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THE ARAL SEA BASIN CRISIS AND SUSTAINABLE WATER RESOURCE MANAGEMENT IN CENTRAL ASIA

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This article traces the historical development of water resource management in Central Asia, focusing on the causes of the current Aral Sea Basin crisis. It examines the obstacles facing the Central Asian republics in addressing this problem and offers predictions regarding the future state of the region's ecology, economy, and stability, as well as the health of the region's people. The article also explains how existing plans of action have been largely ineffective and why restoring the Aral Sea to its original state is an impossible task. Finally, it provides feasible policy recommendations on how to prevent the further mismanagement of the region's water while maintaining viable levels of economic development and population growth.

“That which is common to the greatest number has the least care bestowed on it”

(Aristotle, *Politics*, Book II, Chapter 3).

The five Central Asian republics of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan are facing a nearly unsolvable crisis in the Aral Sea Basin, the site of an environmental and human catastrophe. Given economic and time constraints, the mitigation of the catastrophe, rather than the reconstruction of the Basin's original ecosystem, is the only viable

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approach to the problem. Damage control must be the course of action for the Central Asian community. It is necessary that the republics work together in a highly integrated and cooperative manner to manage the limited water resources in the region in an equitable and sustainable way. Without such an approach, the region is destined for an unprecedented economic, social, and humanitarian crisis.

The value, productivity, and measure of land in Central Asia have always been inextricably linked to its access to water. As a result, a high degree of sociopolitical organization developed to maintain, monitor, and secure water resources in these “hydraulic societies” (Gleason 1991, 11; Wittfogel 1957). The Aral Sea, once the world’s fourth largest inland body of water, is at the very heart of the region, measuring some 67,000 square kilometers (Weinthal 2002, 5). Prior to Soviet interference, the Aral Sea Basin supported 75 percent of Central Asia’s population, contained nearly 90 percent of its surface water, and acted as a cultural, economic, and geographical core for the region (Allison and Jonson 2001, 70). In addition, the deltas of the Amu Darya and Syr Darya (two rivers) supported numerous flora and fauna, and the sheer magnitude of the lake helped to keep the climate mild and temperate relative to the region’s geography (Engelman 2001, 149).

SOVIET MISMANAGEMENT OF WATER RESOURCES AND THE CREATION OF A “WHITE GOLD” MONOCULTURE

This harmonious balance changed once the Soviet Union began a massive cultivation of water-intensive cash crops in the upstream regions of the Amu Darya and the Syr Darya. Soviet planners emphasized agricultural products, rather than finished products or other crops appropriate for the climate, and rapidly expanded the production of such goods. As a result of these irrigation practices, the Aral Sea received less than 1,000 cubic kilometers of river water during the past 35 years, leading to a lower sea level and a sharp reduction in the sea’s volume of water (Engelman 2001, 149). Even though Soviet scientists understood the economic and environmental ramifications of such water diversion schemes as early as 1927, the Soviet Union continued to emphasize short-term production over long-term sustainable growth and development (Glantz 1999, 3). It was irresponsible Soviet planning, therefore, that created the trend of poor water resource management and unsustainable development in Central Asia. The cotton monoculture exacerbated the situation and resulted in the destruction of the Aral Sea, the Central Asian ecosystem, and sustainable water resources for present and future generations.

The hydraulic societies of Central Asia historically developed a pseudo-feudal system, complete with water lords who controlled water in these semi-arid and arid regions, especially with respect to the production of cotton. Contrary to widespread belief, cotton had been widely cultivated in the Syr Darya and Amu Darya river valleys of Central Asia long before the Russians arrived in the region (Spoor 1993, 4–5). Uzbeks historically used a highly successful crop rotation system, which consisted of growing cotton one year, alfalfa the next, herding livestock on the fallow fields the third year, and then repeating the cycle. This process maintained soil fertility levels and continued until the 1940s (Rumer 1989, 82).

Russian influence in the region began as early as the time of the U.S. Civil War, when, due to shortages, Russia began to colonize it in search of a raw cotton source (Carlisle 1998). In the 1950s, planners in Moscow, as a result of Khrushchev's "Virgin Lands" campaign, expanded the agricultural development of Central Asia by 88.6 million hectares on the basis of a concept called "cotton first," which assumed that specializing in cotton would create economies of scale (Wegerich 2001, 9; Gleason 1991, 13). A monoculture developed while food and industrial inputs were brought from elsewhere in the Soviet Union. In addition, a structural dependency emerged between the Central Asian republics and the other Soviet republics because cotton and other agricultural goods were sold to other republics in a raw state, while the republics paid extremely high prices for the finished goods and agricultural staples (Spoor 1999, 5).

