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Historical Water Governance in Turkmenistan and the Challenges of Soviet Interventions

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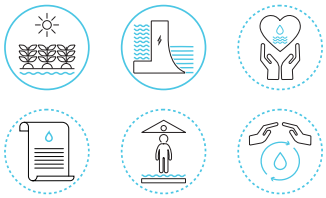
Abstract
This article investigates historical water management practices in Turkmenistan and the development of canal construction technology, comparing the operation of traditional irrigation canals with Soviet water management policies. It explores how Soviet officials regarded water and used water management to consolidate state power and advance the region economically, arguing that centralized Soviet water management policies, which largely disregarded local expertise and participation, ultimately proved unsustainable and environmentally destructive. The article underscores the need to include diverse stakeholders in decision-making processes to avoid perpetuating outdated practices, further exacerbating the deterioration of the environment and societal customs.

KEYWORDS

USSR
irrigation system
environmental degradation
water management
local stakeholders

WATER VALUES



Policy Recommendations

- Large-scale irrigation systems must be developed following extensive interdisciplinary studies of the area's geology and soil hydrology to prevent problems such as water loss, swamp formation and salinization.
- An open dialogue must be initiated with affected communities, along with a bottom-up approach to governance, efforts to raise awareness, and consideration of existing vernacular irrigation practices. The involvement of a diverse set of actors and local participants can enable sustainable future development.

< Fig. 1 Hanhowuz (Khauzkhan) Reservoir, Turkmenistan (Source: NASA Landsat 8, 2014. Public Domain, via Wikimedia Commons).

Introduction

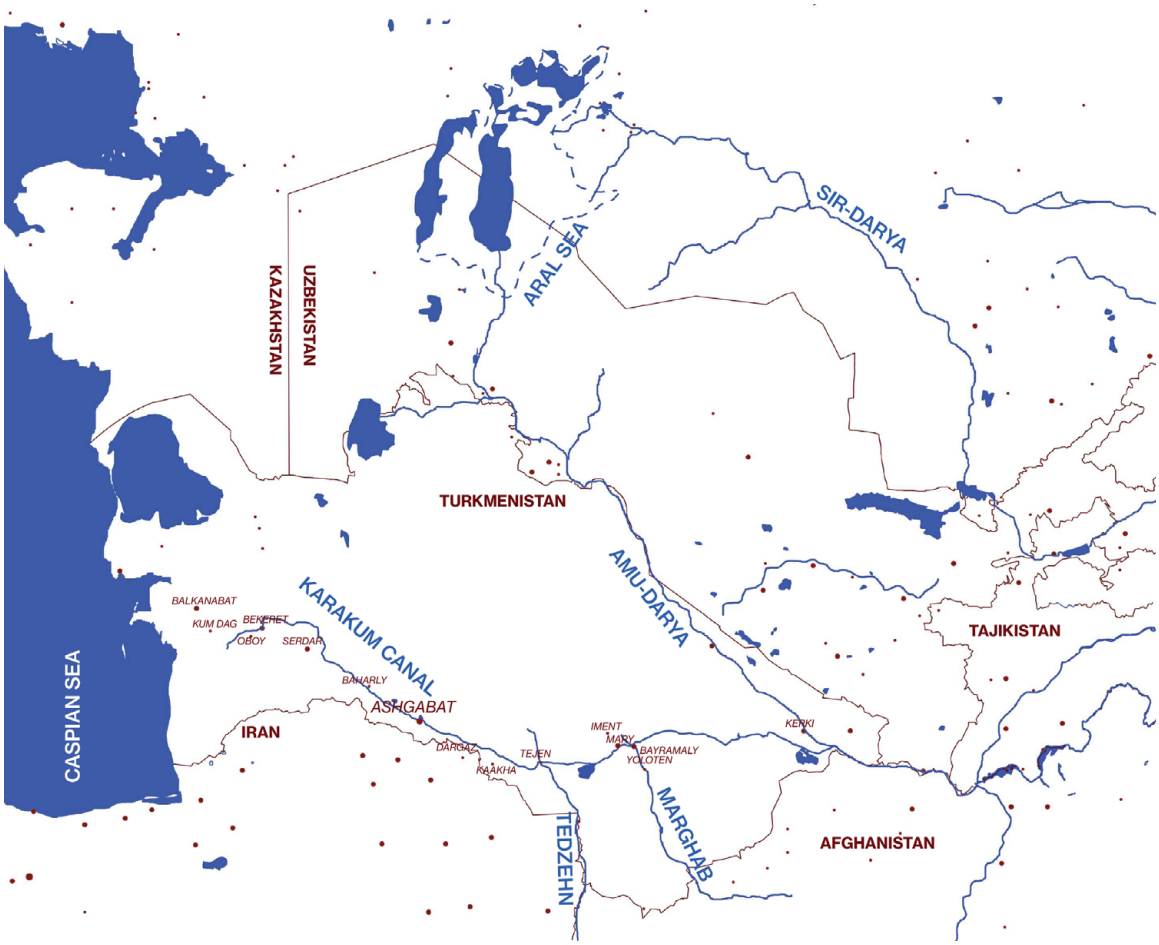
Until the twentieth century, cities in the Turkmen region of Central Asia flourished in natural oases despite limited access to water and daytime temperatures that could exceed 40 degrees Celsius. During the Soviet rule of Turkmenistan (1921–1991), water management became crucial to establishing sovereignty in this water-scarce region (fig. 2). Hydraulic infrastructure both symbolized and materialized state power by enabling naval transport and administrative control of irrigation and agriculture. Irrigation, in particular, became a core strategy for transforming the region toward a more "advanced" form of socialism. The Soviet rulers seeking to build the country's economy and industries presented their regime and its technology as superior to "backward" local practices (Brite 2018).

