Watering Central Asia

by Mary Burdman

"Water is life" is the fundamental idea of the civilization of Central Asia from ancient times. Central Asia lies at the heart of the world's biggest landmass, Eurasia, a region of steppes, deserts, and oases, surrounded by the some of the world's highest mountain ranges. It is the most arid region on Earth. Irrigation is essential for agriculture and city life, and has been the basis of Central Asian culture since 4,000-3,000 B.C.

The idea of taking water from the great, north-flowing rivers of Siberia, south and west, to water the steppes and deserts of Central Asia, is at least 100 years old. This idea was almost brought to life in the early 1980s, when preparations were under way in the then-Soviet Union, to construct a 2,200 kilometer canal from the Ob-Irtysh river system in central Siberia, to take water to the two great rivers of Central Asia. These are the Amu Darya (formerly known in the West as the Oxus) and the Syr Darya, which flowed into the Aral Sea, at one time the fourth largest inland body of water in the world. In the last half-century, as more and more water has been taken from the Amu Darya and Syr Darya for irrigation, the Aral Sea has been fast drying up into a salt desert.

The economic upheaval imposed by the last Soviet leader, Mikhail Gorbachov—*perestroika*—which has done so much to destroy the economies of Russia and the other nations of the former Soviet Union, led Moscow to suddenly decide, in August 1986, to stop this project cold. The reasons given were cost, and alleged environmental concerns.

In reality, much more was at stake; this decision was a repudiation of the great Russian scientific tradition, as it was led by V.I. Vernadsky.

The nations of Central Asia, led by Uzbekistan, refused to allow the idea of the Siberia-to-Aral water project die. As an April 2002 conference in Tashkent, capital of Uzbekistan, emphasized, this canal will create an "economic bridge" between central Russia and the Aral Sea basin, and make it possible to develop large-scale social and economic cooperation. In Russia, which would supply the water, scientists are restarting, or continuing, research begun in the 1970s. The Sib-Aral Canal would not be the only great water project of such a scale in Eurasia. China is leading the way, in the construction of its Three Gorges project on the Yangtse, and—as *EIR* has documented—in its huge "Move South Water North" project, begun in November 2002. More and more articles are appearing on the subject, including in the United States.

Man Managing the Biosphere

The Aral Sea Basin, at the core of Central Asia, includes all or part of seven nations: Uzbekistan, Kazakstan, Turkmenstan, Tajikistan, Kyrgyzstan, Afghanistan, and Iran. It is some 1.8 million square kilometers in extent. This is the crossroads of Eurasia, and has been for millennia. The ancient Silk Road, which carried art, religions, and philosophy, as well as goods, to and from China and India, Persia, Arabia and Africa, and Russia and Europe, passed through the oases of Central Asia.

The region is as strategically placed today. It borders Russia, China, and Iran, and lies directly to the north of the Indian Subcontinent. The development of the interior of Eurasia is the key to the future of mankind. Here lie vast space, and the great mineral wealth and other resources which humanity urgently needs.

The idea of the Eurasian Land-Bridge, is to open up this great interior, using the most advanced infrastructure for transport, energy, water management, and city-building. This will change the face of Eurasia. This must be done to the highest scientific standards. During the Soviet period, huge water-management projects were carried out to control the flow of the Amu Darya and Syr Darya, and to irrigate large areas. However, big problems have arisen: It was not understood, or not taken into account, what effect diverting so much water would have, letting the Aral Sea dry up. Then, long-promised water supplies from Siberia were never brought to

Part of Gorbachev's (left) disastrous perestroika *was a repudiation of the legacy of Russia's great scientific genius V.I. Vernadsky (center), who developed the broad idea of mankind's mental activity (the Noösphere) managing the Biosphere. Gorbachev in 1986 stopped the project to bring Siberian rivers' water to the desertifying Aral Sea area. Now many in Russia and Central Asia want it revived. Lyndon LaRouche (right, speaking at Moscow State University April 14) cited the Sib-Aral project, to be done over a generation's time, as an example of Vernadsky's scientific vision.*

Central Asia.

Such mistakes should not be repeated. The "first law" of building such infrastructure projects, is that this is humanity "managing" what the Russian biogeochemist V.I. Vernadsky has defined as the Biosphere. Living things and their products have transformed the nature of the world during their long history on the planet; humans most of all. Human responsibility is to perform this task optimally. The world is always in flux; the role of humanity is in directing those changes.

Vernadsky made scientific, ideas which have their roots in ancient philosophic thought, of three divisions of the world: the "abiotic" (non-living processes), the "biotic" (living processes and their products), and the noëtic (the creative processes.) Vernadsky discussed the relationship between the biotic and abiotic phases of our planet's history. This means, essentially, the effects of living processes upon the Earth, including the formation of fossils, which include rocks, soil, and fuels, the basis of our current economy; the effects of water, which everywhere is full of life; and then, the impact of man's work, on the whole planet.

These are not "environmentalist" concerns. Environmentalists have as their basic assumption, that the world is "fixed," and they want to keep it stagnant. This is *impossible,* and leads directly to regression of the Biosphere. The Biosphere is being constantly changed by the impact of life; human science and physical economy should be directed to maximizing the beneficial effects of this process.

For the future of humanity, the vast interior regions of Eurasia have to be developed, despite the most dramatic geography on Earth. More water is urgently needed to support greater population density. This means water-management projects, between water-rich, and water-poor areas, conceived on a Eurasian scale. In addition, all around the Eurasian rim, more fresh water can be created by using nuclear energy to desalinate seawater. "Greening deserts" produces climate changes, just as desertification does in reverse. For such a region as Central Asia, the most arid region on Earth, there must be *sufficient* water to do this—the failure to meet this challenge, was the disaster of the Soviet water management policy. The politically motivated dedication of Central Asia to inappropriate water-hungry crops such as cotton and rice, contributed to the problem.

As Lyndon LaRouche explained to students in a Moscow State University speech on April 14, "In the development of great projects of basic economic infrastructure, we are launching works to be realized over an immediate future period of not less than one or two generations, and are thereby laying the foundation for a future benefit of mankind which lies many generations beyond that."

The Siberian Project

It is important to understand that this project, sometimes called "diverting" or even "reversing the flow" of the Siberian Rivers, is nothing so drastic. The Siberian-Aral, or "Sib-Aral" Canal, about to be built in 1986, would have taken a small portion—some 6-7%—of the flow of the Ob and Irtysh. These

two rivers together are the longest river system in Asia. The flow of the Ob averages about 404 cubic kilometers per year, and overall flow can reach a maximum of over 586 cu km per year at the Salekhard Station near the Ob Estuary.

The cost of the project, for which estimates range from $4 billion to $30 billion, would be substantial, given the current poverty of some of the Central Asian nations. Yet this region is, in physical economic reality, very rich. It is the crossroads of the greatest landmass in the world; it would be the "roundhouse" of transport, energy, and water-managment projects for all Eurasia. The region is also very rich in minerals, including petroleum, natural gas, and in Uzbekistan, gold and uranium. The potential is great.

Central Asia must have more water for its fast-growing population. At the beginning of the 20th Century, there were some 7-8 million people living in the Central Asian oases; now, the population is more than 50 million, and will be 60 million by 2020. Irrigated land has doubled, to 7.5-7.7 million hectares. Already, Uzbekistan and Turkmenistan have the highest per-capita consumption of water in the world; and in Uzbekistan, 90% of that is for irrigation. Some of this is due to inefficiency, but much also to the special nature of the Aral Sea Basin.

The Siberian rivers project was researched and designed in the 1970s and 1980s, by the All-Union Design and Research Institute for Water Resources Construction (SoyUzbekistangiprovodkhoz)—a subagency of the Soviet Union's Ministry of Reclamation and Water Management—with strong support from Central Asian leaders. Some 80% of rivers in the former Soviet Union empty into the Artic Ocean. Water from two of them, the Ob and Irtysh, would be sent to Central Asia via a system using low dams, pumping stations, and a huge canal, the Sib-Aral.

