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Fluid Legalities: Human-Fish Relations and Water Governance in Uzbekistan's Zarafshan River Basin

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ABSTRACT: This article explores water governance in Uzbekistan's Zarafshan River Basin through a socio-legal analysis of human-fish relations. Building on scholarship that conceptualises fish as vessels embodying the biochemical, ideological, and economic forces of riverscapes, this article follows their movements through the domestic and international regimes that govern water, revealing how law, custom, and informal exchange shape everyday life along the river. Ethnographic research illuminates a post-Soviet landscape marked by legal pluralism: While international conventions introduced after the USSR's collapse largely reinforced Soviet-era governance systems, decades of institutional decay – compounded by the Covid-19 pandemic, Russia's war against Ukraine, and mounting food insecurity – have opened new spaces for local agency. Humans and fish have formed more-than-human assemblages to navigate this turbulent socio-political, environmental, and economic terrain. Uzbek citizens leverage their relationships with fish to reinterpret and contest water governance, asserting agency beyond formal law, while fish depend on human interventions for survival. This article overall introduces fish as a medium for tracing how legality and life flow through Central Asia's fluid landscapes.

KEYWORDS: Water governance, human-fish relations, socio-legal studies, Uzbekistan, Aral Sea

INTRODUCTION

In May 2020, Uzbekistan's Sardoba dam collapsed after days of heavy storms, unleashing torrential waves that swept away villages and farms in both the Uzbekistan and Kazakhstan border regions (Simonov, 2020). This catastrophic event not only led to several deaths, the evacuation of over 100,000 residents, and infrastructural damage, but also sparked outrage on social media. In response to mounting public pressure, the Uzbek government initiated a police investigation into their most prominent suspect behind the dam collapse: catfish (K-News, 2020).

The Sardoba Dam and reservoir system had been heralded by the newly elected Mirziyoyev government as a flagship of the 'New Uzbekistan'. While Uzbekistan's foreign policy under the previous regime had been marked by isolationism, Mirziyoyev sought to project a cooperative and accountable state through regional water diplomacy (Global Observatory for Water and Peace, 2020). Although Sardoba was a domestic project initially constructed under the Karimov regime in 2010, its relaunch in 2017 was folded into this broader diplomatic narrative, rebranded as evidence of a state aligned with international norms and modernised infrastructure (Global Observatory for Water and Peace, 2020).

As a relatively new construction, Sardoba's collapse punctured this carefully curated image of reform and renewal. Though the disaster pointed to enduring political corruption and bureaucratic negligence, the government harnessed expert statements to claim that giant catfish burrowed into the dam wall, transforming a human-made failure into an act of nature (K-News, 2020).

Through this displacement of responsibility, fish became legal actors, enlisted in the state's effort to stabilise its authority amid failure, allowing the government to rhetorically preserve its image as modern and lawful. I begin with this story to identify the role of nonhuman agency, both perceived and imaginary,

in shaping how legality moves and mutates. A focus on fish reveals Uzbekistan's waterways not through their concrete edges or bureaucratic blueprints but through what stirs beneath them: the slow, unseen lives that show how water governance is lived, adapted, and constantly negotiated within riparian communities.

From Sardoba, I turn to the Zarafshan River in the south. Here, fish have also served as living witnesses to the law's transformations, anchoring a more everyday view of law. This article takes human-fish entanglements as an ethnographic starting point for exploring law *in* society: how legality is interpreted through human-fish relations in the Zarafshan basin. By bringing such relations into focus, it considers how fish, moving with the river, illuminate the shifting dynamics of law, ecology, and governance in post-Soviet Central Asia. Following the collapse of the USSR and the ensuing political vacuum, new international conventions largely reinforced Soviet-era institutions and norms surrounding water governance. Yet, amid decades of institutional erosion and recent instability exacerbated by the Covid-19 pandemic, Russia's war against Ukraine, and mounting food insecurity, humans and fish have forged new modes of governance. Uzbek citizens have begun to assert greater control over their water access and use, forming informal networks that sustain fisheries and reshape relations with the river. Meanwhile fish, driven to collapse by pollution, now depend on human interventions for survival.