To facilitate fertile conditions for the development of new agricultural lands in the Soviet Republic of Turkmenistan, Soviet bureaucrats planned the Karakum Canal, beginning its construction in 1954 and continuing to work on it until 1988. It became a poster project of the Soviet Union and its largest hydrological undertaking. The canal resulted in a fourfold expansion of Turkmenistan's fertile land, and when it reached the Turkmen capital Ashgabat, in 1962, its water helped shape the city's urban development. As of today, the Karakum canal remains one of the largest irrigation canals in the world, supplying water to approximately one million hectares of land (Brite 2018; O'Hara 1999).

This historical analysis of water heritage in Soviet Turkmenistan highlights the main drivers behind the evolution of water management, offering insights into its legacy and the challenges that exist today (D'Agostino and Hein 2024). Such understanding is especially crucial in water-scarce regions, where every decision related to water management can have a profound and enduring impact.

Water in the Turkmen Region

The region of Southern Turkmenistan has long been shaped by humans: irrigation in the Marghab Oasis dates back 10,000 years. After the region came under Arab control in the seventh century, an extensive and sophisticated irrigation network emerged, enabling land to be used for agriculture (O'Hara 1999; Obertreis 2017). By carefully allocating plots and water resources, inhabitants of Marghab Oasis could produce food for themselves and export it to neighboring regions. Sustainable water management was achieved, as the knowledge regarding the maintenance of the irrigation canals was passed down and improved through generations, with a large part of society contributing to their sustenance through tax payment and labor (Obertreis 2017). The amount of cultivated area was regulated based on the spring flow of the Marghab River. During years of reduced discharge, only the most crucial lands were farmed (O'Hara 1999). The preservation of the irrigation infrastructure was overseen by a governing body formed by Mirab, an administrative authority responsible for water resources, and other local officials (O'Hara 1999; Peterson 2019). 12,000 individuals were dedicated to managing and maintaining the irrigation structure, while Mirab was informed of water levels in the main canal on an hourly basis, which reflects the great care with which irrigation was managed in the Marghab Oasis during the 12th century (O'Hara 1999; Peterson 2019). For many local cultures around the Karakum Desert, water held religious and symbolic significance and was viewed as sa-



^ Fig. 2 Water and cities in the Aral Sea basin: the Aral Sea, the Syr Darya and Amy Darya Rivers and Karakum Canal (Source: Estere Cvilikovska, 2024).

cred and magical (Edgar 2004; Obertreis 2017). In the Khanate of Khiva, the irrigation season was ceremonially initiated by the ruler, or Khan, who participated in cleaning the main canal and plowing the first furrow, reflecting the role of irrigation systems as a cornerstone of social and political life (Obertreis 2017).