Soviet acculturation and the destruction of traditional ways of life for Central Asians induced a movement of large numbers of people to *kolkhozi* (collective farms) and *sovkhozi* (state-owned farms). The traditional cotton-alfalfa-livestock rotations were abandoned in favor of mechanization, which was initially successful. Cotton production rose from about 2.6 million tons in the 1950s to a peak of 5.6 million tons in 1980 (Gleason 1990, 19). Tonnage of cotton per hectare in Uzbekistan rose from 1.2 in 1913, reflecting the use of traditional rotations, to 2.0 in 1960, and peaked at 2.7 in 1980, an output more than double what it had been 65 years earlier (Spoor 1993, 19).

The Soviet Union's white-golden dreams eventually turned brown, however, as the ill effects of its destructive and unsustainable planning began to be manifest. The transition to a cotton monoculture, combined with the destruction of traditional lifestyles and the impoverishment of Central Asian populations, eventually took a severe toll on economic productivity. This was exacerbated by increased irrigation and the intense use of pesticides and fertilizer. These factors contributed to the Aral Sea Basin crisis the region faces today.

The Central Asian economy became highly vulnerable to climate change and environmental conditions from year to year, and, by the 1990s, cotton yields were severely declining due to water logging and salinization (Glantz 1999, 9). Water quality decreased due to increased effluence discharged into rivers from areas of high population concentration as well as from upstream industries and mines (Spoor 1998, 410; Wegerich 2001, 16). Furthermore, the increase in the prevalence of pesticides and herbicides due to irrigation runoff into the rivers made the water unfit for human consumption. Even by Soviet standards, the amount of pesticide use was staggering. Some 202-205 kilograms per hectare were used, compared to only 3 kilograms per hectare elsewhere in the Soviet Union (Olcott 2002, 204).

Even though cotton output increased between the 1950s and the late 1980s, varieties of inferior quality increased as a proportion of output from 14 to 29 percent (Rumer, 1989, 78). Much of this change was due to soil exhaustion, desertification, salinization, the spread of the cotton wilt virus, and the difficulty of maintaining a large number of mechanical harvesters (Gleason 1990, 20). Producers, who were dominated by a cotton *nomenklatura*, were nonetheless forced to overstate production and quality figures—to meet state-mandated quotas from Moscow—and to sell their output in parallel black markets. They had to do this in order to purchase basic consumer goods and agricultural inputs, some of which were necessary for the production of cotton (Spoor 1993, 6–7).

THE ARAL SEA BASIN CRISIS

Disastrous Soviet planning led to serious environmental, economic, and social consequences in Central Asia. First, because of steady irrigation upstream, the decreased flow into the Aral Sea resulted in a lowering of the sea level by an average of 17 meters and a reduction in the volume of water in the sea of 75 percent (Micklin 2001, 140–141). In 1987, the sea split in two—the Large (Boł'shoi) Sea and the Small (Maloi) Sea, and salinity in the remaining waters increased by as much as 450 percent (Micklin 2001, 149). Currently, desertification is spreading, and salt-hardy vegetation is replacing native, more salt-sensitive plants. Native bird populations and waterfowl are also endangered or have already become extinct because of the loss of wetlands and increased pesticide concentration in the water (Micklin 2001, 153).

Second, the destruction of the Aral Sea disrupted the climatic balance of the region. January temperatures from 1981 to 1988 were 3-3 1/2 degrees Celsius lower in the Aral Sea region than the previous average,

and, during that same period, July temperatures were 1-4 degrees Celsius warmer than average (Glantz 1999, 90). Additionally, during the Soviet period the frequency of sunny and very hot, dry weather increased by 15 percent, and the vegetative season decreased to 170 days, far short of the 200 frost-free days needed to grow cotton (Glantz 1999, 94; Kriner 2002). Furthermore, pasture productivity decreased by 50 percent, the evaporation of surface water increased markedly, and air moisture diminished by 10 percent from its rate of 50 years ago (United Nations Environmental Program GRID-Arendal 2000). These drastic changes resulted in a decrease in the quantity and quality of cotton yields. Farmers who had less access to better farming techniques, pesticides, herbicides, or adequate water suffered the most. They were the biggest losers in this catastrophe because they were unable to compete economically with wealthier, better endowed farmers, which exacerbated their impoverished state.

Third, an increase in the number of dust storms in the region has led to a rise in the amount of dust on glacial surfaces, and the mineralization of precipitation on glaciers has caused them to melt. At present, 1,081 glaciers have disappeared,¹ and what is most troubling is the following:

[On average,] valley glaciers in the Tien-Shan area retreat 7.5 to 13.1 meters per year and grow thicker at the same time. Glacial retreat and disintegration is dangerous and will have long-term development implications because these glaciers are the only ancient remaining storage of fresh water supply and are the main atmospheric moisture condensators of the region (United Nations Environment Program GRID-Arendal 2000).

