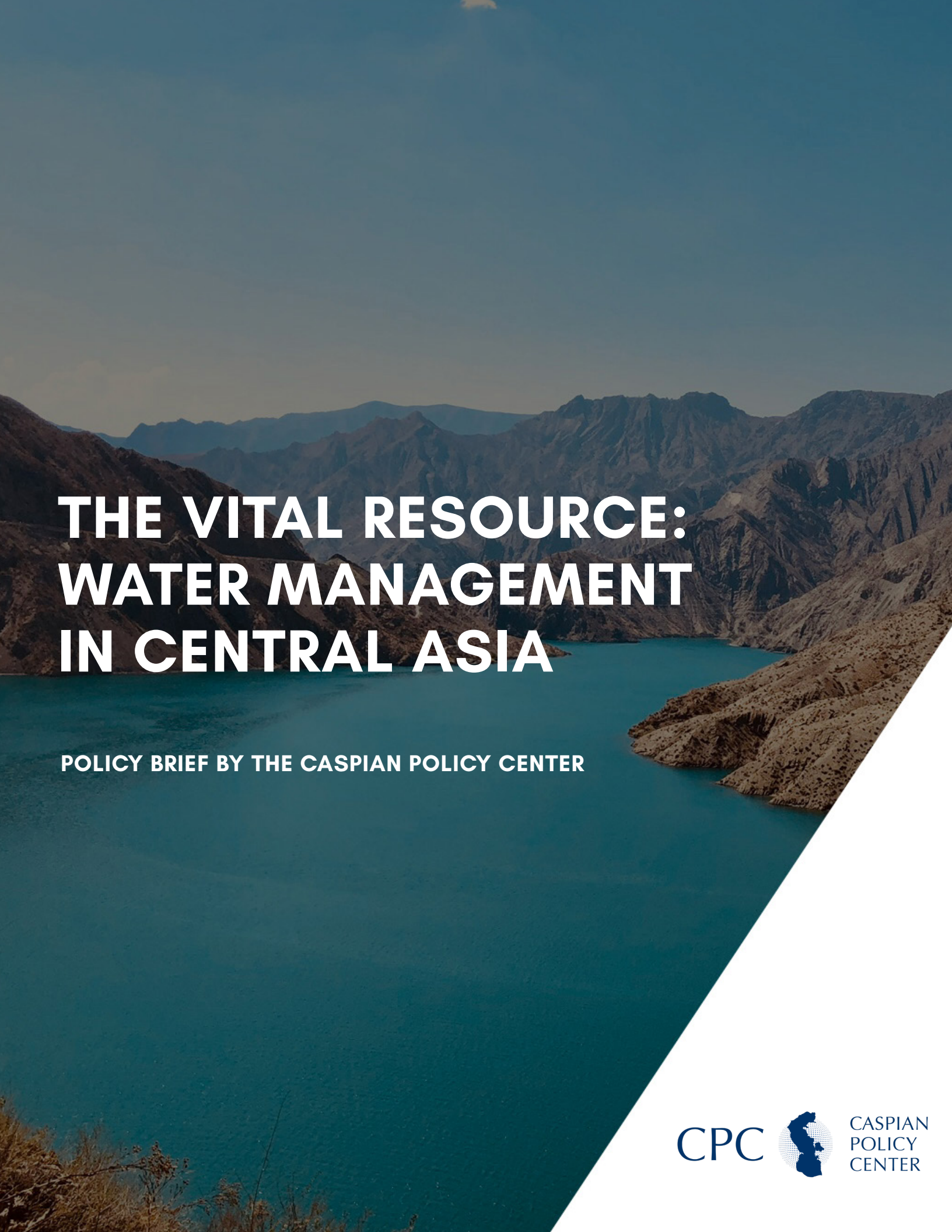


THE VITAL RESOURCE: WATER MANAGEMENT IN CENTRAL ASIA

POLICY BRIEF BY THE CASPIAN POLICY CENTER

CPC CASPIAN POLICY CENTER

ABOUT US

The Caspian Policy Center (CPC) is an independent, nonprofit research think tank based in Washington D.C. Economic, political, energy, and security issues of the Caspian region constitute the central research focus of the Center.

