

# Uzbekistan: Water Insecurity in a Forgotten Nation

Avi Bagchi

## Introduction

Lying between the Syr Darya and the Amu Darya rivers, Uzbekistan rests in the heart of a forgotten region. Accounting for ½ of all Central Asian inhabitants and with a relatively youthful population, Uzbekistan may seem like a land of potential (Caspian Report, 2019). However, the politics, economics, and history of Uzbekistan are just as obscure as its Central Asian neighbors. Uzbekistan has always been caught between the glory days of the Silk Road cities of Samarkand and Bukhara and the dark era under Soviet rule, but now Uzbekistan must emerge from isolation and find its place in a modern world with competing nations vying for spheres of influence in Central Asia.

Amidst Russian and Chinese interference, paired with always testy relations with its neighbors Tajikistan and Kyrgyzstan, water scarcity is probably not on the top of President Mirziyoyev's list of priorities. However, there is a reason for concern. The Fergana Valley, the most populous region and the agriculture base of Uzbekistan, is virtually detached from the rest of the state, lying in an isolated eastern region (Kreutzmann, 2016). Recent environmental and political events have magnified the importance of water security in the Fergana Valley. The situation could soon be dire because if Fergana collapses, so does Uzbekistan.

## Country and Family

Uzbekistan is a double landlocked country meaning not only is Uzbekistan landlocked, but all its neighbors are landlocked as well (Imamova, 2019). Therefore, the prosperity of Uzbekistan is determined by the prosperity of the Central Asian region at large. The Soviet Union, unfortunately, understood this fact three decades ago when they exploited the region for their political gain. The Soviets devised arbitrary borders specifically to prevent Central Asia from becoming a powerful region. They created the Uzbek border so that transportation from the agricultural center of the Fergana Valley to the Uzbek political capital of Tashkent had to go through neighboring Tajikistan (Caspian Report, 2019). The result of this has been constant ethnic strife between the Uzbeks and the Tajiks due to land, water, and agricultural disputes (Pannier, 2020).

With 26% of the working Uzbek population involved with agriculture, many Uzbek families are involved with the cultivation of fruits, vegetables, and perhaps most importantly, cotton ("Uzbekistan-Agricultural," 2019). Uzbekistan is one of the world's leading cotton producers, but the reliance on this "white gold" (especially during the Soviet era where Uzbekistan was virtually a "cotton colony") has always interfered with the cultivation of foodstuffs which poses a serious threat to food security (Putz, 2016).

The average monthly income in Tashkent is \$270 (Sotz, 2021) and the mean household size is around five members with most being involved in agriculture or the textile industry (Asadov & Li, 2013). By GDP per capita, Uzbekistan is ranked 125th out of 191 ("GDP," 2021). 30% of the population in Uzbekistan live below the food poverty line, and income inequality

remains a significant problem (“Food Security,” 2010). Millions of Uzbek men have migrated and are currently living in Russia as migrant workers to attain more economic opportunities (Godwin, 2020). From a social perspective, Uzbekistan is home to a diverse religious population. Although most of the population are Sunni Muslims, there remains a large population of secularists (Caspian Report, 2019). Women’s rights have drastically improved very recently due to President Mirziyoyev’s initiative to improve gender equality. In fact, the number of women in the national assembly has doubled since he took office in 2016 (Kaylan, 2020).

## Challenge and Impact

During the Soviet era, major water shortages in Central Asia caused Central Asian leaders to propose a plan—Kyrgyzstan and Tajikistan would provide water to Kazakhstan, Turkmenistan, and Uzbekistan in the summer if they were provided oil and gas in return in the winter. This plan fell through the cracks once the Soviet Union collapsed in 1991, leaving Uzbekistan and the rest of Central Asia with water insecurity (Caspian Report, 2019).

Further complicating matters, Tajikistan (east of Uzbekistan) had forged ahead with the construction of the Rogun Dam on the Vakhsh River (Stronski, 2016). The dam interfered with irrigation to Uzbek cotton crops, causing former Uzbek president Islam Karimov to threaten war against the Tajiks. Although Mirziyoyev has patched up Uzbek-Tajik water relations recently, this is just one of many examples of the impact of water scarcity and its impact on political strife. Water disputes are still a possibility in the future especially given that transportation through Tajikistan is vital for Uzbeks to transport goods between the Fergana Valley and Tashkent.