The disappearance of these glaciers will lead to an even greater shortage of water and could pose a security threat that might destabilize the region as tensions over this scarce resource grow. Equitable management of this limited resource will become more important as each country wishes to maximize its economic growth and exploit its water resources fully. This could lead to conflict as each republic—or perhaps ethnic group—tries to exert its influence over other countries or groups for control and use of water.

Fourth, damage to biological diversity in the Basin is irreversible. The area possessed half of all the biological species of the former Soviet Union, many of which are now threatened or extinct. Before 1960, the “river deltas were home to over 70 kinds of mammals and 319 types of birds.” At present, “only 32 kinds of mammals and 160 types of birds remain” in the Aral Sea Basin (United Nations Environment Program GRID-Arendal 2000). This loss of biodiversity will have a severe negative

impact on the ecosystem's viability and health, and will be impossible to rectify through future development programs.

The disadvantaged poor who reside downstream and in former seaside communities were the first to be affected by the changes in the Basin. Although they only represent 3-4 million people (out of a total population of 44 million in the region), they cover an area of 400,000 square kilometers and continue to have the worst general health of any people in the Central Asian republics (Micklin 2001, 150). They represent the fifth casualty of this crisis. Furthermore, their traditional livelihood has disappeared with the dramatic decrease in the sea's volume and the vanishing of twenty of the twenty-four native species of fish (Elance 1997, 210). The quality of diets is now quite poor, adequate sewage systems are rare, and these communities have limited access to basic medical services (Micklin 2001, 155).

A sixth phenomenon of this crisis is the increase in dust storms containing toxic salt residue. Populations downstream and downwind, sometimes hundreds of miles away, inhale these carcinogens, and, as a result, suffer increased incidences of infant mortality, respiratory illnesses, esophageal cancers, typhoid, and hepatitis (Weinthal 2002, 5). During the last fifteen years of the Soviet Union, the incidences of typhoid fever increased to a level thirty times greater than the world average. Similarly, incidents of hepatitis grew to seven times the world average and esophageal cancer to a level fifty times greater than the world average (Frederick 1991, 2-3). Although some of the increase in these diseases can be attributed to the economic and social upheaval in the period leading up to and during the collapse of the Soviet Union, much of it can be attributed to the destruction of the Aral Sea Basin that resulted in more limited and tainted potable water supplies.

The list of environmental and health calamities is long and severe. With poor health care, populations are even more susceptible to adverse economic and environmental effects, and this increased vulnerability exacerbates the already tenuous situation in the region. Finally, the climactic and environmental impact of the crisis could render the majority of the region uninhabitable for many forms of life, bringing about the collapse of the entire ecosystem.

The Development of Unsustainable and Ineffective Irrigation Schemes

Beginning in the early twentieth century, irrigation, particularly of the Syr Darya and Amu Darya rivers, increased dramatically to quench the thirst for increased cotton production. Aging, traditional irrigation systems

were abandoned in favor of new Soviet canals and structures, such as the 1,200 kilometer-long Kara-kum canal, which did not utilize water-saving techniques that would improve irrigation efficiency. Seepage was enormous, in part because many of these irrigation canals were unlined, open, and exposed to the desert climate of the region. Irrigation currently accounts for more than 90 percent of all water withdrawals from the Aral tributaries (Micklin 2001, 174).² Because of the inefficiencies of the irrigation systems in Central Asia, six to ten cubic meters of water are needed to produce one hundred kilograms of raw cotton, compared to one-and-a-half cubic meters needed to produce the same amount in Israel (Spoor 1993, 10).

The Soviets recognized these irrigation problems and drafted plans to rectify the situation. An equitable solution to the problem would have been to repair and modernize existing irrigation canals, as the Israelis have done, but since the Soviet Union relied heavily on brute industrial force over nature, this option was not viable for Moscow authorities. By the late 1980s, elaborate and costly schemes were drafted to divert sixty cubic kilometers per annum from Siberian river basins to Central Asia (Micklin 1985, 16). The most elaborate was to be the Main Diversion Canal, which would have redirected waters from the Ob and Irtysh rivers in Siberia to the water-starved Central Asian republics. This canal would have transported 27.2 cubic kilometers annually, irrigated 2.3 million hectares, and cost some \$41 billion (Micklin 1985, 18–19).

Had it been implemented, the effects of this scheme would have been catastrophic. Filtration losses from the canal alone would have totaled between 2.2 and 2.7 cubic kilometers annually (Micklin 1985, 18–19), and Siberia's estuaries, floodplains, and water quality would have been seriously harmed because of the diversion of water from these rivers. This scheme never came to fruition, in part because of the weakening and eventual collapse of the Soviet Union only five years later. Many experts have claimed that it was mismanagement in the highly bureaucratic Soviet Ministry of Land Reclamation and Water Resources, more than opposition to the diversion project itself, which led to the shelving of the canal project (Gleason 1991, 18).