CPC aims at becoming a primary research and debate platform in the Caspian region with relevant publications, events, projects, and media productions to nurture a comprehensive understanding of the intertwined affairs of the Caspian region.

With an inclusive, scholarly, and innovative approach, the Caspian Policy Center presents a platform where diverse voices from academia, business, and policy world from both the region and the nation's capital interact to produce distinct ideas and insights to the outstanding issues of the Caspian region.

CPC CASPIAN POLICY CENTER

ABOUT THE AUTHORS

Aizhan Abilgazina
Research Assistant

Aizhan Abilgazina is currently a Research assistant with the Caspian Policy Center's Energy and Economy Program. She is a recent graduate of the Pennsylvania State University with a major in International Energy Studies. She worked as a research assistant on several projects related to energy transitions in Central Asian and security concerns associated with them. Over the summer of 2019, she also interned at the Wilson Center and assisted with research on joint military exercises and law harmonization in Central Asia.

Jeremy Cohen
Program Assistant

Jeremy Cohen serves as the Program Assistant for the Energy and Economy Program at the Caspian Policy Center. He completed his B.S. at Georgetown University's School of Foreign Service with honors in International History and a minor in Russian. Cohen studied ethnic policy and conflict in Eurasia during the imperial and Soviet periods of Russian history, and Russo-British relations in nineteenth-century Central Asia. At CPC, he pursues his interest in the Caspian region's status as a political and economic crossroads both today and throughout history. He has worked previously in Kazakhstan and Ukraine and organized non-profit educational programming in the Kyrgyz Republic.

Ambassador (Ret.) Allan Mustard
Senior Fellow

Ambassador (Ret.) Allan Mustard, class of Career Minister, was sworn in as U.S. Ambassador to Turkmenistan on November 25, 2014. He previously served as Agricultural Minister-Counselor at the U.S. Embassy in India, Mexico, and Russia, and held various positions in the Foreign Agricultural Service, U.S. Department of Agriculture, including Assistant Deputy Administrator for Foreign Agricultural Affairs and Deputy Director for Emerging Democracies Office. A widely recognized authority on agricultural and food aid policy, he has broad experience in guiding economic reform assistance throughout Eastern Europe and the former Soviet Union.

Introduction

Water management remains a key issue for Central Asia and one which is crucial for maintaining regional stability and energy security. Central Asia's heavy reliance on agriculture and water-intensive crops requires an integrated and coordinated approach to the distribution of water resources among upstream countries Tajikistan and Kyrgyzstan and their downstream neighbors Uzbekistan, Kazakhstan, and Turkmenistan. Uneven distribution of regional water and energy resources, poor infrastructure inherited from the Soviet Union, inefficient water use and irrigation practices, as well as growing concerns over climate change and its adverse effects on water levels put additional strain on the region's already precarious water resources.

Major river basins in Central Asia. Source: CAWater Info

Water Resources in Central Asia

Central Asia has five main rivers flowing through its territory: the Syr Darya, Amu Darya, Balkhash-Alakol, Ob-Irtysh and Ural. Afghanistan and Iran also share important transboundary water sources with Central Asia. The Amu Darya is formed at the border between Afghanistan and Tajikistan before flowing towards the Aral Sea. The Murghab River also originates in Afghanistan, then flows through Turkmenistan before disappearing into the Karakum Desert. Similarly, the Hari, or Tejen, River starts in Afghanistan, passes along the northern border of Afghanistan and Iran, and continues to Turkmenistan.

Water and Energy Resources of Central Asian States

Central Asia is characterized by an uneven distribution of water and energy resources. Although the region is predominantly arid, mountainous portions of Kyrgyzstan and Tajikistan enjoy substantial amounts of rainfall that result in huge hydropower potential. Tajikistan, while utilizing only around 5 percent of its hydropower capacity, has the potential to generate 527 billion kWh of electricity, which would be enough to cover the electricity needs of the entire Central Asian region.[1] Similarly, Kyrgyzstan, while using only 10 percent of its hydropower capacity, occupies third place among CIS countries in hydropower potential.[2] Poor energy infrastructure inherited from the Soviet Union and a lack of investment impede upstream countries from taking full advantage of their resources.[3] As a result, they are usually forced to depend on imports of energy from neighboring countries to meet their domestic power demand.