The project was designed for two stages: The first was to take 27 cubic kilometers of water a year to Central Asia, and would have been underway by the late 1980s or early 1990s. A second canal project would have taken water to the Volga River and Sea of Azov.

In an interview with *Pravda* on July 2, 1971, Igor Gerardi, chief project technical director, described the beginning work on this "Project of the Century." Nature, he said, had not distributed water resources in the then-Soviet Union very well: The vast majority of rivers and precipitation flow are in the sparsely-populated North and East; and only 12% of water resources flow to the arable lands in the South. At the beginning of the 1970s, he said, "Our science and technology have reached a level of development at which the daring dream of Russia's advanced scientists—that of diverting part of the flow of the Siberian and northern rivers southward in the interests of the entire national economy—now has a realistic basis."

In the first stage, water would be collected where the Tobol River flows into the Irtysh, and a "Tobol Sea" created. Via eight or so pumping stations along the canal, water would be pumped up to a height of 80-100 meters, to the Turgai Divide or Gates, near the city of Zavodoukovsk. From there it would flow downwards, via the long canal, to a reservoir in the Aral Basin plains, where it would be sent into the Syr Darya and Amu Darya, and into a system of irrigation canals. The main canal would be 2,200 kilometers long, 10-15 meters deep, and 200 meters wide.

The first stage would transport about 25 cubic kilometers (cu km) of water a year to Central Asia. A second stage would double the volume of water, by also taking water from the Ob. In the final stage, more water would be taken from the Ob in two places: near Bilsk, and near Khanty-Mansiisk, where the Irtysh flows into the Ob.

In a later interview, given to *Literaturnaya Gazeta* on March 10, 1982, technical director Gerardi emphasized that without water, you cannot "properly utilize the industrial and agricultural potential of Central Asia." There was "great interest among the public" in this project, which had been researched already for about 15 years. Gerardi emphasized that many of the doubts and questions being raised about the feasibility of the project, were not based on reality. Fulminations about supposedly "turning around" or "reversing the flow" of the Siberian rivers were totally exaggerated, he said, since this would not be done. Use of "*only a small part* of the Siberian rivers' enormous flow" was under discussion. Also, opponents' claims that the project would build reservoirs on the Ob and Irtysh, so big that they would swamp huge areas, were not true.

In addition, the lower reaches of the Ob and other north-flowing rivers often flood, especially in the Spring, and this project could help flood prevention.

Of the 404 cu km average annual water flow of the west Siberian rivers into the Kara Sea basin, it was planned to take just 25 cu km during the first stage, and 60 cu km during the later stage of the project.

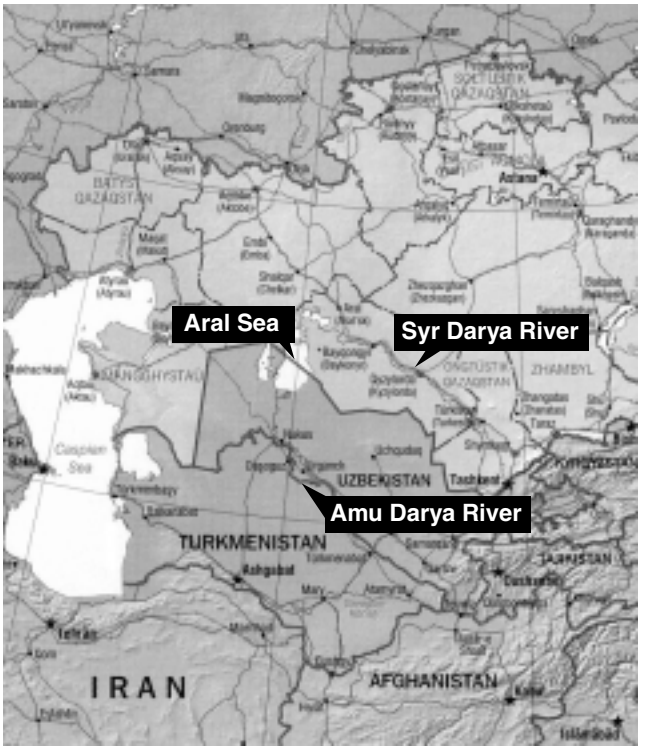
There were demands for "ecological substantiation" of the project; much work had already been done, Gerardi stressed. Opponents, he said, "are undervaluing knowledge that has already been accumulated, confusing the problem, and burying its vast social and economic essence, under excessive details."

Why Pravda and Izvestia Said, 'No!'

In Russia and Central Asia, only about 30% of arable land gets enough precipitation; 70% is afflicted with regular droughts. This situation, according to Soviet Academcian Ye. Fyodorov, is the opposite of that in North America.

Gerardi said that using this much Siberian water would "guarantee grain production" for the Soviet Union, where so much agriculture depends upon precipitation: Corn and soybean production in Central Asia could be increased by 25 million tons, and eventually by 60 millon tons a year. This would be an "intelligent and comprehensive use" of Siberian water and the dry lands of Central Asia, and eventually could

FIGURE 1
The Aral Sea Basin



Like virtually all water resources in the Central and South Asian region of Eurasia, the flow of the rivers which feed the Aral Sea originates in the "roof of the world," the great Himalaya and related mountain chains. The headwaters of the Amu Darya (photo above) are in northern Afghanistan's Pamir Mountains. The Syr Darya and Amu Darya flow northwestward from the mountains through all the Central Asian Republics to the Aral Sea (Figure 1 at left), and these growing nations' economic activity is dependent on them.

feed 200 million people. In this way, Gerardi said, the canal would have paid for itself in 10 years.

Their research indicated that water losses in a long earthen canal would be less than expected, Gerardi said. In the large irrigation canals in Central Asia, water loss due to evaporation and seepage, was 5-10% (although current estimates, from the Uzbek State Committee for Science and Technology and Samarkand State University, put such losses at 30-50%. This is, however, also due to the current very bad state of repair of these systems). Much of the Sib-Aral canal, however, Gerardi stated, would go through relatively impermeable, clayey soil, where seepage would be less; where it has to go through sandy soil, the engineers would lay drainage pipes along the canal to capture seepage.

Water salinity, he estimated, would be 0.5 grams per liter at the end of the main canal, less than the salinity of the water in the lower Syr and Amu Darya already.

As to the warnings that the Arctic Ocean would be affected by this water loss: Every year, it gets 2,800 cu km of water from the rivers of Russia; the loss would be about 2% of that! Fish in the rivers would be affected, but fish production in Central Asia would be increased.

The Aral Sea itself would not get help from the first phase of the project, but only when the second phase was completed, after 2000, the scientists said. Other measures to stabilize the Sea would also have to be taken.

No "trade off" would be made between the water diversion project and improving existing irrigation in Central Asia, Gerardi said. The Soviet Ministry of Land Reclamation was, at that same time, working to improve the irrigation systems, which work was to have been completed when the canal was finished, ensuring that the Siberian water would not be wasted. The irrigation systems' efficiency would have reached about 80%. Proposals existed to use other irrigation methods in Central Asia, which could be useful, but no panacea for conditions there, Gerardi said.

Another important consideration, was that this canal would have been deep and wide enough for navigation. The second stage of the project would have linked the canal to the Caspian Sea, thus creating "a direct water route, with no transshipments, from Siberia to Europe. I do not think, that the importance to the country of this water-transport route requires any special explanation," Gerardi stated.