Impact of the Soviet Union's Collapse on the Economy of the Aral Sea Basin

The collapse of the Soviet Union threw the five Central Asian republics into uncharted territory. The rapid change affected the republics' political and economic systems, which had clear ramifications for the Aral Sea

Basin. The economic shocks to the system were considerable. Median incomes plummeted from \$300 per month at the turn of the decade to roughly \$60 by 2000, and half of the population came to live below the poverty line. There was no capital to maintain the antiquated and obsolete Soviet infrastructure. Privatization efforts took hold, but they resulted in the formation of an extremely wealthy class of former Soviet *nomenklatura* who took advantage of the turbulent situation and procured state-owned infrastructure at minimal prices (Sievers 2003, 197–98).

The economic crisis also had a major impact on the output of agricultural products, most notably water-intensive crops such as wheat and cotton. Cotton output dropped in Uzbekistan, Central Asia's major producer, from 5,058,000 tons in 1990 to 3,002,000 tons in 1998 (Spoor 1999, 4–5; Gleason 2003, 120). A major part of this decrease was due to the breakup of the Soviet Union itself, as the collapse of the system eliminated Central Asia's access to agricultural inputs, technology, and capital as well as its access to markets for cotton. A less important factor was the desire of countries like Uzbekistan to reduce their dependency on external states, particularly Russia. The monocultivistic character of the economy also made the economy more susceptible to externalities like price shocks and changes in weather from year to year (Spoor 1999, 4–5). Furthermore, some estimates indicate that an estimated \$300 million in crop production is lost annually due to wasteful irrigation, the waterlogging of soils, and salinization (Uitto 2002, 372).

Though water is both the cause and the cure of salinization, it only serves to intensify the problems in Central Asia. Water is used to flush out existing salts in the soil; however, it carries with it more salts, exacerbating the unwanted process (Spoor 1998, 421–22). This is especially the case in the desert-like regions of Central Asia, where a dry, hot climate increases the rate of evaporation, leaving minerals and salts in the soil. This process represents an additional reason to advance economic reform and diversification, particularly given the region's finite water supplies and the unsustainability of these flushing techniques.

Central authorities and elites stalled some of the efforts to diversify the cotton industry because they had a vested interest in maintaining the status quo. Even ordinary people found that they were better off under the status quo than they would be by diversifying production. One Uzbek farmer stated, for example, “[a] hectare of cotton brought up 3,150 rubles, while a hectare of alfalfa along with the income from meat or milk brought up only 1,200 rubles” (Gleason 1990, 20). Almabek Nurushev, Director of the International Fund for the Aral Sea (IFAS), echoed the words of the

Uzbek: “Who will have the braveness to tell the farmers: ‘reduce production and perish?’ It will take quite some time to have rational production systems, where instead of cotton and rice, in some places the farms will produce wine and other products. This question is a very important one, and has to be faced in the very near future” (Spoor 1998, 427).

Nonetheless, the production of wheat, another water-intensive crop, grew from 610 tons in 1991 to a remarkable 3,532 tons in 2000 (Gleason 2003, 120). There was also a shift, albeit minor, in the production of rice due to the shortening of the growing season resulting from the temperature changes in the region. Ironically, rice production will further exacerbate the water resource problem in Central Asia. Cotton uses approximately 10,000 cubic meters of water per hectare, while rice uses 35,000 cubic meters per hectare (Spoor 1988, 423).

Currently about 7.5 million hectares of farmland are being irrigated in the Central Asian republics. Some 35 million people, 20 million of whom live in Uzbekistan, depend on this agriculture for their livelihood. The population of these republics continues to grow at a rate that water resources cannot support. The population in the region was estimated to be 54 million in 1994 and is expected to reach 86 million in 2025 before peaking at 128 million around mid-century (Elance 1997, 209).³

Potential for Conflict

The demarcations of republic boundaries, a significant population increase, limited water resources, and a depressed economic situation are all important factors that could lead to conflict within and among Central Asian states. The new boundaries of these five republics, irrespective of the Aral Sea Basin boundaries, mean that over 50 percent of the water supplies for Uzbekistan and the Kazakhstani *oblasti* (provinces) of Kyzl-Orda and Shymkent come from foreign sources. For Turkmenistan, this problem is worse—98 percent of its water resources are imported. These three states are the major downstream states, and they rely heavily on Kyrgyzstan and Tajikistan, which possess 90 percent of all Aral Basin water resources, for their water. Despite their relatively rich endowment, collectively Kyrgyzstan and Tajikistan only withdraw 11.4 percent of the Basin’s water (Allison and Jonson 2001, 70–71).