Nurek Hydropower Plant. Source: World Bank

Meanwhile, the downstream countries of Uzbekistan, Kazakhstan, and Turkmenistan, while possessing considerable hydrocarbon reserves, cannot boast of having significant water resources of their own. This requires them to rely on upstream countries for water supply during the summer irrigation period. Uzbekistan and Turkmenistan are also the region's top water consumers as they rely on water-intensive crops, such as cotton and wheat. As a result, according to a FAO (Food and Agriculture Organization) report, Turkmenistan has the highest water stress index in Central Asia, with its agricultural water withdrawal being almost the same amount as its water availability.[4]

Challenges in Water Management

Water management in Central Asia cannot be viewed in isolation from the energy and food security needs of upstream and downstream countries, respectively. One of the major problems inherent in the water management system of Central Asia is the transboundary nature of water resources coupled with conflicting interests of upstream and downstream states as to when and in what quantities water needs to be released from reservoirs.[5] While Tajikistan and Kyrgyzstan prioritize releasing water in winter to generate much needed electricity, Kazakhstan, Uzbekistan, and Turkmenistan are concerned that such a practice makes them particularly vulnerable to water scarcity during spring and summer, thus endangering summer irrigation and crop yields.

Although these tensions date back to Soviet times, the Soviet Union's centralized approach established an effective and well-regulated system to oversee water and energy distribution across the region. According to the Soviet scheme, Tajikistan and Kyrgyzstan released water from reservoirs to allow enough water access for summer irrigation in downstream countries.[6] To compensate for the loss of potential hydropower that upstream countries could have generated by releasing water in the winter, when energy demands are typically highest, fossil-fuel rich Kazakhstan, Uzbekistan, and Turkmenistan supplied Tajikistan and Kyrgyzstan with energy imports and electricity through the Central Asian Power System (CAPS), a unified power grid.[7]

Following the collapse of the Soviet Union, there were several attempts to preserve the system of water and energy sharing, including the adoption in 1992 and 1998 of agreements on joint water management and use.[8] However, as newly independent states began to pursue their own national interests, it was considerably more profitable for downstream countries to sell their energy outside the region at higher prices.[9] In turn, Tajikistan and Kyrgyzstan, deprived of cheap energy imports, also increased their water releases in winter to meet their domestic energy demand.[10] As

a result of extensive water releases in winter, there is little water stored for summer irrigation, which significantly undermines the agricultural industry downstream. This need for balance between the energy generation upstream and agricultural productivity downstream still remains one of the key challenges in regional water management. Lack of cooperation and coordination between countries further contributes to the problem.

Saline soil near Konye-Urgench, Turkmenistan. Source: Personal Archive, Ambassador (ret.) Allan Mustard

In addition to tradeoffs in a water-energy nexus seen in Central Asia, very low water use efficiency indicators along with poor infrastructure also add to the complexity of water management issues in the region. Central Asia is heavily reliant on flood irrigation, which, in the absence of proper drainage systems, leads to lower water quality, soil salinization, waterlogging, and soil erosion.[11] Kyrgyzstan has been particularly affected by a lack of adequate drainage on around 750,000 hectares (1,853,290) of cultivated land, resulting in severe soil salinization, and consequently, in a considerable loss of agricultural productivity.[12] Cotton production, primarily in Uzbekistan and Turkmenistan, puts further stress on water use and availability. Being a water-intensive crop, it not only consumes large amounts of water but also greatly contributes to water pollution through extensive use of pesticides and fertilizers.[13] In combination with poor irrigation technologies, this practice often results in substantial strain on local water supplies.