Some 150 research and design institutes had worked with the Water Ministry on the technical and economic feasibility studies for 15 years. In January 1985, preparatory work for constructing the Sib-Aral began. But, as Prof. Philip Micklin wrote in 1988: on Aug. 20, 1986, "in a dramatic policy reversal," front-page articles in *Pravda* and *Izvestia* announced that the Central Committee of the Communist Party of the Soviet Union, and the Soviet Council of Ministers, had adopted a resolution "On Discontinuing Work on Diverting Part of the Flow of Northern and Siberian Rivers." Design and preparatory work on the project to send northern water to the Volga was stopped, as well as any further research on the

Sib-Aral. The State Planning Committee, State Agro-Industrial Committee, and Ministry of Land Reclamation and Water Resources were told to halt any work on these projects for their economic planning until 1990. Regional solutions would have to found to the Central Asian water shortages, Moscow announced.

The Siberian Branch of the Russian Academy of Sciences led the opposition to the plan. This, combined with sharp cost-cutting, and "nationalist" views of some Russian writers opposed to sending such resources to the South, prevailed. Even after the August order, the controversy was so great, Micklin wrote, that criticism of the project continued, some of it exaggerated, misrepresentative, and using personal attacks.

A December 1991 *Pravda* interview of KGB Major General E.N. Yakovlev, on the 70th anniversary of the Soviet secret services, gives one insight into what was behind this decision. In 1985, Yakovlev said, the KGB had "obtained data" that Western intelligence services and experts viewed clean fresh water as "an important strategic material," soon to be "in short supply in many parts of the world." The Westerners urged saving water with better irrigation systems, but also "pointed out that gigantic projects to irrigate arid areas—and particularly to divert rivers—are not cost-effective." Water losses, they claimed, are enormous and "negative ecological effects" too great. The KGB submitted these views to the Council of Ministers, which gave the KGB "several unpleasant moments." There were many counter-reactions to these Western views.

Yakovlev said the KGB could not "claim the main role in the government's decision, soon after, to reject river diversion," but was gratified that it had "spoken out from objective, impartial positions." (I owe this reference to my late colleague Denise Henderson.)

Indeed, Nikolay Grishchenko, leader of the project under the Soviet Union, said in April 2002, that he regretted the project had not been started then, in the 1980s. It would have increased agriculture production in the Aral Sea basin, and given the region good drinking water. "The West was against it, because it was selling a lot of grain and other produce to the Soviet Union and needed to keep its market intact," he told Uzbek journalist Karina Insarova.

In Central Asia, the reaction to this Soviet decision was strong, especially in Uzbekistan and Kazakstan, where governments, population, and "scientists, writers, and journalists," as Micklin wrote, continued to demand that action be taken to bring water to the region and the Aral Sea. In 1988, Micklin wrote that the "preservation of the Aral may require implementation of the controversial project to divert water from western Siberia into the Aral Sea basin." Now, his views have apparently changed: UPI quoted him on April 2, 2004 warning that Central Asia "can (and probably must) get along without Siberian water"—because the World Bank and such institutions would not fund such a project.

More momentous decisions were being made in Moscow in August 1986. At the beginning of the month, then-U.S. President Reagan made a speech in Washington, describing

What Transforms The Biosphere?

And you look, as Vernadsky did, at the planet. And the planet is a Biosphere. What does that mean? That life is more powerful than abiotic principles. That life penetrates, and acts upon the domain of abiotic principles. Life does not come from inorganic processes. Life is a principle, in the universe, which *acts* upon what we call inorganic processes, to produce the combined effect, such as we call the Biosphere: a planet which has fossil layers and so forth—including the atmosphere which is a fossil, a product of living activities which produced the atmosphere, which produced the oceans, the water; which produced the fossil layers on this planet; which concentrated certain minerals and certain deposits within the fossil layer, which you will not find concentrated as efficiently for your purpose anywhere else, except by knowing which fossil made that deposit. Who made all that chalk, on the cliffs of Dover? Trillions of animals, who died, and left their little bodies behind, as chalk, as a result of what they had consumed.

So, the planet is becoming, more and more, a living creature. Because, what we call the "inorganic" or abiotic processes of the planet, are constantly being gobbled up, and *taken over,* by a superior force, called "life!"

And then, we find a third one: The planet is being transformed, the biosphere is being transformed, by a *more powerful force!* The more powerful force is the ability of the human mind, to discover a universal physical principle. And the changes in the planet as a whole, as a result of man's discovery and application of physical principles, is changing the planet into what Vernadsky called a Noösphere. That is, the ratio—of the total pure weight, of the mass of the planet—is being increased, so the product of man's intervention, through man's discovery of principles, is becoming more and more. And if this continues, the whole Solar System is going to become a product of the human mind, which has gobbled up, assimilated, and mastered all processes of non-living and living processes on the planet.—*Lyndon H. LaRouche, Jr.*

The ruins of Subashi at the edge of the Taklamakan Desert. The deserts of Central Asia are extensive and are the dryest in the world; the region has been famed for highly efficient irrigation uses of water, for 5,000 years.

a letter he had sent to Gorbachov, calling on the Soviets to respond to his proposal to *share* the critical Strategic Defense Initiative (SDI) technology, which could have ended the "Mutual and Assured Destruction" nuclear threat. Reagan's proposal was for joint or parallel deployment of the SDI—the only way to make the program truly effective strategically. Reagan stressed the enormous potential of the SDI and related technologies, for "increasing our productivity and expanding the limits of human potential."

This was the core of the concept of Lyndon LaRouche, the conceptual author of the SDI: that sharing such advanced technologies could create a transformation of the Soviet economy, and the U.S. economy as well. Without this infusion of advanced technologies, especially into the backward civilian sector, the Soviet economy would collapse, as LaRouche warned the Russian leadership from 1982-83 onward. Barely five years after his warnings, that is exactly what happened.

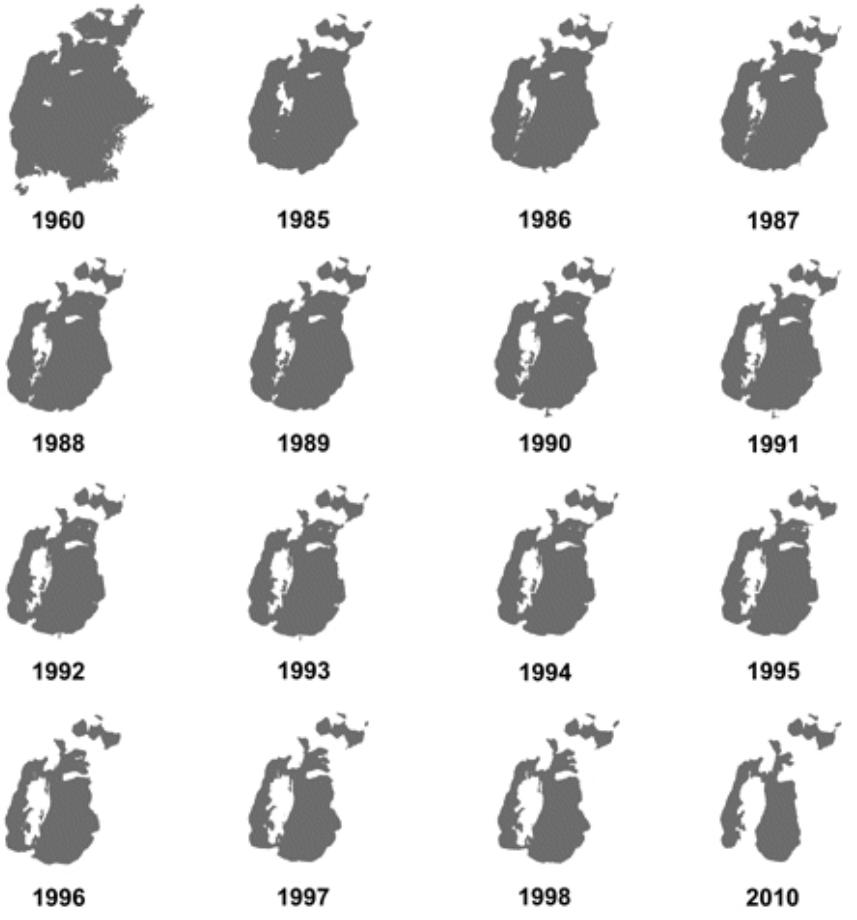
Moscow did not publicly respond to this offer by President Reagan until October 1986, when it was roundly rejected by Gorbachov at the Reykjavik, Iceland summit. However, Moscow's intentions had been made known earlier, in a series of nasty press attacks on LaRouche, which utilized nothing but the fraudulent material used by the U.S. Eastern Establishment press against LaRouche. On Aug. 7, 1986, *Sovietskaya Kultura* had launched the attack on LaRouche; by September, Moscow's flagship propaganda organ, *New Times,* published a Soviet intelligence-authored attack on LaRouche, and specifically, his support for the SDI.

