itself, this water was not salty and came from the freshwater rivers, and if purified could be converted into drinking water and for household use.

The local population purified the water in the same manner people all over the world make water potable—by boiling it. This killed biological impurities, but the water also held large quantities of chemical contaminants,

many of them toxic. Beyond overusing irrigation water, Soviet agriculturalists also used enormous quantities of fertilizer, pesticides, and herbicides, many of them extremely hazardous. In the same period that cotton yields were increasing astronomically in the Uzbek and Turkmen SSRs (1960–1985), the amount of fertilizer applied to the fields was also exponentially rising. In 1985, farmers in the Uzbek SSR on average were dumping 285 kilograms of fertilizer on each hectare of land, with an almost-identical amount being applied to land in the Turkmen SSR. This was universally in the form of granular fertilizer, much of which was washed off into the *ariq*, or local drainage ditch adjacent to the fields—also the source of the water many people were using for drinking water. Coupled with the use of dangerous pesticides (some mercury-based) and chemicals to control weeds, the water many people were gathering from these channels was a chemical soup that could not be purified by merely boiling the water. Ingesting this contaminated water severely taxed the livers of victims, leading to high incidences of jaundice and other diseases of that organ.

Much of the work in the cotton fields is done by women, who frequently bring their infants and toddlers with them to play alongside the rows of cotton plants. Soviet managers of the collective farms would in some cases use aerial spraying to treat the fields with herbicides or pesticides, and occasionally would spray the crops *while the workers were in the field*, directly exposing them to both the aerosol of the chemicals and contaminating any exposed skin. As was the case with fertilizers, overuse of toxic chemicals was common, and substances banned in much of the remainder of the world were sometimes widely, if surreptitiously, employed in Soviet agriculture. For example, the Soviet government officially banned the production of DDT in 1970, but some sources allege the insecticide was used in Central Asia well into the 1980s. Moreover, the Soviets had an extensive biological weapons testing facility located on Vozrozhdeniya Island in the Aral Sea for several decades. In 1971, a weaponized variant of smallpox escaped the island, killing three people and forcing a massive decontamination campaign in Aralsk, the main port on the Kazakhstan shore. In recent years, the United States and Uzbekistan have jointly decontaminated several locations for anthrax, and further cleanup is planned. Vozrozhdeniya Island is no longer an island, linking with the mainland in the early 2000s as water levels dropped.

Economic Consequences of the Disaster

Muynak, the largest city on the Aral Sea in 1960, once held a population of close to 30,000. It was not only a major port servicing the sea's fishing trawlers, but also contained many of the ancillary industries associated with commercial fishing, including the processing of the abundant catch brought in by the fleet. The entire economy of the city revolved around the fishing industry, and as the fish disappeared, so did the livelihoods of thousands. Today, the town has 13,500 official inhabitants and sits approximately 150 kilometers (93.2 miles) from the remnants of the Aral's waters. As the numbers of fish taken from the Aral declined in the 1980s, the Soviet government attempted to keep the local cannery open, as unemployment was an economic ill that should not have affected an economy anchored in Marxism–Leninism. The solution was to ship fish caught in the Sea of Okhotsk, in eastern Siberia, to the cannery in Muynak to keep the assembly line running. The Pacific lies nearly 4,000 miles from Muynak, so the fish had to be sent in refrigerated railcars, with the transport costs alone making it probably the most expensively produced canned fish in the world. After the collapse of the Soviet Union in 1991, this absurd practice stopped and the cannery closed down, putting most of the local population out of work.