Climate change poses another severe threat to the region's water reserves. For the last several years, Central Asia has experienced extremely hot summers

and reduced precipitation, which have led to increased evaporation and, subsequently, to dramatic drops in water levels.[14] According to a World Bank report, an anticipated rise in temperature will result in the melting of around one third of glaciers feeding Central Asia's major rivers by 2050.[15] Reduced reliability of glacial and snowpack water would devastate the region's already precarious water supply.[16] These projections do not only present a significant danger to long-term water availability in the affected countries but also raise the risk of flooding and dam failures. For example, in 1998, significant increases in the water levels of the Shahimardan river, caused by the glaciers melting in the Alay mountains, flooded villages in Kyrgyzstan and Uzbekistan.[17] As a result of the incident, more than 40 people died, and houses and infrastructure were severely damaged.

Unprecedented decreases in snowfall in the mountainous regions of Kyrgyzstan and Tajikistan have also negatively affected energy generation capacity of the upstream countries. In July, 2020, due to a significant drop in water levels in the Panj river, Tajikistan announced that it would restrict its domestic power supply to save water for release in winter, when demand for electricity peaks.[18] This is not the first time Tajikistan's population had its electricity available only for several hours a day, which makes water and energy management a major priority for the country.

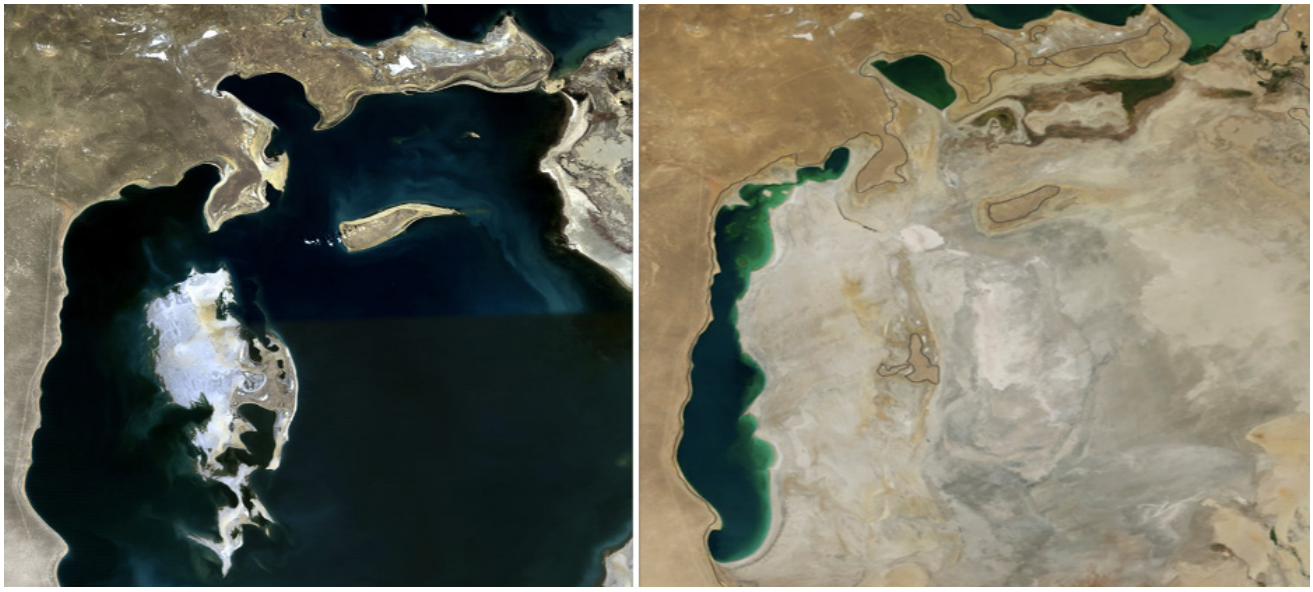
Costs of Water Mismanagement

If not adequately addressed, water mismanagement has serious implications for the economic, political, social, and environmental situation in the region. Direct economic effects include the loss of agricultural productivity, which translates into lower GDP in countries with heavy reliance on crop yields. Reduced water supply, in combination with poor agricultural systems, results in around $2.1 billion in annual economic costs in Central Asia.[19] Indirect economic effects include the costs of infrastructure built in individual countries to account for the lack of cooperation in water-related issues in the region. For example, Uzbekistan has spent around $20 million to construct pumping stations to compensate for the undersupply of water resources from Kyrgyzstan.[20] Kazakhstan has also set up the Koksarai reservoir to shield against potential flooding resulting from the extensive winter water releases in the upstream countries.[21] Regional cooperation in water management will not only allow for increased water availability but will also reduce costs by avoiding redundant investments in water infrastructure.