Some of the ideology behind these attacks, was reflected a decade later in a strange 1996 article by Prof. David Schwartzman, of Howard University's Biology Department, entitled "Solar Communism." The radical "green socialist" Schwartzman attacked the constructive efforts of scientists in the Soviet Union, and also tried to denigrate Russia's great founding scientist Vernadsky. He complained that Vernadsky's conception of the Noösphere "converged with the ambitions of the planners of the Soviet economy. . . . Some of the biggest planned projects, e.g., the diversion of Siberian rivers to arid Soviet Central Asia, were narrowly averted." He admitted the importance of Vernadsky's biogeochemistry, having "vital importance" to understanding environmental impacts such as "global warming"; but urged that the "possibility of inherent unpredictability" of anthropogenic impacts on the environment showed the "necessity" of containment and precaution.

Saving the Aral Sea

The Aral Sea, once the world's fourth largest lake—after the Caspian Sea, Lake Superior in North America, and Lake Victoria in Africa—and once a rich center of human, animal, and plant life, is fast becoming a salt desert. Its fish, plant, and animal life are dead or dying; human life on its former shores is impoverished and disease-ridden; and salt-dust storms are blowing to areas 1,000 kilometers away. Bringing water from the Siberian rivers would not, alone, revive the Aral Sea—much more water would be required. But, if combined with

FIGURE 2
The Shrinking Aral Sea



The disappearance of the Aral Sea since 1960, shown in these satellite remote-sensing images, was caused primarily by misguided Soviet-era monoculture—growing cotton and rice in near-desert areas. It has intensified desertification of the region around it, with widespread salt-dust storms and worsening ecological and human effects.

other measures, it would be a step, at least to preserve what remains.

The Aral Sea basin is watered, as is all of East and South Eurasia, by the rivers which rise at the "roof of the world"—the Tibetan plateau and the vast surrounding mountain ranges. Huge amounts of water come "rolling down" the Pamir and Tian Shan mountains, especially in the Spring. The Amu Darya, the largest river, flows 2,400 kilometers from the Pamirs in Tajikistan, through the Kara-Kum desert to the Aral Sea; its long-term average annual flow is 75.9 cu km. The Syr Darya flows 2,500 kilometers from the Tian Shan. Together, the two rivers' annual flow is 114 cu km. For comparison, the Rhine River's annual flow averages 86.1 cu km.

Including groundwater, annual renewable water resources in the Aral Sea basin are about 133 cu km. In the past, about half the water from the mountains reached the Aral Sea, but by 1990-95, water taken for irrigation was so much—some 111-126 cu km—that almost nothing reached the Sea.

As Prof. Amanbek Ramazanov, chairman of the water resources committee of Uzbekistan's Ministry of Natural Resources and Environmental Protection, wrote in June 2001, there have been many climate shifts in this region during past millennia, and the Aral Sea depression has repeatedly been flooded and then desiccated, depending especially on the flow of the Amu Darya.

The region is bordered by some of the highest mountains in the world, including the Hindu Kush to the south, and the Pamirs, Kun Lun, and Tian Shan to the east. The Aral Sea itself lies among the three great deserts in Central Asia: Kara-Kum, Kyzyl-Kum, and Betpakdala. This is the most arid region on Earth: The evaporation rate is high, 1,750-2,250 millimeters of water a year, and precipitation low and unevenly distributed (150-200 millimeters average). Summer temperatures reach 49° Celsius. This region is much more arid than other desert regions, such as Southwest Asia, (called the "Middle East" by British tradition) which borders the Mediterranean.

The bordering mountains to the south and east are much wetter and cooler.

Since the 19th Century, many Russian scientists have studied the Aral Sea basin. Academician Aleksandr Fedorovich Middendorf, who explored the entire region to the Pacific coast, wrote in 1880-81 that Central Asia would face a shortage of water and natural fertilizers in the future. In 1868, Ukrainian agronomist Y.B. Demchenko proposed to send Siberian river water to Central Asia, in a student thesis and presentation to the Russian Geographical Society, "On the Climate of Russia." In 1871, he published a book *On flooding the Aral-Caspian lowlands to improve the climate of adjacent countries.* In 1902, the Russian Academy of Sciences approved the great canal project, but it was never built, due to the enormous strain put on Russia by World War I and the later collapse of economy in the Civil War.

Irrigation began in ancient times, and was expanded under the Russian Empire and further expanded by the Soviet Union, as Professor Micklin wrote in *Managing Water in*

Central Asia. Settlements were already established 8-10,000 years ago; by 4,000 years ago, there was substantial irrigation in the Aral Sea deltas of the Amu Darya and Syr Darya. Canals took 200-300 cubic meters a day, and the apparent efficency of water use was close to modern standards. By 3,000 years ago, irrigation "flourished," Micklin wrote. In the Khorezm basin, as many as 1.2 million hectares could have been under irrigation, supporting a population of 200,000; in the famous, ancient Merv oasis, one of the world's biggest cities during the Middle Ages, as much as 500,000 hectares could have been irrigated, to support a population of 300,000.

The ancient systems were highly regulated: Large areas were left fallow, to prevent waterlogging and increasing salinity of the soil, a severe problem in Central Asia today. In the medieval period, Central Asian civilization perfected the use of diversion dams and storage basins, use of the chigir wheel to lift water, and built canals through the Kyzyl-kum desert to unite irrigated areas along the Amu and Syr Darya. Up to 2.5 million hectares of land were under irrigation.

The town of Aralsk, once a thriving port on the Aral Sea at the Syr Darya River delta, is now far from any water; the Syr Darya at this point is a trickling stream.

Recurrent invasions, the worst by the Mongols in 1220, destroyed the complex water-management systems. They conquered Merv by breaking its dams; so great was the Mongol destruction of dikes and dams, that the Amu Darya changed its course, and flowed away from the Aral Sea. After centuries of reconstruction, 2 million hectares of land were under irrigation by the early 19th Century—still less than prior to the Mongol invasion!

The abundant gardens and vineyards of the 6th-7th Centuries earned the river valleys the name of the "the garden of the caliph of the faithful," wrote Iskandar Abdullaev, Executive Director of Uzbekistan's Association for Sustainable Use of Water Resources, in November 2000. The medieval system would give 5-7 years rest to irrigated lands. The ruins of reservoirs, canals, and dams, show how advanced the system was before the Russian invasion. In the early 19th Century, the Uzbek scientist A. Donish designed a plan to build a canal to the middle Amu Darya, warning that Turkestan could be easily conquered by cutting off the waters of the Zaravshan River—which the Russians did.

Russia's Cotton Strategy

The Russian empire conquered Central Asia during 1860-1900. To become self-sufficent in cotton production, imperial Russia expanded irrigation into new steppe and desert areas. The Soviet Union set up modern intense irrigation in Central Asia, and problems came with it. In the 1930s, cotton became the predominant crop, and by 1990, some 85% of irrigated land was planted in cotton. Collectivization, large fields, constant irrigation, and heavy use of fertilizers and pesticides, all "radically and permanently changed the face of agriculture and human life" in the Aral Sea basin, wrote Micklin.

