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Impact of the Qosh-Tepa canal in Afghanistan to the Downstream of the Amu Darya River Basin

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The Amu Darya River is crucial in providing water resources to riparian countries, including Afghanistan, Turkmenistan, Uzbekistan, and Tajikistan. The water resource sharing between upstream and downstream and tension over water use have always been high. The water distribution management was regulated only between former Soviet Union countries with Almaty agreement (FAO, 1992) from 1992, as Afghanistan hasn't had any significant resources to divert waters. The construction of a new canal in Afghanistan from 2022 to as long as 285km, 100 meters length and 8 meters in depth has the potential to alter the dynamics of water allocation in the region significantly and requires all countries' cooperation on the Amu Darya River and especially for the delta area of the Aral Sea.

The Amu Darya, which historically flowed to the Aral Sea, now rarely supplies water into it, as most of the water is distributed for irrigation between Turkmenistan and Uzbekistan (fig. 1). 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 such as wetlands and lakes within the basins. According to the Interstate Commission for Water Coordination of Central Asia (ICWC) in the last decades wetlands and lakes in the downstream areas have received only 30% of average water flow. Canal construction will change previous water allocation and accelerate desertification in the downstream area that is expanding from the bottom of the Aral Sea. It is why the Qosh-tepa canal construction will have significant if not severe impacts on the region's politics and economics.

The canal is funded by the public funding through governmental agencies of Afghanistan, after completion it will provide enough irrigation water for 4 provinces 550000 ha (The Economist, 2023). Afghanistan plans to complete construction works within 2-4 years till 2025 (The Diplomat, 2023). The works that began in summer 2022 have already completed more than 100 km of the canal by the end of 2023 through deserted area (fig. 2).

Fig. 1. Aral Sea Basin. Qosh-tepa Canal is shown in red. Adapted from Wikimedia

Water allocation in the complex of the Amu Darya River Basin should develop an assessment framework that will consider environmental, social, and economic dimensions. This research proposal investigates the implications of additional water allocation to various parts of the transboundary river Amu Darya, focusing on the potential vulnerability of water resources from the canal's construction. In this report we consider satellite imaginary analysis and water requirements from the model simulation for amount of irrigation

water requirements in the water balance.

Fig. 2. Current stage of the canal construction. The spill seen in the middle marked by red square. Source: Landsat 8-9 (2024.01.20)

Fig. 3. Canal construction process. Source: Afghanistan PM for economic affairs promotion video

The rapid pace of the canal construction has raised concerns, particularly regarding water-saving precautions. Evaluating the construction quality of the canal gives rise to substantial concerns, as evident from available materials and satellite imagery (fig. 2, 3). The construction on such a rapid pace is notably rudimentary, characterized by a simplistic "digging" method without adequate reinforcement or lining for the canal's bed and embankments. This approach presents a significant hazard, as there is a considerable risk of water seepage into the arid, sandy soil, leading to substantial water losses. Such losses further intensify existing challenges of salinization and waterlogging in irrigated areas, significantly heightening the peril of water loss. This situation is reminiscent of the earlier development of the Karakum Canal, a project initiated in 1980 in Turkmenistan and finalized in the 1990s. Evaluations suggest that losses amounted to approximately from 18% up to 30% of the total flow, resulting in extensive waterlogging and salinization of the surrounding ecosystem and impacts to agricultural productivity due to the accumulation of excess salts in the soil and waterlogged conditions (FAO, 2007).

Establishing a robust framework to assess the vulnerability of regions affected by alterations in water allocation, especially considering the reduction of irrigation water for downstream countries, is imperative for implementing effective adaptation measures. This need is underscored by the significant reliance of Uzbekistan and Turkmenistan on irrigation water for their GDP (Varis, 2014), highlighting the economic implications associated with changes in water distribution.

Environmental factors, including ecosystem health, biodiversity, agriculture, livelihoods, and community resilience should be integral components of the assessment. This inclusive evaluation aims to provide a nuanced understanding of the multifaceted impacts for the adaptive strategies.

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