Starting in the sixteenth century, the Russian Empire gradually expanded control over territories in Central Asia ruled by khanates. The nineteenth century saw the conquest of present-day Turkmenistan. At the time, this area was controlled by three Muslim khanates with unstable borders, comprising many Turkmen tribes (Edgar 2004; Obertreis 2017). The perception of water among Central Asians contrasted sharply with that of Russian expansionists. Indigenous irrigation systems were deemed primitive by the Russians, which reflected the general attitude of Europeans towards non-European cultures that began in the eighteenth century (Obertreis 2017). Nevertheless, following the Russian Empire's conquest, only a few new canal networks were constructed, mostly to expand already existing ones (O'Hara 1999).

^ Fig. 3 USSR propaganda poster "We'll conquer drought, too" (Source: Viktor Ivanovich Govorkov, 1949).

During the rule of the Russian Empire and the first decades of the Soviet Union, large-scale irrigation schemes were planned but not realized, due to little enthusiasm and interest on the part of potential financial contributors (O'Hara 1999).

Water in the Turkmen Soviet Socialist Republic

In the 1920s, with the advent of Soviet rule, talks ensued about how to move the Turkmen-inhabited regions toward a more "advanced" form of socialism (Edgar 2004; Obertreis 2017). In Central Asia the Soviets saw national delimitation as imperative: by establishing a common language, culture and territory they sought to create a stable and modern society (Edgar 2004). Through their promotion of "national cultures," the Soviet state contributed to developing a sense of national identity in Turkmenistan and other Central Asian countries, even though the drive for unity often involved the erasure of distinctive customs and identities (Edgar 2004). Building national consciousness was fundamental in managing water, as rights to land and water were nationalized and redistributed.

The Soviet regions of Central Asia developed economically; until the 1950s, the Aral Sea region supported major fisheries and regional transport. However, under Stalin, combating the desert by transforming it into agricultural land

through infrastructure became key to strengthening state power. Khrushchev's rise saw increased emphasis on agriculture and large-scale industrial farming seen as critical to both nation-building and Soviet control. Higher crop yields bolstered Khrushchev's position, an indication that the ability to control water was linked to maintaining power in the Soviet Union (Peterson 2019).

The propaganda posters of the time portrayed nature and water as controllable by "Soviet man" (Obertreis 2017) (fig. 3). Although this poster features Stalin drafting new irrigation canals in Russia and Kazakhstan, the sensibility it depicts was applied throughout the USSR. The text presents the desert as something to overcome, translating to "We'll conquer drought, too". Water governance was dominated by the Ministry of Water Management and the Ministry of Agriculture, where officials often lacked proper expertise or local knowledge.

The Development and Impact of the Karakum Canal

Following Stalin's death in 1953, plans for the Karakum Canal developed rapidly, favoring a route close to the Trans-Caspian railway and Turkmen cities like Ashgabat (Zohn 2014). Soviet views on water involved naturalizing the canal infrastructure, as in the newspapers, it was often named the "Karakum River" or the "River of Life", normalizing the scale of interventions (Atajevs 1974; Rogočovs 1972). Despite propaganda claims, the canal's construction was relatively simple, with bulldozers carving out a preliminary route and the water flow widening it (Obertreis 2017). Barely any concrete lining was used in construction, resulting in water seepage issues in later years. Although the Soviets claimed that only 30 per cent of the water was lost, modern studies reveal that up to 70 per cent of the water is wasted in the irrigation processes (Obertreis 2017; Zohn and Kostianoy 2013; Верный 2023).