Irrigation of new areas such as the Golodnaya (Hungry) Steppe along the Syr Darya, took large amounts of water. The Kara-Kum Canal, 1,450 kilometers long, the largest man-made "river" in Central Asia, was begun in 1954. It takes Amu Darya water 1,300 kilometers westward to the desert, in an unlined canal which loses far too much water to the sandy soil.

Current intensive irrigation has turned over 2 million hectares land into salt marsh, due to over-irrigation and bad drainage. Run-off water from the fields and floodwater have created large, artificial brakish lakes in depressions in the desert, including the Sarykamysh in Turkmenistan, the Arnasay in Uzbekistan, or Aydarkul in Uzbekistan.

For the Aral Sea, all this water is lost.

During 1965-85, the Soviets began constructing big dams and reservoirs on the upper reaches of the rivers—at least 10 in Kyrgyzstan—to store Spring flows for Summer agriculture. The Nurek dam on the Vaksh, the main Amu Darya tributary in Tajikistan, is the second largest dam in the world. The Soviets made an integral system of water management on the Naryn, Talas, and Syr Darya, and built hydroelectric plants on the Toktogul and Kairakkum reservoirs. They also built huge irrigation projects in the downstream nations of Kazakstan, Uzbekistan, and Turkmenistan, inclusing some 45-50,000 kilometers of irrigation channels.

By the late 1960s, the Amu Darya and Syr Darya were "exhausted." Russian officials—especially in the Water Ministry—and the Central Asian republics began to call for water from the Siberian rivers, to expand irrigation.

Russian and Soviet policy kept Central Asia an agricul-

Wide areas of what used to be the waters of the Aral Sea, are now turned into salty marshes and dessicating flats, and the Sea has been divided into two shrinking bodies of water, as shown in this enhanced satellite image.

tural economy. Over 95% of Soviet industry for processing cotton was located far away; the only industry that developed in the region, was to produce fertilizer or cotton farm machinery. In the 1980s, cotton accounted for 75-80% of the crop yield, and land under irrigation constantly increased: A ton of cotton requires four or five tons of water; rice is grown in flooded paddies. Despite this demand for water, the dependence upon cotton, especially as an export for foreign exchange, has not changed: Uzbekistan is the world's third largest cotton producer, and earns over $1.5 billion a year—50-60% of its export earnings, according to the World Bank—and Turkmenistan wants to increase production. To do this, Turkmen President Saparmurat Niyazov wants to create the "Lake of the Golden Century" in the Kara-kum desert—by diverting even more water from the Amu Darya. He signed a decree on this in September 2000.

Until 1960, the Aral Sea was an important body of water. Now, due to lack of inflow—the Sea used to receive about 56 cu km of water a year, now it gets 6 cu km—it is disappearing. Its water, once one-third as saline as the oceans, is now as salt as ocean water. By 1987, its depth, which had been 53-54 meters, had fallen by 18 meters, leaving two separate seas. The overall size of the Aral has decreased by over 50% and its volume by nearly 80%. Whole regions of Uzbekistan and Kazakstan on the Sea have been devastated; the rich deltas have dried up. Never before has so important a body of water disappeared so fast. The smaller sea still gets some flow from the Syr Darya, and could survive.

The problem will be worse, Micklin warns, because the 1990s was a period of high water flow, the highest, at 104 cu km, since the 1950s. Then, drought began. The big dam/reservoir projects regulate river flow to some degree, but it is impossible—and not a good idea—to try to control river flow completely. In coming decades, water shortages could worsen.

Irrigation methods could certainly be improved, especially since the effects of "market reforms" in the Central Asian nations have led to drastic cuts in maintenance of the water systems. Key measures would include lining canals and leveling fields. Sprinkler, subsurface or drip irrigation have been promoted, especially by opponents of the Siberian project, but these are not only very expensive, but likely not useful in Central Asia, where the scale of irrigation is too large, and mineralization of the water too high.

Soil salinity is also big problem: Over half the soil is slightly salinized, especially in Uzbekistan, and 13% badly so. Even more water is needed to leach, or "flush" the soil, than for irrigation. The results are falling yields of irrigated crops.

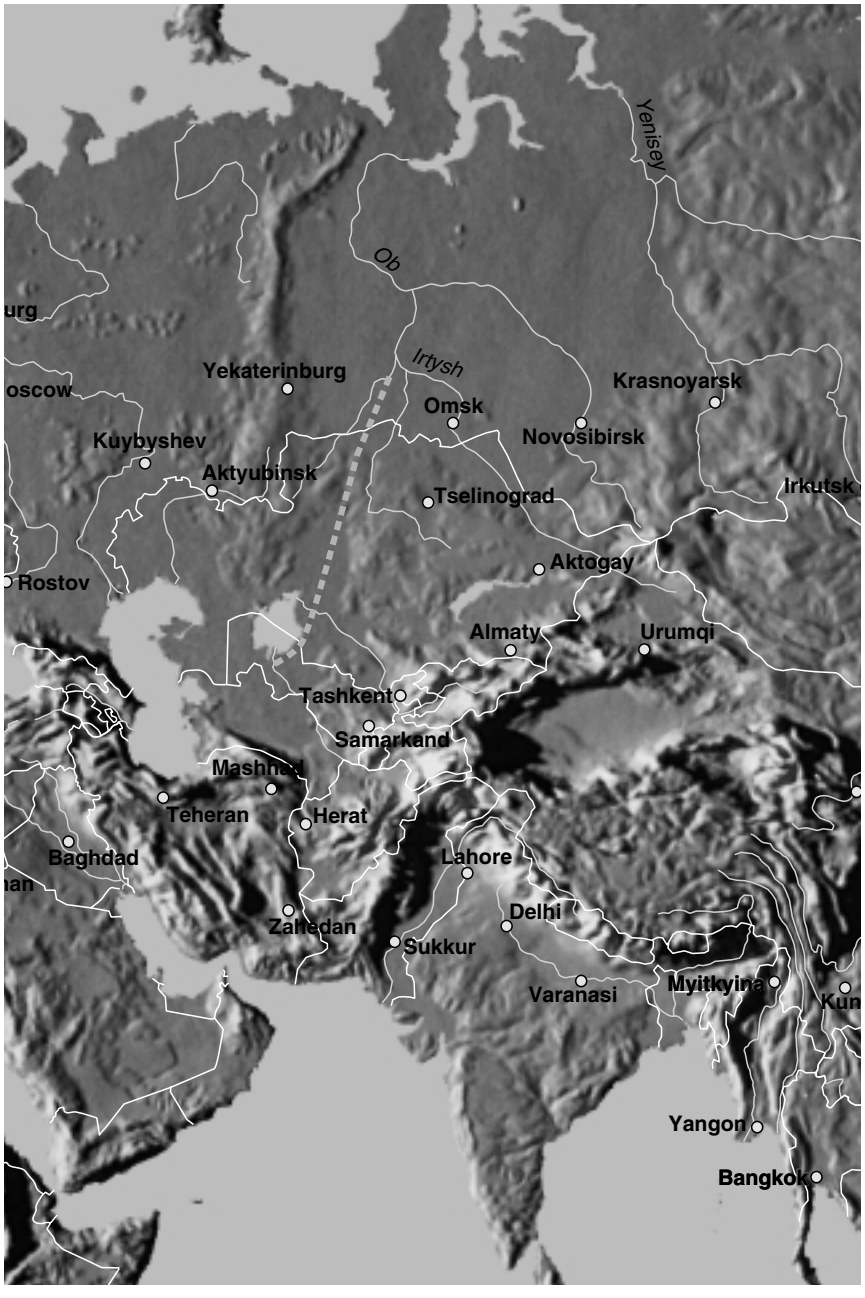
Uzbek water engineers Kayum Odilov and Pirmat Shermukhamedov wrote in the newspaper *Vatan* in February 2000, about problems in Soviet-era research into the economic value of opening up new lands. Extremely saline lands require three-four times more water than non-saline soils, and the cost of raising crops on such land is double that of non-saline land.

