Balancing Development and Water Management in the Amu Darya: Lessons from Afghanistan's New Irrigation Canal

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1. Introduction

For the past century, Afghanistan has played a minimal role in water distribution for the Aral Sea Basin, despite contributing 10% of the Aral Sea's natural river flow originating from its territory (MWR, 2020). Negotiations on water sharing between the Soviet Union and Afghanistan occurred, but these were limited especially after 1977 and war. Even after gaining independence from Soviet Union, Central Asian countries have reached an agreement between themselves on water sharing but it didn't include Afghanistan. Over the last two decades, Afghanistan has asserted its water rights objectives but lacked significant leverage. Over these 30 years, downstreams countries has been labeled as hydro-hegomons (Menga, 2016) and several research have addressed water energy food nexus. In summer 2022 construction of the Qosh-Tepa Canal in Afghanistan has started. It has already completed more than 100 km of the canal by the end of 2023 through deserted area (fig. 1a). This project has potential to significantly impact water allocation and distribution among stakeholders in the Amu Darya River leading to the continued conflict and imbalance of the previous unstable agreements of water sharing between parties.

Water resource sharing between upstream and downstream countries has historically been a point of tension, with water distribution previously managed between former Soviet Union countries under the Almaty Agreement (FAO, 1992), later several others were signed, but haven't included Afghanistan in it. The construction of a new canal in northern Afghanistan, the Qosh-Tepa Canal, stretching 285 km with a depth of 8 meters, is projected to significantly alter water allocation dynamics in the region. The canal aims to divert water from the Amu Darya River to irrigate the northern Afghan, boosting agricultural production and economic development. Evaluating quality of the canal from available materials and satellite imagery (fig. 1b, 2) shows no adequate reinforcement of concrete or lining for the canal's bed and embankments. Such a frequient pace may lead to waste vast amounts of water.

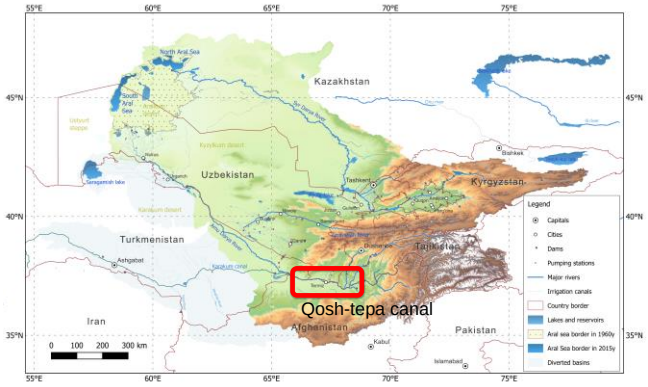

Fig. 1. a)Aral Sea Basin map and b) Qosh-tepa canal construction by 2024. Possible water spill seen in the middle marked by red square. Source: Landsat 8-9

Water diversion for irrigation and other human activities has been widely considered one of the main reasons for the Aral Sea shrinking; it has disrupted the natural hydrological balance of the Aral Sea basin, causing various environmental, social, and ecological impacts to the region. This has impacted not only the

Aral Sea itself but also all surrounding environments within the basins. Canal construction will change previous water allocation and accelerate desertification in the downstream area.

Fig. 2. Qosh-tepa canal in Afghanistan. Source: Afghanistan PM for economic affairs promotion video

2. Method and results

Using developed water balance model for the Aral Sea we investigate water allocation considering the previous assessment of irrigation distribution. To identify lessons from transboundary water sharing in the Amu Darya River, focusing on the potential vulnerability of downstream countries like Uzbekistan and Turkmenistan. By applying scenarios based on past water allocation agreements for dry and wet years, focusing on the potential vulnerability of downstream countries future water allocation is analyzed.

The significant reliance of Uzbekistan and Turkmenistan on Amu Darya water for irrigation and economic impact (Varis, 2014), necessitates faster adoption of water-saving techniques, especially downstream, to mitigate the potential economic impacts if the canal reaches its full capacity. Considering the current average annual river flow of the Amu Darya is estimated at 79 km^3 (MWR, 2020), extraction of approximately 10 km^3 would be a significant challenge.

3. Conclusion and discussion

Previously these two countries were considered hydro-hegemons in Central Asia (Menga, 2016), and in several frameworks for Water Energy Food Nexus analysis (Shi et al, 2021) found that only serious restraints applied by commisions can help in achiving it. However, the construction of the Qosh-Tepa Canal in Afghanistan, an upstream country, disrupts this dynamic. This situation provides both challenges and opportunities, at the same time climate change adds another layer of complexity. As water resources become scarcer, upstream countries like Afghanistan may gain more leverage in future negotiations, also pointing that in age of climate change previous water allocations and hydro-hegemony may have less impact, as it was considered before. This necessitates a reevaluation of historical water allocations and a shift towards a more collaborative approach, as water could become much more valuable resources for the countries in the “lower income” upstream countries. While downstream countries may need to adapt to changing realities, and improve water management practices, improved irrigation techniques and infrastructure development to optimize water usage.

Reference

1) Ministry of Water Resources of Uzbekistan (MWR), 2020. Irrigation and Drainage in Republic of Uzbeksitan, History and Morend State.
2) FAO, FAOLEX database. Retrieved 22 January 2024.www.fao.org/faolex/results/details/en/c/LEX-FAOC054529/
3) Shi, H., Luo, G., Zheng, H., Chen, C., Hellwich, O., Bai, J., Liu, T., Liu, S., Xue, J., Cai, P., He, H., Ochege, F.U., Van de Voorde, T., De Maeyer, P., 2021. A novel causal structure-based framework for comparing a basin-wide water–energy–food–ecology nexus applied to the data-limited Amu Darya and Syr Darya river basins. Hydrol. Earth Syst. Sci. 25 (2), 901–925.
4) Menga, Filippo. 2016. “Reconceptualizing Hegemony: The Circle of Hydro-Hegemony.” Water Policy 18 (2): 401–18. https://doi.org/10.2166/wp.2015.063.
5) Varis, O. Resources: Curb vast water use in central Asia. Nature 514, 27–29 (2014). https://doi.org/10.1038/514027a

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