These contrasting figures between downstream extraction and upstream water inputs do not by themselves constitute a significant reason for concern; however, there are a number of related issues that could potentially present a security threat to the region. Irrigated land, for example, is responsible for producing 90 percent of the region’s crops, and this agriculture

employs 44 percent of Turkmenistan's work-force while providing for 75 percent of Uzbekistan's hard currency value. Furthermore, the Basin water produces 50 percent of Kyrgyzstan and Tajikistan's electricity (Allison and Jonson 71). Water, therefore, serves as the economic catalyst for the region and is the primary resource on which its growth relies. Because of this, leaders in Central Asia will safeguard and protect their water rights and resources as demand for it increases in the years to come. This will increase the potential for militarization and conflict among actors in the region as states vie for control of this vital limited natural resource. As a result, water will be seen increasingly as a matter of national security.

In fact, international and ethnic resource-based conflicts have already begun to proliferate. In June 1990, a clash over access to land and water between Kyrgyz and Uzbeks in the Osh region left 300 people dead (Spoor 1998, 425). Perhaps these tensions have always been present and the current socioeconomic situation is such that these situations are becoming more pronounced. However, given the high and relatively concentrated population growth, especially in the Fergana Valley, the increasing scarcity of land and water could easily serve as a precursor to greater manifestations of tension over resources. This possibility might become more likely as migration to urban centers increases people's frustration with their inability to achieve economic betterment.

ADDRESSING THE ARAL SEA BASIN CRISIS ON MANY FRONTS

The inadequate state of water resources has forced the seven Aral Sea Basin states (the five Central Asian republics as well as Afghanistan and Iran) to address this issue collectively, a relatively new concept for the republics since all directives came from Moscow during the Soviet era. As Garret Hardin illustrated in the *Tragedy of the Commons*, if one country attempts to maximize its own utility, it can lead to the destruction of the common good—in this case, the entire Aral Sea Basin ecosystem. All actors would then lose. Therefore, integrated, streamlined involvement and cooperation *must* take place at all levels to address the issues of equitable distribution and usage of the Aral Sea Basin waters before the situation becomes any more dire.

Funding and Reform Mechanisms: Vying for Control

Unfortunately, the involvement of the seven states in addressing these issues has been uneven. Upstream states such as Kyrgyzstan, Tajikistan, and,

to a lesser extent, Turkmenistan, have not been very involved, while Iran and Afghanistan have not participated in the dialogue at all. Kazakhstan and Uzbekistan, the two countries facing the greatest problems, are the most involved in negotiations. Varying levels of political commitment from the governments do not create a level playing field from which to address the issues at hand. Nonetheless, in the time frame between the republics' independence and 1994, as many as 300 agreements concerning the Aral Sea region were signed (Allison and Jonson 2001, 73).

Discussions on the crisis began to take place shortly after the five republics gained their independence.⁴ They signed the Almaty Agreement on February 18, 1992, with the intent of resolving water disputes. In this Agreement, the states recognized that "only through unification and joint coordination of action" could they effectively manage the region's water resources (Allison and Jonson, 70–71). The agreement also established a working group to oversee its enforcement and the development of a single program of exploitation and water consumption in the interest of both supporting national economies and protecting water resources (Elance 1997, 214). The Almaty Agreement is a major part of the existing framework for the regional dialogue on Aral Sea issues. It serves as a solid springboard for action; yet, its vagueness and generality leave it ineffective as a functional plan of action.

Although many of the 300 Aral Sea Basin-related agreements promoted idealistic aims, few established mechanisms to enforce their clauses. The Almaty Agreement, for example, mandates that disputes be settled by the ministers of water resources of the five republics, but the problem is that the various ministers cannot agree on solutions, and there seem to be no measures in the agreements stipulating how to break such deadlocks (Vinogradov and Langford, 11). The creation of strong, effective, and meaningful treaties and agreements requires water resource distribution plans that are acceptable and equitable to all actors involved. Stringent enforcement mechanisms also need to be written into these standards to ensure adherence to the agreements.⁵

In order to procure World Bank funding for various water resource management programs, the republics took further action and created the Interstate Council for Addressing the Aral Sea Crisis (ICAS) and the International Fund for the Aral Sea (IFAS). The ICAS is a body of twenty-five high-level representatives from the five states who meet biannually to "hold discussions, reconcile the issues of the member nations, and decide on the programs, policies, and institutional proposals recommended by the EC [European Community]" (Carlisle 1998). It is the main organization

responsible for developing Aral Sea-related policies and proposals. The ICAS was intended to become the leading management organization for making decisions regarding water use and distribution among the new Central Asian states. Unfortunately, the body's legal status remains unclear, and its jurisdiction overlaps with the Interstate Water Management Coordinating Commission (IWMCC), created prior to the ICAS (Elance 1997, 217) at the Almaty Conference in February 1992.⁶

The ICAS oversees two organizations, the Interstate Commission for Water Coordination (ICWC) and the Sustainable Development Commission (SDC).⁷ The ICWC meets five times a year to determine water allocations among the five basin states, which are based on the 1991 Soviet-era water withdrawal levels. These ICWC directives concern issues including the control of hydroelectric facilities, the maintenance of water control structures, and diversions to canals. Its decisions are implemented by two Soviet-era Basin Valley Organizations (BVOs), one relating to the Syr Darya and the other to the Amu Darya (Carlisle 1998).