The Soviet system failed to comprehend the impact of drying up the Aral Sea. The loss of the Sea was seen as a "productive" trade-off for agriculture, but this did not take into account the "geochemistry of a shrinking and salinizing Aral," wrote Micklin in 2001. Large amounts of toxic salts accumulated on the dried sea bed, and are now being blown all over the basin, and as far away as the Fergana Valley or northern Russia. Big salt-dust storms began already by 1975; and now, an estimated 43 million metric tons of salt annually are carried from the sea's dried bottom.

The effect was climate change: The moderating effect of the large Aral Sea is lost. Now, everything is more arid; Summers are hotter, Winters are longer and colder, by a full 3° Celsius. In Karakalpakstan, the region of Uzbekistan bordering the Aral Sea zone, which once had a flourishing agriculture, it has simply stopped raining. Groundwater levels, although well supplied by the bordering moutains, are sinking. The worst effect has been upon human health. Infant

mortality and morbidity are rising fast; water-borne diseases, anemia, throat cancer, and other health scourges are prevalent.

FIGURE 3
Siberian-Aral Water Transfer



Central to the Sib-Aral great project, killed under Gorbachev in 1986 but being proposed anew by Central Asian nations, is a long canal or water pipeline (dotted line) to transfer about 6% of the flow of the large Siberian Rivers Ob and Irtysh, to the Syr Darya, Amu Darya, and Aral Sea. The point of origin would be the Tugai Gap where the Irtysh first joins the Ob; these, and other major Siberian rivers, flow north to the Arctic Ocean.

Developing Central Asia

The Soviet decision in 1986 to end the Sib-Aral project left Central Asia with enormous economic problems. As the Soviet system broke down in the following years, the Central Asian nations declared their own sovereignty over vital resources, especially water. They had to adapt a "centrally planned" system into an international one. In the 1930s, Stalin's Soviet government had drawn a very complex pattern of national boundaries in Central Asia, cutting through ethnic regions, and dividing up special geographic areas, such as the fertile Fergana Valley. As a result, the Amu Darya and Syr Darya flow from Tajikistan and Kyrgyzstan, into and out of Uzbekistan, Kazakstan, and Turkmenistan.

There have been many predictions, especially by western think-tanks, that water will soon be a greater matter of contention in this region, even than oil is, and of coming "water wars"; but the Central Asian nations have prevented such conflicts. Given the overall economic and security problems of the region—emphatically, the opium-centered "cockpit" of conflict in Afghanistan—this indicates their commitment to cooperation. Yet, the nations of the Aral Sea basin recognize that the scale of the problem—the need for water, the Aral Sea disaster, and overall economic crisis after a decade of "shock therapy"—is beyond their ability to resolve. This is a Eurasian problem, and only a Eurasian approach can deal with it. Such associations as the Shanghai Cooperation Organization can play an important role.

Other nations bordering the Aral Sea basin also could draw on its water. Afghanistan has rights to take some 10% of the flow of the Amu Darya, when the country reaches a sufficient level of economic stability. China is striving to develop its far-west interior, where lack of water is a crucial issue. China wants to use more water from the Irtysh and Ile rivers, the most important among the more than 30 rivers which roll from Xinjiang region, to Kazakstan and Russia. It is planning to build a canal

to take about 1 million cu km of water a year, about 10% of the Irytsh's flow.

The economic growth of Uzbekistan and Kazakstan, the two most populous Central Asian nations, is already being curbed due to lack of water. Uzbekistan has 27 million people (its population grew by 17 million in the past 20 years); Kazakstan has 15 million. Several years of extreme drought, starting in 2000, have exacerbated the problem. There have been crop and food shortages in Tajikistan, Iran, Uzbekistan, and in Afghanistan, and insurgency by radical groups, which set off civil war in Tajikistan. The deployment of U.S. troops in the region, especially in Uzbekistan, as part of the unsuccessful "war on terrorism" in Afghanistan and Iraq, is also generating regional tensions.

After the collapse of the Soviet Union, the five Central Asian republics put together accords to maintain existing region-wide water- and energy-distribution policies. In 1992, the five nations formed the Interstate Commission for Water Coordination (ICWC), to manage water in the entire Aral Sea basin system; the International Fund for the Aral Sea (IFAS), was begun in 1993; and the 1994 Interstate Council of the Republics of Kazakstan, Kyrgyzstan, Tajikistan, and Uzbekistan (ICKKTU), to enhance economic and trade cooperation. Turmenistan stands "outside" the later two agreements, but the Syr Darya countries—Kazakstan, Kyrgyzstan, Tajikistan and Uzbekistan—are showing a continuous interest in cooperating within common legal frameworks. (Daniel Linotte)

The newly independent countries all wrote "Water Codes" emphasizing national sovereignty over water resources; they define water as "exclusive property of the state" and "national wealth." In early 2001, Uzbekistan called for declaring all Central Asian water resources "common wealth." In 1997, a draft Agreement "On the Use of Water and Energy Resources in the Syr Darya Basin" was made part of the Action Program on Formation of a Single Economic Zone of the Syr Darya nations. This set up a Working

Desalination's Huge Potential

The greatest potential for solving the whole world's water problems, is through creation of much more fresh water by desalinating seawater. The failure of Soviet water management in Central Asia, was not so much due to its grand scale, but rather to the failure to bring sufficient water into the most arid region on Earth, both to save the Aral Sea and to turn the steppes and deserts green.

Bringing river water from Siberia would be one great help; another, is desalinating brackish water in Central Asia, including its abundant groundwater reserves.

Hal B.H. Cooper, a civil engineer and consultant on many infrastructure projects in North America, says, "I believe that there are many saline aquifers which exist throughout the world which could be utiliized if it were possible to implement the LaRouche water and energy desalination policy, with nuclear power plants and desalination together. . . . We should be making extensive use of the desalination of brackish and impure waters, so they can be used for municipal, industrial, and agricultural purposes."

Professor Micklin reported in 1988 that in Central Asia, "ground water could make a larger contribution to regional water supplies. Subsurface storage is huge, but little used. However, much of the reserve lies at great depth or is heavily mineralized. Up to 17 cu km per year of ground water could be consumed in the Aral Sea basin without adversely affecting river flow." Kyrgyzstan alone has aquifers which carry 13 cu km of water a year.

Only small-scale desalination projects exist, such as one set up by the United Nations Children's Fund (UNICEF) to produce drinking water on the Amu Darya River in Dashoguz province, Turkmenistan.

Both China and India, with huge populations and urgent water management problems, are working on combined nuclear power and desalination projects. Some 11 seawater desalination plants using nuclear energy are already in operation internationally. The nations of Southwest Asia produce about 60% of current desalinated seawater, but they use abundant petroleum supplies as the heat source for the process. This would be far too expensive for petroleum-importing nations. In Central Asia, Kazakstan has petroleum resources, which could be put to use for desalination projects on the Aral Sea and in the lower reaches of the Syr Darya.

But this, while useful in the short term, will not meet the needs of the future. Regions of such broad expanses as Central Asia, and nations of such high population as China and India, must develop nuclear energy as the only clean, safe, and "non-geopolitical" energy resource. Petroleum must be transported, often over long distances, and is currently hostage to geopolitical economic and political operations. Nuclear plants are local, under a nation's sovereign control, and uniquely produce enough energy for *large-scale* desalination.

In December 2003, India's President Abdul Kalam, a noted scientist, told an Indian Nuclear Society conference

Group of water and energy ministry managers and specialists, from Kazakstan, Kyrgyzstan, Tajikistan, and Uzbekistan. U.S. and other international experts contributed to the draft, which drew on models including the Columbia basin of the United States and Canada, and the Rio Grande basin of the the United States and Mexico. In March 1998, Kazakstan, Kyrgyzstan, and Uzbekistan signed an Interstate Agreement "On the Use of Water and Energy Resources of the Syr Darya River Basin."