To a certain extent, the canal construction facilitated agriculture: By 1961, it had more than doubled the amount of irrigated land in Turkmenistan (Obertreis 2017). However, due to the region's geological conditions and poorly constructed outflow systems, the Marghab oasis soon began experiencing issues with inadequate drainage, resulting in salinization and waterlogging. By 1962, the expanding cotton farms were already confronted with yields declining because of salinization, and the accumulation of water led to a resurgence of malaria caused by increased mosquito populations (Obertreis 2017). The canal's construction and operation contributed to environmental degradation, with land being cultivated in an unsustainable, extractive manner, and in the 1970s, agricultural land that had been created with the Soviet introduced farming methods, using the water from the Karakum canal, was abandoned at the rate of 46,000 hectares per year (O'Hara 1999). Nevertheless, the canal was consistently framed as a triumph over nature. Soviet newspapers frequently highlighted the agricultural and infrastructural benefits of the Karakum Canal, emphasizing the quantities of cotton, vegetables, and grain that could be cultivated with its water, as well as the neighborhoods and public buildings constructed thanks to its supply (Korzuna 1982; Obertreis 2017). The head of Karakum Canal Construction trust, B. Annaniizov, in a newspaper, expressed that "the Soviet man has made the Karakum Desert blossom all year long" (Obertreis 2017).

While the primary purpose of constructing the canal was to increase Soviet cotton production, a significant objective was ensuring water

delivery to Turkmenistan's capital – a feat later celebrated as a monumental victory. The state propaganda asserted that the canal will be able to provide the previously limited water supply to Ashgabat's citizens and industry (Korzuna 1982; Obertreis 2017). To mitigate the harsh desert climate, the city was developed with a large amount of fountains, water cascades, open pools, and canals, using the canal's water (Kachelson 1987).

The Karakum Canal is a powerful example of the Soviet Union's approach to water management, rooted in standardization, monumental engineering, and centralized decision-making. Little consideration was given to the region's unique geological characteristics, as most decisions were made by authorities in Moscow or Ashgabat (Obertreis 2017; Peterson 2019). Through their depictions of infrastructure projects and urban landscaping enabled by canal water, Soviet officials sought to impose a uniform value system on the local inhabitants, who had previously maintained a site-specific understanding of water heritage and its management. Despite the canal's harmful environmental impact—such as salinization and widespread swamping caused by poor drainage — the Soviets hailed the canal as an immense success due to its quantifiable gains.

Conclusion

The Soviet perception of water as a financial and political asset led to ambitious plans for river rerouting. Water was viewed as uniform and part of a schematic hydrological cycle, justifying its manipulation without regard for local impact. Narratives carefully crafted by Soviet officials often prioritized the economic value of water while downplaying the complex, multifaceted value systems traditionally maintained by people in present-day Turkmenistan. Through institutionalization and strategic representation, these interventions became normalized and deeply embedded in local cultures and landscapes. Propaganda in state newspapers made exaggerated claims about water management projects and underscored the Soviet state's deliberate efforts to reshape perceptions of water and its cultural heritage – primarily to legitimize its exploitation. This reframing, however, contributed to significant environmental degradation. In contrast, historical studies of water governance in the region highlight the potential for sustainable irrigation practices, emphasizing the role of local communities in responsible water management.

The abstraction of water into a seemingly placeless, tasteless and odorless substance is a relatively recent development, originating in eighteenth-century efforts to rationalize the world (Neimanis 2014). This perception reduced water to its chemical formula and a resource to be exploited, stripping it of spiritual, cultural and ecological significance (Linton 2010). Such a reductionist view facilitated unsustainable practices throughout the twentieth century, leading to groundwater depletion, ecosystem destruction, pollution and salinization. Neimanis (2017) challenges prevalent perceptions of water, describing humans as "bodies of water," inherently connected to the planetary hydrocommons. This interconnectedness suggests that water governance should consider water's relational and cultural dimensions, not just its commodification.

The abstraction of water extended to its governance, resulting in administrative entities being disconnected from the realities of local environments and communities. The twentieth century saw similar approaches to water management implemented across the globe. In

projects focused on the Rhône River in France, the Tennessee River in the US and the Ebro River basin in Spain, centralized administrations lacked site-specific knowledge and an understanding of environmental processes (Swyngedouw 2015; Pritchard 2011). Large-scale hydrological projects were also undertaken as part of nation-building efforts in the post-colonial context, exemplified by the construction of the Aswan High Dam in Egypt and the development of dams and irrigation systems during the implementation of India's first Five-Year Plan. Control over water resources reflects societal values and priorities, with water management choices revealing underlying power dynamics and social structures (Mukerji 2022).

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