Transboundary water resources, coupled with poor water management, can have serious political repercussions and lead to regional tensions. This has often been the case between upstream countries and Uzbekistan and is the primary reason the United Nations established a Regional Centre for Preventive Diplomacy for Central Asia. Under Islam Karimov's presidency, Tashkent voiced concerns over the construction of the Kambar-Ata 1 hydropower station in Kyrgyzstan and the Rogun Dam in Tajikistan as it feared these projects would significantly interfere with Uzbekistan's agriculture and negatively affect cotton production.[22] Tajikistan and Kyrgyzstan, on the other hand, saw the construction of new dams as an opportunity to take advantage of their enormous hydropower potential to ensure both domestic and regional energy security. With the ascent of Shavkat Mirziyoyev following the death of Islam Karimov, Uzbekistan has lifted its opposition to the building of the Kambar-Ata 1 and Rogun dams, and even offered its assistance in the projects' implementation.[23] Although there are signs of a more cooperative attitude from Uzbekistan, the potential for revived water-related tensions still remains.

There are also considerable social costs of water mismanagement. Disruptions in agricultural production, caused by reduced water availability, result in job losses and endanger food security of the affected regions. As a World Bank report suggests, Central Asia's population will increase by 30 percent by 2050, which will put additional strain on per-capita food availability in the region.[24] In combination, these effects will seriously harm the economic circumstances of rural populations and place many of them in extreme poverty.

Diversion of the Amu Darya and Syr Darya flows to accommodate irrigation needs in the downstream countries have resulted in the decline of the Aral Sea, which continues to suffer from disastrously low water levels. In addition to being a major environmental disaster adversely affecting the biodiversity of the region, the shrinking of the Aral Sea has led to polluted, saline dust storms causing respiratory diseases and immunological problems among people living nearby and polluting the environment thousands of kilometers away.[25] The catastrophe of the Aral Sea serves as a constant reminder of how failure to manage water resources effectively and cooperatively in the short run can incur massive long-term costs.



Comparison between water levels in the Aral Sea in 1989 (left) and 2014 (right). Source: NASA

Steps Taken to Address Water Management

Since gaining independence in 1991, the Central Asian states have concluded several regional agreements to address the water management system, including the 1992 and 1998 agreements on the joint use of water and energy resources. The 1992 agreement also established the Interstate Commission for Water Coordination in Central Asia, which is responsible for developing an effective water-sharing policy in the region.[26] Ineffectiveness of existing entities aimed at handling water-related issues can be attributed to the absence of an enforcement mechanism, the lack of a functioning legal system, and lack of guidelines on how to manage regional water resources.[27]

However, international organizations have done much to address water management problems in the region through various projects and initiatives. One is the Central Asia Water and Energy Program (CAWEP) established in partnership among the World Bank, European Union, Switzerland and the United Kingdom.[28] CAWEP seeks to provide assistance and expertise in promoting dialogue between Central Asian states and finding ways to support investment opportunities to modernize water infrastructure in the region. It also works with governments and civil societies to encourage new projects aimed at improving regional water management.

One of the latest positive developments in regional water and energy cooperation has been the adoption of a joint declaration on the establishment of the unified electricity market.[29] It seeks to restore power transmission systems across Central Asia to ensure energy security of the region. As a result, once implemented, this system would significantly alleviate the problem of energy deficiency in the upstream countries and subsequently ease the challenges with water management. The United States Agency for International Development (USAID) has set up the Central Asia Regional Electricity Market program (CAREM) to assist Central Asia with launching the electricity market.