Perhaps the most important water scarcity issue that threatens Uzbekistan is the fact that farmers in the Fergana Valley heavily rely on the Syr Darya river for irrigation from the Aral Sea in the West to the Fergana Valley in the East. Although the Fergana Valley is the most fertile region in Central Asia, regional irrigation systems have proven to be ineffective and inefficient making irrigation from the Aral Sea necessary. Over the years, the Aral Sea, once one of the largest lakes in the world, has been shrinking due to over-irrigation. This has caused the rapid salinization of the sea which has not only devastated biodiversity but also caused salt and dust storms harming public health (“Aral Sea,” 2010). With the population in the Fergana Valley expected to increase by 40% (Caspian Report, 2019) and given the current trajectory of the shrinking of the Aral Sea, a water crisis is inevitable unless drastic measures are taken. Some progress has been made with the C5+1, a coalition of the United States and five Central Asian countries, in dealing with water security issues, but more radical steps must be pursued.

Uzbekistan’s growing population and the salinization of the Aral Sea have contributed to several concerning statistics. It is projected that by 2030, Uzbek water scarcity will increase by over 30% (Alimdjanov, 2020). Further, the World Bank projects that streamflow will decrease by up to 15% in the Amu Darya River by 2050 as the Aral Sea continues to salinize (Alimdjanov, 2020). In response, Uzbekistan has managed to assemble organizations focused on water-related issues such as the Research Institute of Irrigation and Water Problems and research at the National University of Uzbekistan. However, state oversight has contributed to bureaucratic inefficiencies and lack of innovation. Furthermore, a severe lack of funding has contributed to low pay for water specialists and dated technologies in laboratories. Even if research were to flourish in Uzbekistan, the villages that suffer the most from water scarcity would not have the baseline irrigation technology in place to implement any proposed solutions (Alimdjanov, 2020).

## Solutions and Recommendations

In 2016, Uzbek relations with its neighbors became even more precarious when Uzbekistan's Sardoba Reservoir burst, killing and displacing many. The flood even reached Maktarral, Kazakhstan, damaging ten towns and forcing 5,000 people to evacuate. Kazakh officials, having been opposed to the construction of the reservoir from the beginning and having been told that the flood would not reach their country, were initially enraged, and they prepared a "note of protest." Fortunately, President Mirziyoyev's less abrasive methods of foreign policy in comparison to his predecessor served him well, and conflict was avoided (Pannier, 2020).

Mirziyoyev's approach to water security and the political implications of water scarcity should be continued in the future. If the Aral Sea is to be saved and if irrigation is to be improved, Uzbekistan will have to maintain pleasant relations with and work with its neighbors especially given Uzbekistan's location where it is bordered by all five other Central Asian states. This approach should be expanded upon in the C5+1 coalition. Uzbekistan should also avoid interference from Russia and China both of which will attempt to infringe on Uzbek sovereignty with their economic spheres of influence.

Furthermore, Uzbekistan should reintroduce the defunct oil for water exchange plan that was introduced decades ago during the Soviet era. This agreement will not only solve the water insecurity problem in Uzbekistan but will also strengthen the ties between the Central Asian nations. It will provide the economies of the poorer Central Asian countries (Tajikistan and Kyrgyzstan) with valuable resources (oil and gas) that they will need as their economies grow in the future.

Central Asia has always been a dry region, even before the depletion of the Aral Sea. Instead of practicing agriculture, Central Asians lived nomadic lives and pillaged local villages. In their golden age, they facilitated trade along the Silk Road. If agriculture did not bring riches to them then, why should it be successful now? Of course, it is impossible to drop agriculture altogether in Uzbekistan, but they should stop relying on cash crops like cotton to fuel their economy, especially given the current water scarcity of the region. If Uzbekistan were to focus on a different industry like the rapidly growing communications industry in Tashkent, it would be able to preserve the Aral Sea, avoid conflict with its neighbors, and maintain economic growth.