In June 1990, wrote Bakhtior A. Islamov, the leaders of Uzbekistan, Kazakstan, Kyrgyzstan, Tajikistan, and Turkmenistan had signed a joint declaration on the devastation of the Aral Sea basin, and appealed to Moscow for assistance. This came to nothing. By December 1991, the Soviet Union was dead, and the "promised radical measures for the restoration of the destruction of the region's ecological balance and the preservation of the Aral Sea were never fulfilled." Amidst the economic disasters following the end of the U.S.S.R., including radical falls in production, and hyperinflation, the Central Asian nations sought to create new regional cooperation on economic, scientific, technical, cultural, and environmental issues, among "equal and sovereign republics."

There is a commitment to avoid armed conflict, but disputes have arisen over water and energy. A 1996 interstate agreement among Kyrgyzstan, Uzbekistan, and Kazakstan was to compensate Kyrgyzstan for lowering water-use—and therefore generation of hydropower electricity—during the Winter, and increasing water releases during Summer.

Both Kyrgyzstan and Tajikistan have enormous hydropower resources: Tajikistan's are the eighth-largest in the world, at 300 billion kilowatt-hours of potential. The Soviet system was designed to serve the cotton monoculture in the Aral Sea basin. In Winter, water was stored, for release in the Summer months when need for irrigation, not electricity, is greatest. Now, Kyrgyzstan wants to generate cheap electric power, rather than depending upon energy supplies of natural

at the Indira Gandhi Centre for Atomic Research at Kalpakkam, that desalination of seawater is the best solution to the world water crisis. Using the "multistage flash" desalination process requires enormous quantities of energy, and only nuclear power can supply that. "It is essential to set up desalination plants next to nuclear plants to reuse the waste energy effectively," Kalam said.

China's Programs

China also is developing nuclear desalination. The China Society of Nuclear Science, and the Beijing Institute of Nuclear Engineers directed by Prof. Li Zhaoheng, are developing projects which could produce an annual output of 300 million-1 billion tons of water. Only nuclear power is cheap and efficient enough for this scale of desalination. China has also developed new, more efficient distillation techniques. "Three decades worth of effort has ranked China among the world's few countries capable of seawater desalination," Prof. Hui Shaotang, director of the Tianjin Institute of Seawater Desalination and Comprehensive Utilization told a 2002 conference. "Water diversion can only alter the geological layout of water resources. It's not able to enhance the total amount available." Desalinated water from large-scale, nuclear-powered projects would cost about 25%—eventually even more—below what diverted water—at 20 yuan a ton—will cost.

China is now "first" in the world, with a nuclear technology which could be of enormous benefit in Central Asia for desalination. This is the modular high temperature gas-cooled nuclear reactor (MHTGR, or HTR for short). A prototype of the reactor has already been built at China's leading science and technology institution, the Institute of Nuclear Energy Technology (INET) of Qinghua University, northwest of Beijing. This reactor is more efficient than conventional nuclear technology; is relatively simple and inherently safe; and can be built in small units, which are perfect for flexible application—for heating, industrial use, electricity generation. Because they could be produced on standardized "assembly-lines," HTR production costs can be kept low. Germany first developed the technology, but China is the only nation to have built one.—*Mary Burdman*

Seven nations already have operating desalination units powered by nuclear energy, needed for any large-scale production of fresh water, especially from brackish inland and groundwater. This nuclear desalination plant is at Kalpakkam in India.

The Ob River in Siberia. Though population density in the Ob and Irtysh River regions is low, more than 30 million people live in the overall Ob-Irtysh River Basin. These rivers have been significantly dammed for hydropower production, and also badly polluted; major investments in Russia*'s economic infrastructure will be needed to make watering Central Asia possible.*

gas from Uzbekistan and Kazakstan. But, when it releases water in the Winter, that floods Kazakstan's Shardarya reservoir, and spills over into Uzbekistan. In Summer, Kyrgyzstan has been retaining more water, which has dried up Kazakstan's part of the rivers, and the lack of flow has damaged the riverbeds and canals.

Most of Kyrgyzstan's water infrastructure is approaching 50 years old, and maintenance has been minimal since the end of the Soviet Union. Kyrgyzstan does not charge the downstream nations for the water, or the cost of maintaining the infrastructure, but has to rely on unreliable swap agreements for energy.

Tajikistan is very poor and isolated, with its infrastructure totally interdependent with that of Uzbekistan and Kyrgyzstan. It has not been able to realize its hydropower potential, and is dependent upon imports from the other Central Asian nations.

There have been a series of meetings among Central Asian leaders to try and deal with the Aral Sea, but, Bakhtior Islamov wrote, it has become "clear that the environmental and social problems reached an extent which was beyond the capacity of Central Asian states alone to fix." Western suggestions of raising the price for water are unacceptable, given the poverty of much of the population: In many areas, households must spend up to 90% of their cash income for food. Any increase in water costs, would be devastating.

"Water is life"; "Save the water and keep it clean"; these are "common wisdoms" for Central Asian people for thousands of years in an area of irrigated arable land, wrote Islamov. These principles are as true today. Cooperation is especially important because of the effects of shock therapy, and of half a century of intensive irrigation and cotton monoculture. The margins, in managing the water supply, in financial/economic dependence upon cotton exports, are too small—at this time.

In 2000, due especially to severe drought, agricultural production fell by 30% in Central Asia. On top of lack of water, the effects of the "market reforms" are also being felt. Not one of the five Central Asian states has since achieved the production levels of 1990. Uzbekistan produced only 3 million tons of raw cotton in 2000, compared to 4-5 million tons in previous years. In 2001, Uzbekistan's rice harvest was 67,800 tons, a 56% decrease from 2000. In 1999, Uzbekistan reported a rice harvest of 420,800 tons.

Desertification is taking a worsening toll. Uzbekistan's State Committee for Science and Technology and Samarkand State University warned that 60% of Uzbekistan's agricultural land may go barren from dryness. In Turkmenistan, desertification has caused crop shortfalls of up to 40%.

As the Tashkent Institute of Engineers of Irrigation has emphasized, the Aral Sea basin needs an integrated, basin-wide strategy for water, as the only way to avoid conflicts. The Institute proposes rehabilitation and modernization of existing irrigation systems, and crop subsitution; these would be costly untertakings. Philip Micklin also proposed "water user associations," which are widely in use in India, the United States, Mexico, Egypt, and Pakistan, to regulate water use in any given area, and set up reasonable pricing systems. This idea is under discussion in Uzbekistan and other nations.

Reviving Siberia-Aral

Iskandar Abdullaev, Executive Director of Uzbekistan's Association for Sustainable Use of Water Resources, in November 2000 called for a Central Asian Water Pact, along the lines of those existing or being created in the Mekong, Jordan, and Rio Grande river basins. The long history of Central Asian water management and irrigation, should be the basis of the pact, and population density should be a key factor in dividing water, Abdullaev proposed. He also called for region-wide agricultural cooperation to make it possible to diversify crop production, and for founding a Central Asian Bank for Development, to fund maintenance and operation of the entire water-management system.

Abdullaev warned that Central Asia faced a seven-year dry period, beginning in 2000. Of Central Asia's 170-180 cu km of annual water-flow resources, over 90% are already being used. The Soviet-era water quotas "can no longer meet the demands of the day," he said. Lack of management has led to break-up of what used to be an integral water-management system; lack of funding and maintenance has thrown whole infrastructure into disarray. Every country is trying to expand

irrigated lands and taking water if possible. This cannot work; a comprehensive policy, emphatically including the development of new water resorces, is essential.