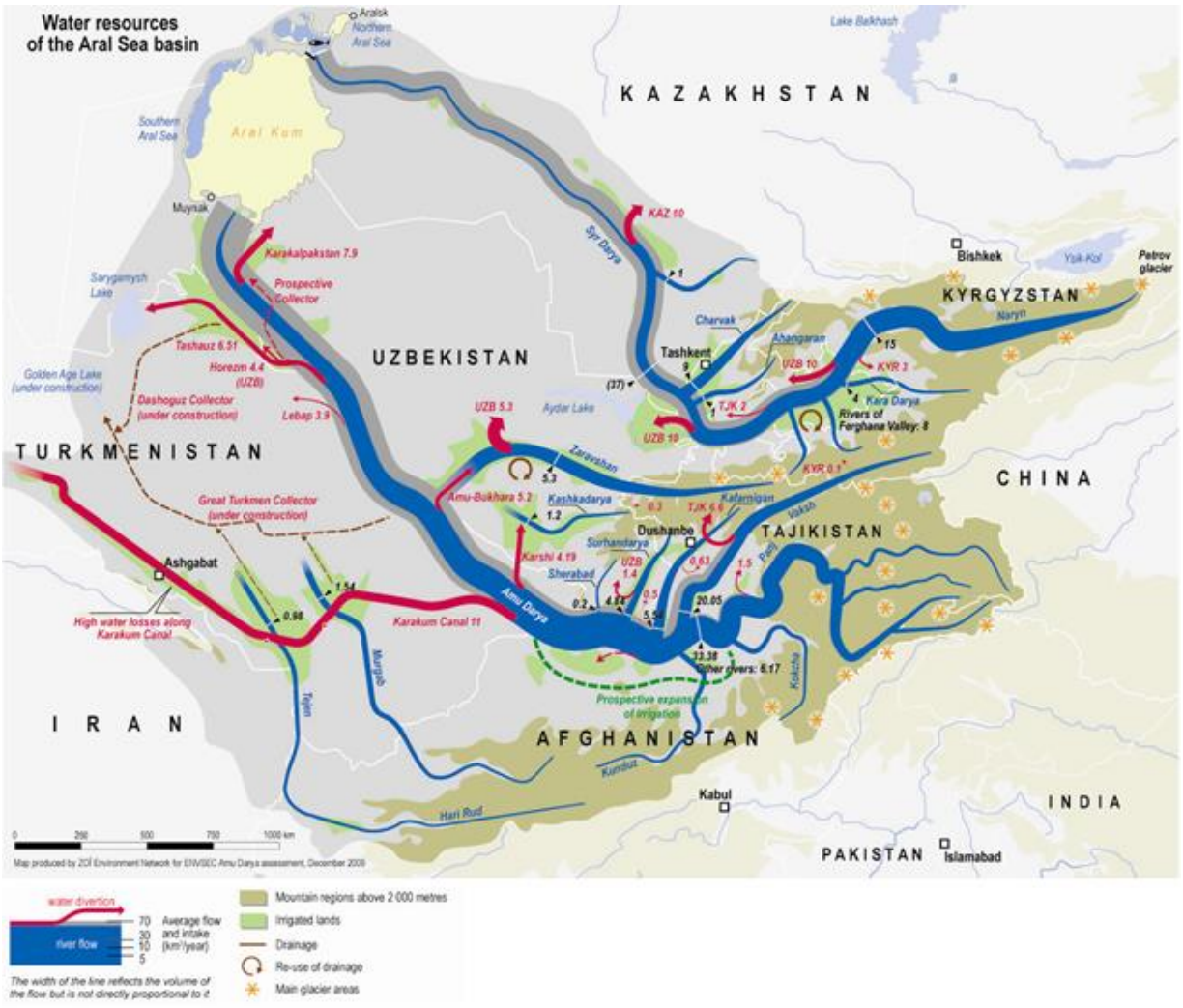
This article unfolds in five parts. It first situates the study within scholarship on water governance in Central Asia and socio-legal approaches to law in society. The second section examines the Zarafshan Basin's legal architecture, tracing how international conventions, domestic legislation, and donor-led initiatives have re-inscribed Soviet technocratic frameworks under the language of reform. The third turns to ethnographic observations of a growing informal fishing economy that has taken root in the legal grey zone surrounding aquaculture on *dehqan* farms (small subsidiary operations typically established on household plots). Building on Todd's (2014) notion of *fish pluralities*, the subsequent section examines how industrial producers, dehqan farmers, and urban recreational anglers ascribe distinct meanings to fish and how these meanings shape everyday legality and access to water. The article concludes by shifting perspective to fish themselves, considering how more-than-human assemblages reveal the fluid and plural nature of legal ordering along the Zarafshan River. In doing so, it adds to Central Asian studies by examining a lesser-explored waterscape and to socio-legal scholarship on water by bringing fish into view as participants in governance and everyday legality.

HYDROCOLONIAL HISTORIES AND THEORETICAL PERSPECTIVES ON THE ARAL SEA BASIN

The Aral Sea Basin consists of two main transboundary rivers: the 2540-km-long Amu River and the 2211-km-long Syr River, both of which drain into the Aral Sea, a saltwater lake shared by Kazakhstan and Uzbekistan (Britannica, 2024). A former tributary river of the Amu, the 877-km-long Zarafshan River (also spelled Zaravshan and Zarafshon) rises in modern-day Tajikistan's Turkestan mountain range and meanders westward into Uzbekistan, irrigating the downstream country's relatively flat agricultural belt (Britannica, 2023).