Today, the main way to make a living in Muynak is either through salt harvesting or to earn a little money providing services to the limited number of foreign tourists coming from eastern Uzbekistan to see the “graveyard of ships” just outside of town. Some enterprising residents have developed a local salt industry using the dried seabed as a source, and tour companies in Uzbekistan offer the experience of “disaster tourism” for a

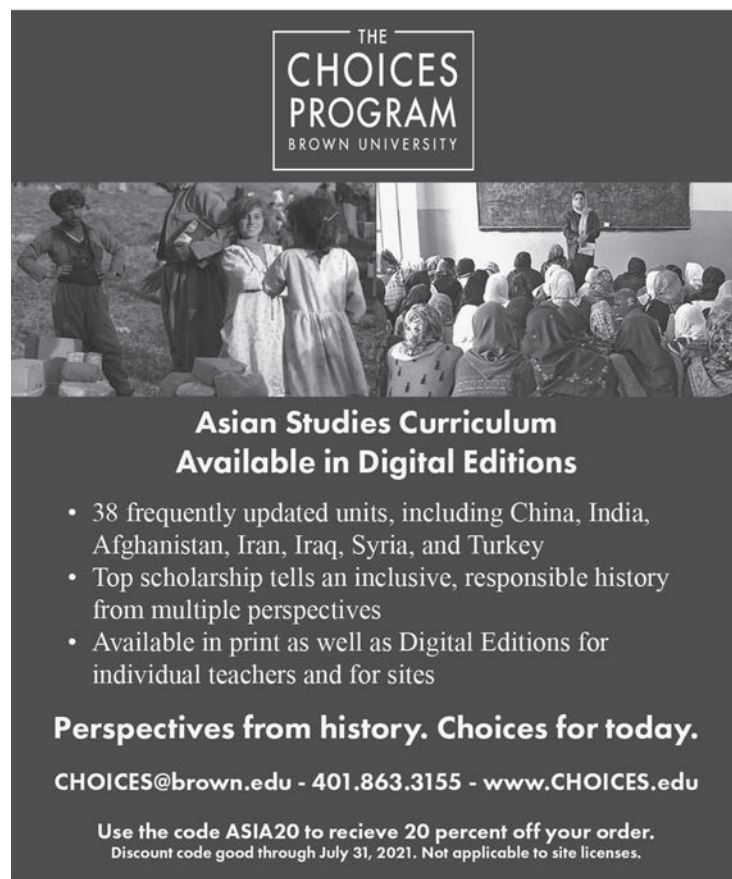
few thousand tourists each year who make the long journey from Tashkent. Most of the young people have left the town, however, moving either to Nukus, the largest nearby city, or the eastern part of Uzbekistan, where more employment opportunities might be found.

IS THERE A “SOLUTION?”

The disaster of the Aral Sea occurred at such a colossal scale that a “solution” with any measureable benefits in the next few decades seems wholly unlikely. Of course, to advance the discussion we must clearly articulate what is meant by “solution.” If we mean by “solution” the Aral regaining its 1960 shoreline; the wholesale reestablishment of the ecosystem and all inclusive species of flora and fauna; and the recovery of the health, livelihood, and quality of life of all the Central Asians adversely affected by the collapse, such a “solution” is completely impossible. The best estimates offered by scholars of the Aral are that even if the Central Asian states all agree to stop extracting water from the Amu Darya and Syr Darya immediately, it would take at least a century for the Aral to recover its volume of 1960. But this is not a viable strategy, given the economic and geopolitical realities of Central Asia.

In a typical year, Uzbekistan ranks in the top five global producers of cotton. Despite almost three decades of attempting to restructure the economy, the Uzbek government has achieved little in terms of moving the country beyond its dependency on agrarian activities, especially the continued reliance on the cotton monoculture. The same may be said of Tajikistan, although in the case of Kazakhstan and Turkmenistan, massive deposits of petroleum and natural gas have delivered a path away from the obsession with cotton. But the key state in any scheme to ameliorate the damage to the Aral is Uzbekistan, and although blessed with considerable deposits of natural gas and some valuable ores, the Uzbek regime must continue to focus on producing large amounts of cotton.

Cotton is a labor-intensive crop, and in Uzbekistan, it accounts for a large number of jobs. A large-scale shift away from cotton without a



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Fishermen on the North Aral Sea near the Kokaraul Dam in Kazakhstan. Source: *Eurasia Overland* website at <https://tinyurl.com/4s4bf44>.