Climate change will increase the length and extremity of droughts in Uzbekistan. With political stability to implement policies to curb this threat not being a guarantee in Uzbekistan's future, technology-based water solutions could prove to be vital. For example, "Smartsticks" are "electronic water-accounting devices" that can tabulate the amount of irrigation water running through a field (Riordan, 2020). Widespread implementation of these devices can ensure that Uzbek farmers irrigate the correct volume of water into their field. These devices can even have socio-political implications. In Uzbekistan, independent organizations often provide their irrigation services to small farmers. However, such organizations are riddled with corruption, and they often do not provide the water volume they claim. Due to this deception, farmers often refuse to pay their water fees. Distrust between farmers and such organizations has contributed to conflicts over monetary disputes. Similar corruption with water transactions is also commonplace in water-related dealings with countries like Tajikistan and Kyrgyzstan which has led to the aforementioned inter-state water disputes. If Smartsticks can verify the amount of water an organization or state claims to provide, much regional conflict can be avoided. A test

program that implemented Smartstick technology in the Fergana Valley led to a dramatic decrease in disputes and over-irrigation (Riordan, 2020).

Other innovative technological solutions to water scarcity in Uzbekistan should be pursued. Artificial intelligence (specifically machine learning) has become a lucrative method in drought prediction—something that can be useful for Uzbek policymakers. Existing methods used in species habitat prediction or image classification can be harnessed to build a machine learning model that takes in climate inputs such as local precipitation and soil moisture to make a real-time drought index prediction. These models could range from artificial neural networks to Random Forests. Such a model could be implemented on the edge or with IoT—the model will be running on independent hardware (like Smartsticks) that has sensors to collect local climate data. Hardware can be distributed in every region of Uzbekistan so policymakers can attain a drought “threat level” prediction in every region (Kaur, 2019). The advantage of an edge or IoT application is that communities without powerful computers can take advantage of the predictions from advanced machine learning models. With this information, Uzbekistan can distribute support resources appropriately. Also, these technology-based solutions can be created by non-governmental organizations (NGOs) to avoid any government corruption or inefficiency that could interfere with production or distribution. It could also be beneficial for Uzbekistan to partner with foreign allies like the United States in research endeavors related to water. American universities could establish research opportunities in Uzbekistan not only for water-related innovation and strengthen trans-Atlantic ties, but also to incentivize young Uzbek professionals to enter water-related fields. These technology-based solutions (rather than political-based solutions) can spread regionally to Tajikistan and Kyrgyzstan—the two poorer Central Asian countries. Uzbek stability necessitates regional water security, and an Uzbek solution requires regional cooperation.

## Conclusion

Caught between five landlocked countries in a neglected region of the world, Uzbekistan is an easy country to forget. However, during a time where Russia and China seek to expand their influence and in a globalizing economy, Uzbekistan should be given attention especially given that the fate of Uzbekistan will determine the fate of Central Asia as a whole. One of the principal issues facing Uzbekistan is water scarcity, an issue that has always plagued the region. Water scarcity is not only important for public well-being, but it is an influential factor for foreign relations in Uzbekistan. Perhaps the most pressing water-related issue is the depletion and salinization of the Aral Sea. To solve these problems, water-related or not, Uzbekistan must take a cooperative approach to its neighbors but a defensive approach against Russia and China. Furthermore, Uzbek officials should revisit water scarcity solutions of the past and focus their efforts on non-agricultural-based industries. In addition, Uzbekistan must pursue technology-based solutions headed by NGOs to its water problems as well in the onset of climate change and an ever-dynamic political arena. Drought prediction with machine learning and edge computing as well as Smartsticks seem to be two viable options for the future. In the end, Uzbekistan cannot change its unfortunate location, political situation, and history. But with these misfortunes, there are also great opportunities for the Uzbek people if their water problem were to be put to rest. With these aforementioned recommendations, Uzbekistan can realize its great potential.