The Aral Sea Basin's development has been marked by colonial ambitions, particularly through large-scale hydraulic interventions. In the late 19th century, the Amu River became the official boundary between Russian and British spheres of influence, allowing imperial Russia to shift its focus southwards and lay the groundwork for a 'cotton empire' in Central Asia. This colonial project relied on extensive irrigation schemes, which transformed Uzbekistan into a cotton monoculture, diverted freshwater for agriculture, and drastically reduced the Aral Sea to 10% of its original size by the late 20th century, precipitating the Aral Sea crisis (Obertreis, 2017; Keating and Knoblach, 2019). The Soviet Union further institutionalised this hydrocolonial legacy by centralising irrigation, marginalising indigenous knowledge, and entrenching socio-environmental inequalities (Teichmann, 2007; Suyarkulova, 2014; Peterson, 2019). Upon independence, Uzbekistan inherited this vast hydrosocial infrastructure.

Figure 1. Map of the Aral Sea Basin.



Source: EP Think Tank, https://shorturl.at/y2DjH

Despite direct links to the Aral Sea crisis, the Zarafshan River seldom receives attention from academia, media, or government, as it is overshadowed by the disaster discourse regarding the Aral Sea crisis (Wheeler, 2021). And existing scholarship on the Zarafshan primarily focuses on ecological aspects, assessing agro-chemical impacts on water quality, fish decline, and biodiversity (Khujanazarov and Tsukatani, 2007; Groll et al., 2016; Kulmatov et al., 2013; Karimov et al., 2022). These reports, however, often overlook the social and more-than-human ramifications of these ecological changes. Wheeler (2017) provides an ethnographic account of the social lives of fish within post-Soviet property relations within Kazakhstan's portion of the Aral Sea. My study turns to the Zarafshan in Uzbekistan, a lesser-known tributary where fishing was never institutionalised. Inspired by Wheeler's (2021) observation that the Aral Sea Basin emerges as a "multiple object" entangled in diverse relations, from a "source of unexploited wealth" to a "modernist paradigm" or "an embarrassing detail on the margins of Soviet Central Asia", this project examines how humans and non-humans assert agency within the enduring hydrocolonial frameworks governing the Zarafshan River Basin (Wheeler, 2021). It foregrounds "human-fish assemblages", relational interdependences between humans, fish, and their shared environments, where people and fish mutually shape each other's lives (Satizábal and Dressler, 2019).

This paper therefore draws on socio-legal studies and more-than-human theory to explore how the Zarafshan's governance framework, a medley of international law and domestic regulation, shapes everyday life. Socio-legal approaches offer a lens beyond formal law, revealing how legality mixes with lived reality and produces a more complex picture of power, one shaped by informal practices and everyday ways of life (Bens and Vetters, 2018; Anderson, 2019; Cotterrell, 2023). More-than-human theory, in turn, illuminates the interdependencies through which humans and fish navigate political, ecological, and economic realities, highlighting how socio-natural relations are integral to water governance. Together, these perspectives unsettle static notions of 'water management' and expose the practices that actually sustain human-water relations.

Within this framework, Todd's (2014, 2018) emphasis on human-fish relations as an under-theorised "active site of engagement" is particularly generative. Through her focus on the relationship between First Nations tribes and the Canadian state, Todd demonstrates how humans and fish mutually collaborate to disrupt the state's authority in dictating how Indigenous peoples engage with land, water, and the atmosphere (Todd, 2014). Her exploration of the "slipperiness of fish-as-beings" reveals their ability to exist as multiple entities that defy regulation and control, a phenomenon she terms 'fish pluralities'. These insights offer broader implications for understanding how riparian communities navigate governance structures, particularly in informal economies like those along the Zarafshan River.

Todd's intervention is also significant for water governance studies more broadly, as it advances a framework that illuminates the material and phenomenological distinctiveness of water as wet and fluid (Peters and Steinberg, 2019). Related literature tends to treat water as a fixed, knowable subject, thereby disregarding its diverse realities and enforcing hegemonic understandings of water management (Linton, 2010; Yates et al., 2017). Todd's work, on the other hand, insists on its multiplicity. Fish are apt vessels for understanding amphibious spaces, given their ability to move with the waterbodies they inhabit and embody the biochemical, ideological, and economic systems that shape modern riverscapes (Jones, 2004; Bull, 2011).

Building on these theoretical insights, I embarked on fieldwork in October and November 2022, alongside a team of local aquatic ecologists from Uzbekistan's premier irrigation institute, to study riparian communities along the Zarafshan River. A transboundary river shared by Uzbekistan and Tajikistan, the Zarafshan is emblematic of the fluid and contested nature of waterscapes.