Soviet scientists and policymakers condemned the Aral Sea as “nature’s mistake,” a body of water that had no business existing, or commented that the Aral should “die beautifully.”

concomitant influx of foreign investment to create new jobs would result in significant disruptions in employment, a situation that could easily result in political instability. The Uzbek regime is quite aware of this vulnerability, and due to its failure to attract sufficient levels of foreign investment and diversify the Uzbek economy since independence, it must continue to promote cotton as the mainstay of that economy. Indeed, Uzbekistan has probably avoided large-scale social and political upheaval in the past twenty years by exporting labor to surrounding countries, primarily Kazakhstan and Russia. Not only have those countries absorbed hundreds of thousands of “excess” Uzbek workers, but the remittances sent back to families in Uzbekistan have played a vital role in keeping the Uzbek economy afloat.

Moreover, in many rural districts of Uzbekistan, the main sources of employment are the farms growing cotton. Even if the government were to attract increased investment to the country, most of that capital would be concentrated in the cities. Without cotton production, widespread unemployment would be the rule in much of Uzbekistan’s hinterland. In addition, cotton earns a considerable amount of income for the Uzbek government, allowing it to provide goods and services that reduce some of the social and economic tensions in the country. A reduction of this revenue would only serve to destabilize an already-volatile political environment, leading to radicalization and potentially insurrection as conditions deteriorate. From the perspective of the Uzbek leadership, a shift away from cotton would amount to political suicide.

So is there no good news at all concerning the fate of the Aral? Actually, there is a glimmer of hope for at least a small portion of the sea. By the late 1990s, the waters of the Aral had receded to such an extent that the sea had divided into several lobes, more or less isolated from each other. The northernmost of these “mini-Arals” is located in Kazakhstan and is now commonly called the “North Aral Sea,” while its counterpart in Uzbekistan is the “South Aral Sea.” In 2005, the Kazakh government, with World Bank assistance, completed the Kokaraul Dam, a seven-and-a-half-mile-long earthen dike that separates the two remnants of the orig-

inal sea. The dam prevents water from flowing southward into the South Aral, where it would be lost to evaporation, and stabilizes the level of the North Aral. Water levels in the North Aral quickly increased to the point that a salt-tolerant species of flounder was introduced, and limited commercial fishing became possible. Over time, the salinity of the North Aral has declined, and indigenous freshwater fish have been introduced, such as the pike-perch, a valuable catch that is widely consumed in Kazakhstan. In 2016, more than 7,000 tons of fish were taken from the North Aral—a tiny fraction of what once came from the Aral Sea, but a clear indication that at least a portion of the Aral Sea may be saved.

LESSONS OF THE ARAL?

The lessons of the Aral Sea disaster seem apparent. While free-market systems are not immune from ignoring the ecological consequences of development, the totalitarian regime of the Soviet Union had no social or political mechanisms that

served as a check on unrestrained abuse of the environment, at least until the advent of glasnost. Part of this lay in the Marxist approach to the natural world, which viewed nature as existing specifically for the exploitation of humanity. Another cautionary tale lies in the obsession with producing ever-greater quotas of cotton, commanded by planners in Moscow who had little comprehension of the consequences of their demands. Yet another warning may be found in the arrogance and hubris of administrators and scientists who simply dismissed the disaster as an inevitable outcome of policy. Soviet scientists and policymakers condemned the Aral Sea as “nature’s mistake,” a body of water that had no business existing, or commented that the Aral should “die beautifully.” But nature does not make such errors. Human fallacy, on the other hand, knows no limits—a lesson that the barren desert that once held a great sea should always bring to mind.

“*Louder than Words” is the title of a song and music video from the British rock group Pink Floyd, released in 2014. Much of the music video footage was shot on location at sites on the former shoreline of the Aral Sea in Kazakhstan. ■

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