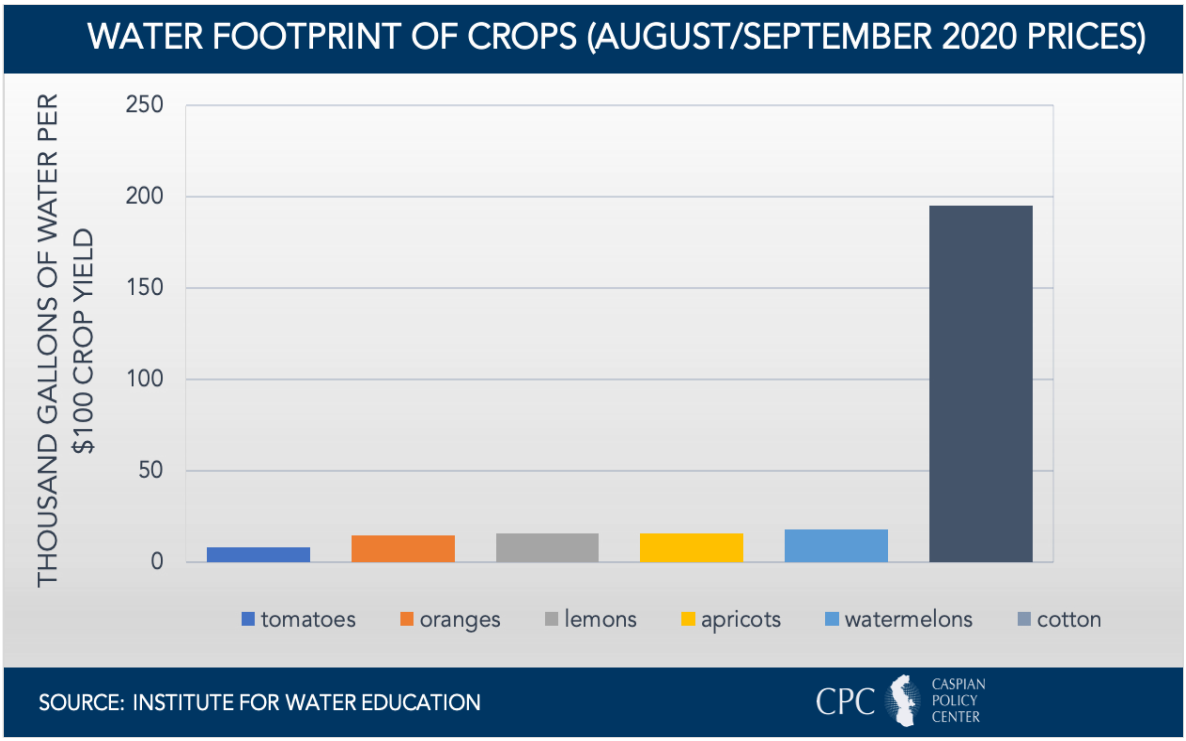
Although the governments of the region have taken steps to improve regional water management, much more needs to be done to align countries' national interests with regional water and energy security objectives. Water use inefficiencies and impractical irrigation techniques also remain significant hurdles to ensuring that increasingly limited supplies of water will be adequate.

Recommendations

To improve water management in Central Asia and reduce the burden on water resources, governments in the region should take the following steps:

- Given the region's significant water consumption for agriculture coupled with its inefficient use of the resource, including the loss of water during flooding, seepage, and evaporation, it is necessary to increase water productivity through the introduction of better irrigation practices. Specifically, the region should adopt sprinkler and drip irrigation techniques that can reduce water consumption by 30-70 percent compared to flood irrigation. In addition to water conservation, these methods create less runoff and thus less soil salinization and less pollution.

- The region must diversify agricultural production away from cotton and towards more viable alternatives that do not require as much water. Production of fruits and vegetables, particularly tree nuts and tree fruits, which would depend on drip irrigation, and their export to the Arab states of the Persian Gulf and Western Europe, are one possibility. As the below graph illustrates, the water footprint of cotton production is significantly higher than that of fruits, such as watermelons, apricots, tomatoes, lemons, and oranges. For example, the amount of water needed to produce $100 worth of cotton is 12 times higher than for lemons and 24 times higher than for tomatoes.