## References

- Alimdjanov, B. (2020, April 24). *Uzbekistan's water Sector: Environmental and managerial issues*. CABAR.asia. <https://cabar.asia/en/uzbekistan-s-water-sector-environmental-and-managerial-issues>.
- Aral sea dust storm. (n.d.). Retrieved February 28, 2021, from <https://earthobservatory.nasa.gov/images/43299/aral-sea-dust-storm#:~:text=Dust%20plumes%20rose%20from%20desiccated,Sea%20in%20late%20March%202010.&text=By%20the%20time%20MODIS%20observed,prone%20to%20forming%20dust%20plumes>.
- Asadov, D. & Li, M. (2013). Characteristics of Households and Respondents. In The DHS Program (Ed.). *Demographic and Health Survey* (pp.13-33).
- [Caspian Report]. (2019, April 8). *Geopolitics of Uzbekistan* [Video]. YouTube. <https://www.youtube.com/watch?v=1RpmswEpMTk>
- Diplomat, B. (2020, September 29). Uzbekistan's COVID-19 response Exposes Tashkent's reform successes and failures. Retrieved February 28, 2021, from <https://thediplomat.com/2020/09/uzbekistans-covid-19-response-exposes-tashkents-reform-successes-and-failures/>
- Export.gov. (n.d.). Retrieved February 28, 2021, from <https://www.export.gov/apex/article2?id=Uzbekistan-Agricultural-Sectors#:~:text=Agriculture%20is%20an%20important%20sector,are%20the%20country's%20principal%20crops>
- Gdp per capita. (2021). Retrieved February 28, 2021, from <https://www.worldometers.info/gdp/gdp-per-capita/>
- IFPRI. (2010, July 18). Ifpri.org. Retrieved February 1, 2021, from <https://www.ifpri.org/blog/uzbekistan%E2%80%99s-road-food-security>
- Imamova, N. (2019, December 1). Uzbekistan faces choice between closer ties to US, Russia. Retrieved February 28, 2021, from <https://www.voanews.com/south-central-asia/uzbekistan-faces-choice-between-closer-ties-us-russia>
- Kaur, A., & Sood, S. K. (2019, November 17). *Artificial intelligence-based model for drought prediction and forecasting*. OUP Academic. <https://academic.oup.com/jnl/article/63/11/1704/5618957>.
- Kreutzmann, H. (2016). *From Upscaling to Rescaling: Transforming the Fergana Basin from Tsarist Irrigation to Water Management for an Independent Uzbekistan*. Springer. [https://link.springer.com/chapter/10.1007/978-3-319-18971-0\\_9](https://link.springer.com/chapter/10.1007/978-3-319-18971-0_9)

- Kaylan, M. (2020, September 30). We must pay attention To Uzbekistan, the big hope for stability in Central Asia. Retrieved February 28, 2021, from <https://www.forbes.com/sites/melikkaylan/2020/09/30/we-must-pay-attention-to-uzbekistan-the-big-hope-for-stability-in-central-asia/?sh=5695683b1fb6>
- Pannier, B. (2020, May 17). Signs of hope (And Conflict) on CENTRAL Asia's Borders. Retrieved February 5, 2021, from <https://www.rferl.org/a/qishloq-ovozi-central-asian-borders-cooperation-conflict-uzbekistan-tajikistan-kyrgyzstan/30615663.html>
- Putz, C. (2018, November 30). Uzbekistan: White Gold, dirty business. Retrieved February 3, 2021, from <https://thediplomat.com/2016/04/uzbekistan-white-gold-dirty-business/>
- Riordan, L. (2020, December 21). *How tech and modern market mechanisms can solve water scarcity in Uzbekistan*. International Partnerships - European Commission. [https://ec.europa.eu/international-partnerships/stories/how-tech-and-modern-market-mechanisms-can-solve-water-scarcity-uzbekistan\\_en](https://ec.europa.eu/international-partnerships/stories/how-tech-and-modern-market-mechanisms-can-solve-water-scarcity-uzbekistan_en).
- Stronski, P. (n.d.). Uzbekistan at Twenty-Five: What next? Retrieved February 28, 2021, from <https://carnegieendowment.org/2016/03/21/uzbekistan-at-twenty-five-what-next-pub-63083>