The U.S. Agency for International Development (USAID) notes, however, that these BVOs are "seriously under funded," despite the fact that at any given time, fifteen to twenty international donor agencies are involved in Aral Sea Basin projects (USAID in Central Asia Natural Resources Management Program 2002; Le Moigne 2003, 4). Indeed, the BVOs have been crippled by staff cuts, and water control structures and hydrotechnical facilities for which they are responsible are falling into disrepair due to a lack of adequate operation and maintenance funds. Additionally, their divisional offices lack basic equipment such as reliable telephones, fax machines, and computers that are necessary to log and process data and operate programs effectively (USAID in Central Asia Natural Resources Management Program 2002). Despite the good intentions and potential efficacy of the Aral Sea BVOs, this lack of funding—particularly from the governments of the states in the Basin—can undermine the potential sustainability of the Basin as well as any reform and modernization projects that could help to decrease water consumption and inefficiency.

The IFAS, for its part, was established to serve as a funding mechanism for Aral Sea programs. It was mandated to rely on contributions of 0.3 percent of the GNP of Kazakhstan, Turkmenistan, and Uzbekistan, and 0.1 percent of the GNP of Kyrgyzstan and Tajikistan. It is also intended to serve as a mechanism to channel funds from donor countries and international agencies to Basin-related projects. Despite the minimal level of mandated state contributions—which has been lowered from the original percentage amounts noted above—the republics have been slow in paying their shares (Allison and Jonson 2001, 73).⁸

Not only have various commissions and organizations been fighting over authority in addressing the Basin crisis, but the actions of international donors have further complicated the situation. The World Bank, in conjunction with the United Nations Development Program (UNDP) and the United Nations Environment Program (UNEP), named strengthening the institutional capacity of the ICAS and the IFAS as one of its main objectives in the region. USAID, however, worked through the Interstate Council for Kazakhstan, Kyrgyzstan, and Uzbekistan (ICKKU), an economic cooperative organization created in 1993 to strengthen cooperation among the Syr Darya states, which were unable to negotiate a sustainable agreement regarding water and energy resources (Weinthal 2000, 2). USAID's approach was to deal with each tributary separately to promote coordination among these states. It further argued that by supporting the ICAS/IFAS, the World Bank was only propagating control by the former *nomenklatura* instead of facilitating meaningful progress and reform. Conversely, the World Bank claimed it was necessary to work with these scientists and bureaucrats because they could subvert donor attempts at reform and development by refusing to cooperate with other initiatives in which they were not included.

Privatization and Pricing

Some researchers claim that there is really no natural water resource shortage in Central Asia and that the problem stems from misallocation and mismanagement (Wegerich 2001, 2, 14). Given that the efficiency of water usage in the region is low, a more sustainable method of management could emerge from the establishment of more private enterprises, which could replace the system of centralized organization handed down from the Soviet era. Another strategy that is largely unutilized is appropriate water pricing. In the countries of the former Soviet Union, consumers do not pay for the true economic cost of water, and pricing seems to be primarily nominal. This is a result of the Soviet practice of squandering natural resources without giving adequate thought to the consequences of such action. Water pricing and tradable water credits could prove effective in reducing water consumption—or at least changing behavioral norms about water consumption—at the regional and local level (Spoor 1998, 430).

PREDICTIONS AND POLICY OPTIONS

Given the current state of affairs, the approach to the crises related to the Aral Sea Basin must resemble damage control more than anything

else. The problems began in the late nineteenth century with Russian colonialism in Central Asia, gaining momentum during the early-to-mid twentieth century with Soviet reordering and upheaval of the entire region. Traditional nomadic and pastoral cultures were uprooted in favor of creating large industrial and agricultural economies of scale favoring short-term growth over long-term development sustainability. Natural resources were exploited at a rate above and beyond their capacity to regenerate, although it was widely known in academic circles and among political elites that the policies being pursued in Central Asia would lead to disaster within a century.

Today, Central Asia is both literally and figuratively reaping what the Soviets sowed. The Aral Sea and its tributaries are a fraction of their original size, and outdated irrigation and water management systems exacerbate the problem. Pesticides and other carcinogens, leached into the soils over the past century, are dramatically worsening health conditions and life expectancy. Preliminary studies show that the region's temperature, rainfall, and mountain glaciers are being adversely affected as well. Since the 1991 breakup of the Soviet Union, the situation has become more difficult to tackle as the Aral Sea Basin is now claimed as the territory of five sovereign states. As the Central Asian republics struggle with their new-found independence and desire for economic prosperity, they are unsuccessfully grappling with the imperative to balance self-interest and the need to address a regional issue cooperatively.