Quantity of water needed to produce $100 worth of crops. Source: Institute for Water Education

This option would not only allow for significant water savings but would also generate more revenues due to higher prices of fruits and vegetables. This shift could not happen overnight and would require financial and technical support, since trees require a few years to mature before they bear fruit, but gradual introduction of this practice would prove feasible in the medium term.

- Interstate dialogues over multilateral agreements should focus on the development of functional legal frameworks that will provide clear guidelines on how to efficiently manage regional water management. These dialogues should also promote technical cooperation in the form of data sharing to warn of or prevent floods and dam failures.

Conclusion

Enhanced water management practices in Central Asia remains one of the key priorities on the region's agenda to ensure energy and food security and compensate for the uneven distribution of energy resources. Water mismanagement does not only incur substantial economic costs in the form of agricultural productivity losses but also poses considerable security, political, and health threats. Poor water infrastructure, inefficient water use, and outdated irrigation techniques present an additional burden on already strained water resources in the region. As a result, it is of critical importance for Central Asian governments to strengthen their regional water cooperation and align their national interests with common regional objectives. Adoption of better irrigation technologies, diversification of agricultural production as well as more active bilateral and multilateral engagement are all effective ways to improve the water management in the region. Rather than water management continuing to function as a recurring problem for Central Asia, the issue can be used to spur intra-regional cooperation and economic development through agriculture.

ENDNOTES

[1] "Tajikistan's hydropower capacity" http://tajhydro.tj/en/hydropower-capacity/#:~:text=Tajikistan%20has%20capacity%20to%20produce,to%205%25%20of%20existing%20potential (retrieved September 9, 2020)

[2] "Kyrgyzstan: regular review of energy efficiency policies". Energy Charter Protocol. https://www.energycharter.org/fileadmin/DocumentsMedia/EERR/EERR-Kyrgysztan_2011_en.pdf (retrieved September 9, 2020)

[3] "Water in Central Asia". European Parliament Briefing. https://www.europarl.europa.eu/RegData/etudes/BRIE/2018/625181/EPRS_BRI(2018)625181_EN.pdf (retrieved August 17, 2020)

[4] Aquastat Water report 15. Food and Agricultural Organization http://www.fao.org/3/w6240e/w6240e20.htm (retrieved September 8, 2020)

[5] Janusz-Pawletta, Barbara, and Mara Gubaidullina. "Transboundary Water Management in Central Asia. Legal Framework to Strengthen Interstate Cooperation and Increase Regional Security". OpenEdition Jouranals. https://journals.openedition.org/asiecentrale/3180?lang=en (retrieved August 15, 2020)

[6] Pohl, Benjamin et al. "Rethinking Water in Central Asia: The Costs of Inaction and Benefits of Water Cooperation". CAREC program report. https://carececo.org/Rethinking%20Water%20in%20Central%20Asia.pdf (retrieved September 5, 2020).

[7] Ibid.

[8] "Promoting Integrated Water Resources Management and Fostering Transboundary Dialogue in Central Asia". EU-UNDP project. http://www.cawater-info.net/bk/water_law/pdf/water-agreements-in-central-asia-2011.pdf (retrieved August 10, 2020)

[9] Pohl, Benjamin et al. "Rethinking Water in Central Asia: The Costs of Inaction and Benefits of Water Cooperation". CAREC program report https://carececo.org/Rethinking%20Water%20in%20Central%20Asia.pdf (retrieved September 5, 2020

[10] Ibid.

[11] "Chapter 7: Environmental Considerations in Irrigation Development". FAO Land and Water Development Division. http://www.fao.org/3/W4347E/w4347e10.htm (retrieved September 7, 2020)

[12] Aquastat Water report 15. Food and Agricultural Organization. http://www.fao.org/nr/water/aquastat/countries_regions/KGZ/KGZ-CP_eng.pdf (retrieved September 8, 2020)

[13] "Sustainable agriculture". World Wide Fund for Nature. https://www.worldwildlife.org/industries/cotton (retrieved August 27, 2020).