The government of Uzbekistan is leading efforts to revive the Siberian-Aral project. Uzbekistan, with half the population of the Aral Sea basin, must play a central role. Tajikistan President Emomali Rakhmonov, currently head of the International Save the Aral Foundation, also supports the Sib-Aral project.

In May 2001, Uzbek President Islam Karimov, during a visit to Russian President Vladimir Putin in Moscow, revived the proposal to use water from Siberia to help Central Asia. Prof. Abdukhalil Razzakov wrote one month later, that rerouting water from the Ob-Irtysh is the "only tangible solution" to the problems caused by the drying up of the Aral Sea. An "efficient system" must be used for this project, Razzakov wrote, including possible use of pipelines, and international funding should support it, due to the interest in solving the Aral Sea problem.

An ironic point made by Professor Razzakov, is that the "ecological" fears cited in the past by some Americans and Canadians, that diverting just some of the water from the Siberian rivers, could lower the level of the Arctic Ocean, were now being challenged by other "ecological" concerns. Now, ecologists fear that increased melting due to "global warming" will *increase* ocean levels, so they should be happy if some Siberian water is sent to Central Asia!

This would be "a mutually beneficial project," said Ismail Jurabekov, aide to President Karimov, at an April 2002 forum organized by ECOSAN in Tashkent and Nukus, which is in the Aral Sea zone. "The shortage will only get worse as the population increases. . . . Siberian water would help us grow fruit, vegetables, cotton, and grain crops, the bulk of which will feed Russian provinces. It would be in Russia's interests to import agricultural produce from Central Asia rather than from more remote parts of the world." The conference decided to establish an international consortium to develop the project, with support from Kazakstan, Uzbekistan, Tajikistan, and Russia. The ECOSAN concept is limited, unfortunately, with the view that "private" and foreign investment would have to fund the project.

Viktor Dukhovny, director of the Interstate Commission on Water Coordination in Tashkent, has warned repeatedly of the looming water deficit in the Aral Sea basin. As he told the *New York Times* in December 2003, "We have enough water for the survival of all five states, even plus Afghanistan, if we will work together. Of course, not forever. Only up to 2025," he emphasized. This April, Dukhovny told UPI that by 2050, the population of the Aral Sea basin should reach 100 million people. By then, more water will be urgently needed.

Prof. Yusufjian Shadimetov, a leading advisor to the President of Uzbekistan and advisor to many UN economic and social councils, told a Workshop on "Water, Climate, and Development Issues in the Amu Darya Basin," held in Philadelphia in July 2002, that the Siberia-Aral basin water project has to be undertaken. Even with optimal results from various existing and proposed water management and conservation policies, it would likely be "impossible" to provide enough water to the populations and national economies of Central Asia, Shadimetov said. Current problems of drought, and potential problems of climate change in Central Asia, "urgently highlight the necessity of the diversion of a part of the Siberian rivers' flow to Central Asia." This would be the only way to solve fundamental problems of lack of water, and stabilize the situation in the region, to prevent possible conflicts.

The "water deficit originated and continues to be aggravated because of the large-scale development of new irrigated areas in the region, conditioned by the rapid and significant growth of the population," Shadimetov said. He contested any view that "the problem of water deficits in the Aral basin does not exist, and that all the troubles the population in the region face are caused exclusively by 'unreasonable economic activities' " related to water use.

While "shortcomings of economic activity in the region certainly exist, . . . they are not the primary reason for the [Aral] sea drying out." The future water needs of Afghanistan make the Siberian project all the more important. Central Asia must create a special program on water economy and improve management and distribution policy, but this would not resolve the real deficit of water, he concluded.

It is notable that, at the same Workshop, Prof. Ye Qian, Director of the Center for Development of Atmospheric Sciences at the Chinese Academy of Sciences, emphasized the role of the Shanghai Cooperation Organization (SCO), for development of relations among the nations of Central Asia and China, and China's own focus on "closing the gaps"—which have existed throughout China's long history—between eastern and western China. China's "Develop the West" program, begun in 1999, is striving to do this, and resolving China's water needs is crucial to this policy.

The Role of Russia

The issue of the Sib-Aral project is still very much alive in Russia. Russia's "kind consent" is obviously essential for the project, as Uzbek President Karimov noted at an October 2002 conference in Dushanbe.

In a Feb. 9, 2004 article in *New Scientist,* Fred Pearce quoted Igor Zonn, director of the official Russian Soyuzvodproject for water management, saying that: "We are beginning to revise the old project plans for the diversion of Siberian rivers. The old material has to be gathered from more than 300 institutes." And Victor Brovkin, a Russian expert in climate modelling at the Potsdam Institute for Climate Impact Research, "If Putin wants to respond to Bush's plan to go to Mars, this might be it."

Academician Oleg Vasilyev, hydrologist at the Institute of Water and Ecology Problems in the Russian Academy of

Sciences in Siberia at Novosibirsk, who also worked on the Soviet-era project, said at an April 2002 Tashkent conference that "Water, unlike natural gas and oil, is a renewable resource." Diverting some 5-7% of the Siberian rivers' flow would not have a global effect, and could create a "green bridge" between Central Asia and Russia, Vasilyev told *Komosmolskya Pravda* in January 2003.

Moscow Mayor Yury Luzhkov also is promoting the idea—but from the perspective of promoting more Russian selling of its natural resources. In December 2002, Luzhkov wrote a letter to President Vladimir Putin, that fresh water would at some point be traded on world markets, as oil is today. "Water will be main source of conflicts and priority problem of mankind in 21st Century," his letter stated. Russia should take advantage of this, he stated. The 1980s project had been abandoned "due to the weakness and indecisiveness of the authorities at the time who were opposed by unfairly formed public opinion by pseudo-patriots and pseudo-environmentalists."

Now, Luzhkov said, an "international Eurasian Consortium" to trade Siberian water should be set up, with the various parties owning shares. Russia would get cheaper agricultural produce in exchange. In January, Luzhkov visited Kazakstan to discuss the project. Some Central Asian analysts note that Russia emphatically wants to improve relations with Kazakstan, and especially to bind the two economies close together. Such a water project would play a central role in this.

At a late-August 2003 conference on "Transboundary Water Resources," held at the Russian science city of Akademgorodok, near Novosibirsk, the Sib-Aral project was a much-discussed issue, *Pravda* reported. There, as in the 1980s, there was universal support for this project from the Central Asian representatives.

Hydrologist Vasilyev told the conference that the "idea to take a portion of water from Siberia and deliver it to Asia looks quite natural to me. Many projects of this kind are being carried out in the world. . . . The project must be considered once again. Sooner or later, people will again return to the problem."

In the same context, Prof. Nikolay Grishin, director of Moscow's Ecoterra Center for Environmental Studies, emphasized the scientific importance of the Sib-Aral: "The project for delivery of water from the Ob and Irtysh Rivers in Siberia to Central Asia is unique regarding its scale and the level of development work. It is a good example of 'strategic ecological evaluation' [due to the need for] construction of a wide range of hydraulic constructions. . . .

"Even if we consider the project from the point of view of today's scientific development, it was and is the world's largest project containing strategic ecological evaluation. Such detailed research has never been done either in this country or abroad." Grishin noted the financial problems and the amount of study which would have to be done. However, he said, "It is very important to get back to consideration of the project once again. The project is invaluable scientific material. It is very interesting from a scientific point of view and could help develop methods to estimate the scale of ecological impact."

Bringing the almost 150-year-old Siberian-to-Aral Sea water project into existence, has the potential to help transform the Eurasian landmass. This must be done using the most advanced scientific principles, drawing in particular on the great scientific and advanced techology tradition and capability of Russia. It must be done with the necessary perspective of taking one to two generations—25 to 50 years—to realize its full potential.

This project can help make the Eurasian "heartland," so coveted by evil geopoliticians for the last two centuries, into a modern garden with a secure future, and one of the most productive and beautiful regions on Earth.

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