Negativists take a Malthusian approach to the future of Central Asia. They assume that a significant increase in the population of Central Asia would lead to continued resource depletion and the maintenance of the status quo. Such an approach is premised on the belief that all actors in the region wish to have their proverbial cake and eat it too. Accordingly, Hardin's scenario of the destruction of the commons would manifest itself as the Central Asian states strive for independence in food production and continue to produce revenue-earning cotton for export (Wegerich 2001, 18).

Others, such as John A. Allan and Massoud Karshena, argue instead that there are three positive potential future scenarios for the Aral Sea Basin: a conventional scenario, a precautionary one, and a scenario of reconstructing the Basin to its original state. A conventional scenario—featuring the maintenance of status quo water withdrawals—would be based on maintaining the Central Asian standard of living and continuing to deplete the region's resources. Allen and Kareshna reject this possible outcome as unacceptable. The precautionary scenario—which would rely on the

maintenance of the current sea level as well as setting sustainable water withdrawal limits—would be the most feasible option. It calls for regional stabilization and accepts current levels of resource depletion. However, it does not allow the situation to deteriorate. The third scenario would feature the reconstruction of the natural environment to a pre-1960s state, which is simply no longer possible (Wegerich 2001, 3).

A large part of the problem in the Basin crisis concerns the goals and directives for sustainable development in the region. Because the problem is so complex and involves multiple economic and social sectors, it is difficult to agree on common objectives.

When we talk about a sustainable outcome [for the Aral Sea Basin], we need to ask ourselves, “What is it that the governments are seeking to sustain? Soil fertility? Human health? Fish populations? The economy? A way of life? The well-being of the region’s leaders? How long do we wish to sustain it?” In other words, are short-term attempts at sustainability compatible with achieving sustainability in the long run? (Glantz 1999, 19)

It is also important to ask whether or not the economic objectives are at odds with long-term environmental and social objectives. Governments have drafted laws, written action plans, and conducted seminars which establish an optimistic and dynamic base for future action (Sievers 2003, 4). These measures, however well-intentioned, have been largely ineffective due to their vagueness and high degree of overlap, as well as the varying degrees of political will of governments and other actors. There are also competing interests among upstream and downstream communities regarding whether water usage should be for commercial or domestic use, or for irrigation or hydroelectric dams.

Moreover, this discussion does not even begin to address the question of cost. Restoring the Aral Sea Basin and its tributaries to their original boundaries would require the flow of 1,000 cubic kilometers of water per year—that is, 10 years of full flow of both the Amu Darya and Syr Darya rivers (Wegerich 2001, 11). To achieve this, economies would have to be diversified, populations shifted, and consumption reduced (Sievers 2003, 204). The cost of such changes would be in the tens of billions of dollars—a cost the Central Asian republics cannot afford to bear and a price the West is unwilling to subsidize. Restoring the Aral Sea Basin to its original pre-Soviet boundaries, therefore, is not feasible. Funding and policies should focus on mitigating the crisis, stabilizing the region’s water resource management, and ensuring its sustainability for future generations.

POLICY PROPOSALS

Basin Valley Organizations (BVOs): The most viable solution to this systemic crisis is, therefore, to rely on “an integrated [Basin]-wide strategy to optimize water use efficiency and maximize efforts to restore and protect key water related ecosystems” (Allison and Jonson 2001, 85). Successful approaches will be ones that reflect diverse interests, geographies, and applications at the local, national, and regional levels of each republic. A systemic approach also needs to be taken which capitalizes on local, community-based initiatives, which best reflect the needs of the populations they serve. Since communities have the best understanding of their needs and limitations, they are in the best position to address water resource management issues. Involving them in the decision-making process would give them ownership of and responsibility for their future and the resolution to the crisis. Community-based, micro-institutions can best address local water needs and environmental concerns, while simultaneously monitoring progress, enforcing legislation, and encouraging adherence to guidelines and principles (Allison and Jonson 2001, 204).

These localized approaches should be housed within Basin Valley Organizations (BVOs) that serve entire rivers and drainage systems, rather than within national governments or sub-national administrations. These BVOs should work in conjunction with regional and local NGOs within the boundaries of each republic to educate citizens about proper irrigation and water management techniques. They should also educate citizens about more sustainable forms of agriculture—for example, traditional crop rotations consisting of alfalfa, cotton, and livestock. In order to discourage excess water consumption and waste, water should be priced to more adequately reflect its true economic cost. This economic incentive will lead people voluntarily to reduce water consumption and/or adopt more water conserving methods.