[14] https://thediplomat.com/2019/07/climate-change-an-omitted-security-threat-in-central-asia/

[15] "Forecasting for Resilience: Central Asia Strengthening Climate and Weather Services". The World Bank Report. https://www.worldbank.org/en/news/feature/2018/03/23/forecasting-for-resilience-central-asia-strengthens-climate-and-weather-services (retrieved August 27, 2020); Chen, Yaning et al. "Changes in Central Asia's Water Tower: Past, Present and Future". Scientific reports 6 (2016): 35458 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5071869/ (retrieved September 15, 2020).

[16] Glaciers melting in Central Asia: Time for Action. United Nations Regional Centre For Preventive Diplomacy For Central Asia. Seminar Report 2014. https://unrcca.unmissions.org/sites/default/files/glacier_book_04042015.pdf (retrieved September 15, 2020).

[17] "Kyrgyzstan/Uzbekistan-Dam Burst- Disaster Situation". Report No.1 OCHA services. https://reliefweb.int/report/kyrgyzstan/kyrgyzstanuzbekistan-dam-burst-disaster-situation-report-no-1 (retrieved September 7, 2020)

[18] Tajikistan Limits Power Due to Low Water At Hydroelectric Dam". RFE/RL. https://www.rferl.org/a/tajikistan-limits-power-due-to-low-water-at-hydroelectric-dam/30753912.html (retrieved August 17, 2020)

[19] "No More Business as Usual: Improving Water Usage in Central Asia". World Bank. https://www.worldbank.org/en/news/feature/2019/06/28/no-more-business-as-usual-improving-water-usage-in-central-asia (retrieved August 27, 2020).

[20] Pohl, Benjamin et al. "Rethinking Water in Central Asia: The Costs of Inaction and Benefits of Water Cooperation". CAREC program report https://carececo.org/Rethinking%20Water%20in%20Central%20Asia.pdf (retrieved September 5, 2020).

[21] Gaëlle, Bal. "Koksaray Reservoir". Shymkent Sweet Texas. http://shymkentsweettexas.com/index.php/2017/05/17/koksaray-reservoir/

[22] https://library.ecc-platform.org/conflicts/rogun-dam-tajikistan (retrieved September 8, 2020).

[23] Hammond, Joseph. "Uzbekistan and Tajikistan: No More Dam Problems?". the Defense Post. https://www.thedefensepost.com/2018/07/30/uzbekistan-tajikistan-no-more-rogun-dam-problems/ (retrieved August 25, 2020).

[24] No More Business as Usual: Improving Water Usage in Central Asia". World Bank. https://www.worldbank.org/en/news/feature/2019/06/28/no-more-business-as-usual-improving-water-usage-in-central-asia (retrieved August 27, 2020).

[25] Ataniyazova, A. "Health and Ecological Consequences of the Aral Sea Crisis". https://www.caee.utexas.edu/prof/mckinney/ce385d/papers/atanizaova_wwf3.pdf (retrieved September 8, 2020); "The Aral Sea Crisis". Columbia University. http://www.columbia.edu/~tmt2120/impacts%20to%20life%20in%20the%20region.htm (retrieved September 15, 2020)

[26] Pohl, Benjamin et al. "Rethinking Water in Central Asia: The Costs of Inaction and Benefits of Water Cooperation". CAREC program report https://carececo.org/Rethinking%20Water%20in%20Central%20Asia.pdf (retrieved September 5, 2020).

[27] Janusz-Pawletta, Barbara, and Mara Gubaidullina. "Transboundary Water Management in Central Asia. Legal Framework to Strengthen Interstate Cooperation and Increase Regional Security". OpenEdition Jouranals. https://journals.openedition.org/asiecentrale/3180?lang=en

[28] https://www.worldbank.org/en/region/eca/brief/cawep (retrieved August 15, 2020).

[29] Pannier, Bruce. "Will Massive Project Make Central Asia The Core Of Regional Energy Market?". https://www.rferl.org/a/will-massive-project-make-central-asia-the-core-of-regional-energy-market-/30227503.html (retrieved August 15, 2020).

1015 15th ST NW Suite 380, Washington DC 20005
:202 864 6958
INFO@CASPIANPOLICY.ORG
CASPIANPOLICY.ORG

CPC  CASPIAN POLICY CENTER