Central Asian Republics: The governments of the Central Asian republics should work together with independent BVOs to address sectoral needs such as agricultural and industrial diversification, and water withdrawal quotas (Sievers 2003, 204). These governments should also do more to address concerns within their countries, such as the decreasing quality of health due to airborne pollutants, the increase in the prevalence of dust storms, climate change, and the reduction in size of permanent glaciers in upstream states. Central Asian governments should also be held accountable for making timely contributions to the IFAS based on their assessed rates, and monies should be used to fund BVO and NGO

activities rather than projects that are internal to individual countries. These states also need to increase their domestic funding of environmental education programs to increase awareness of the critical issues. Finally, downstream countries need to provide economic incentives such as subsidies to farmers to help them transition into producing more crops which are not water-intensive.

International Community: International organizations (such as the UNDP and the UNEP) and bilateral donor institutions (such as USAID) should also play a role in this process, albeit a secondary, supportive one. Their involvement should have three main prongs.

First, their assistance is needed to increase cooperation within the donor community and among regional bodies in order to develop a more coherent and less conflictual management structure. This would maximize the sharing of knowledge, technology transfer, and the efficient use of funds. In addition, it could shift the focus of Basin-related efforts from the alleviation of the symptoms to the cause of the problems (Allison and Jonson 2001, 86; Wegerich 2001, 19).

Second, international organizations and other donors should work to ensure that states contribute their respective GNP assessments to the IFAS. The application of diplomatic pressure on the Central Asian republics would illustrate the commitment of the international community to combat this crisis and would help to ensure that payments are made to continue funding BVO and NGO programs and projects.

Third, nations can help address the crisis through bilateral aid. Western governments must understand that the water crisis poses a potential threat to regional stability and security. Given contemporary geopolitical interests in the region, such stability is integral to the promotion of many nations' foreign policy aims. Furthermore, the receipt of much needed aid now could stall the Basin's further degradation and begin to undo some of the damage, whereas delaying action would only result in a situation which is more dire and more costly to solve. On a local level, donors should offer assistance to NGOs and environmental or public health groups, among others. In this way, they can help implement directives and goals established at a regional or national level that may otherwise not be implemented.

The Aral Sea Basin crisis, arguably one of the worst man-made systemic disasters in history, is truly an example of the Aristotelian idea that "that which is common ... has the least care bestowed on it." Any real solution to the problem will not involve the supply of more water but rather must

focus on the use of less water and more efficient use of water withdrawals (Spoor 1998, 425). It is only through cooperative and streamlined initiatives at the local, national, regional, and international levels that any progress will be made to prevent the exacerbation of this ever-worsening crisis and to sustain the ecology, development, and security of the entire region. Further delays will likely result in severe consequences for the health, societies, and economies of the people of Central Asia, ultimately posing a threat to their entire existence.

NOTES

- ¹ Studies indicate that there are approximately 12,183 loaded glaciers in the Tien-Shan range (United States Geological Survey 1998).
- ² Of the 180,000 kilometers of irrigation canals in Central Asia, only 15,000 kilometers of them have linings (Carlisle 1998).
- ³ Estimates on population growth in the region vary. The World Bank assumes a 2.5 percent growth rate, while the United Nations Education, Scientific, and Cultural Organization (UNESCO) calculates a 1.61 percent growth rate. According to the UNESCO estimate, the region's population is expected to reach 70 million by 2025, not the 80 million estimated by Elance (Elance 1997, 209).
- ⁴ Vinogradov and Langford note that international agreements on the uses and quality of frontier waters were signed between the USSR and Afghanistan as early as 1946. In general, most of the Aral Sea initiatives took place under the Soviet umbrella (Vinogradov and Langford 2003, 6).
- ⁵ The 1997 draft *Agreement on the Use of Water Resources in the Present Conditions* takes steps toward arbitration of disputes, although it is weakened by provisions that waive penalties in the event of noncompliance or a breach of the agreement (Vinogradov and Langford 2003, 11).
- ⁶ The IWMCC would be responsible for the "regulation, rational use, and protection of water resources from interstate sources" as well as the "determination of water management policy in the region" and the "approval of water use limits in the region," among other things (Elance 1997, 207).
- ⁷ The Sustainable Development Commission was formerly called the Interstate Commission for Socio-Economic Development and Scientific, Technical, and Ecological Cooperation (ICSDSTEC).
- ⁸ To give an approximate value of the amount of funding in question, 0.3 percent of the combined gross national product of Kazakhstan, Turkmenistan, and Uzbekistan would be U.S. \$652.2 million in 2002 purchasing power parity. The assessments of Kyrgyzstan and Tajikistan—at 0.1 percent—would total U.S. \$79.94 million. In all, assessments would total approximately U.S. \$732.14 million per year (Central Intelligence Agency 2003).

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