The Uzbek Ministry of Ecology provided a state-produced map intended to guide routine water quality checks performed by the Centre of Hydrometeorological Service. While the map depicted a 346-km course from the Uzbek-Tajik border to Bukhara province, fieldwork revealed a river that did not conform to this singular, bounded representation.

At Ravot-Khoja, a Soviet-era hydroelectric station marking the Zarafshan's entry into Uzbekistan, the river is split into five streams, four of which are confined to concrete canals for irrigation. These canals carry the water that sustained Uzbekistan's agrarian economy, while the main channel ran shallow and exposed, its stony bed visible. Further downstream, in western Bukhara, what the government map marked as the river's terminal basin proved instead to be another irrigation canal. Conversations with Bukhara State University experts and farmers eventually led us to a 'collector', a channel for agro-chemical runoff. Despite repeated attempts to locate the Zarafshan's drainage, the river dissolved into a network of interconnected canals and reservoirs, defying the coherence suggested by official documents.

These experiences highlight how the Zarafshan resists being fixed as a stable object of governance. While official representations portray a coherent river that can be measured and administered, in practice the river exists as a fragmented waterscape shaped by diversion, infrastructure, and flow. Attending to fish as they move through river channels and ponds offers a way to engage this liveliness and multiplicity directly: Fish trace the water as it circulates through the hydrosocial system, revealing forms of connection that static representations cannot capture. Doing so provides a more comprehensive account of how water is lived and governed within a fluid and changing waterscape (Ingold, 1997).

METHODOLOGY

I conducted ethnographic fieldwork in the Uzbek portion of the transboundary Zarafshan River Basin from September to November 2022. This research was informed by a seven-month period of preliminary field engagement in the region between January and July 2021, during which I conducted exploratory site visits, informed conversations, and archival reviews that shaped the design and location of the subsequent fieldwork. Starting at the Ravot-Khoja Dam, where the Zarafshan River crosses the Uzbekistan-Tajikistan border, I traced the river's nearly 350-km course to its drainage in Bukhara province. I made regular stops at settlements along the riverbank, using the 'snowball method' to explore riparian communities' relationships with fish. Throughout this three-month period of fieldwork, I engaged with 37 participants across various sectors including the fishing industry, government agencies, and development organisations. I employed a combination of semi-structured interviews, participant observation, and informal conversations in both Uzbek and Tajik Persian. While I am fluent in Tajik Persian, a local PhD student from the National Research University's Tashkent Institute of Irrigation and Agricultural Mechanization Engineers Institute served as my Uzbek-to-English translator. Her involvement was mutually beneficial, as she simultaneously conducted research on the Zarafshan River's ecological health for her doctoral thesis.

My positionality as a woman and a heritage-connected ethnographer (given my Afghan Tajik background) shaped my interactions, granting me access to marginalised spaces like dehqan farms, where female relatives often invited me for tea, seeing me as a *mehman* (guest) and *hamzaban* (someone who speaks the same language) (Ohnuki-Tierney, 1984). Narayan (1993) aptly captures how native anthropologists are also susceptible to playing the role of distant and all-knowing figures, exercising the "view from nowhere" or the "god trick" (Haraway, 1988; Latour, 1991; Shapin, 1998). Echoing Haraway's (1988) call for reflexivity, Narayan argues that native ethnographers also navigate outsider dynamics, influenced by factors such as socio-economic background, dialect, and educational level. While my Tajik fluency facilitated connections, it sometimes posed challenges due to dialectical differences, particularly the presence of Uzbek loanwords in the dialect of Tajik Persian spoken in Uzbekistan. In such instances, I relied on my collaborator for clarity. These reflexive insights not only underscore the complexities of ethnographic fieldwork but also align with post-colonial critiques that advocate for culturally informed, representative research approaches that illuminate the lived realities of riparian communities (Jacobs-Huey, 2002; Woon, 2015).

My investigation involved visits to 18 fish farms and in-depth interviews with three recreational fishers (see Figure 2). The fish farms included both industrial enterprises and dehqan farms. As this article will later demonstrate, dehqan farms are increasingly integrating aquaculture into existing plots, and my interactions with fishers provided insights into the informal fishing economy. In addition to my interactions with fish farms, I also conversed with private citizens engaged in recreational fishing along the banks of the Zarafshan. These individuals pursued fishing as a leisure activity, enriching my understanding of the river's dynamics and its significance to local communities. The spatial distribution of the sites visited is shown in Figures 3 and 4, highlighting geographic concentrations of different fishing activities. While dehqan farms were roughly evenly distributed along the Zarafshan river, recreational fishers were concentrated in Samarkand and industrial fish farms coalesced around Navoi, a recognised fish market. The distribution pattern revealed by Figures 3 and 4 highlights the varying geographic concentrations of different types of fish farming activities observed during the fieldwork period and will be further explored in this paper.

Figure 2. Breakdown of participant population in the Zarafshan River Valley (Source: Author)

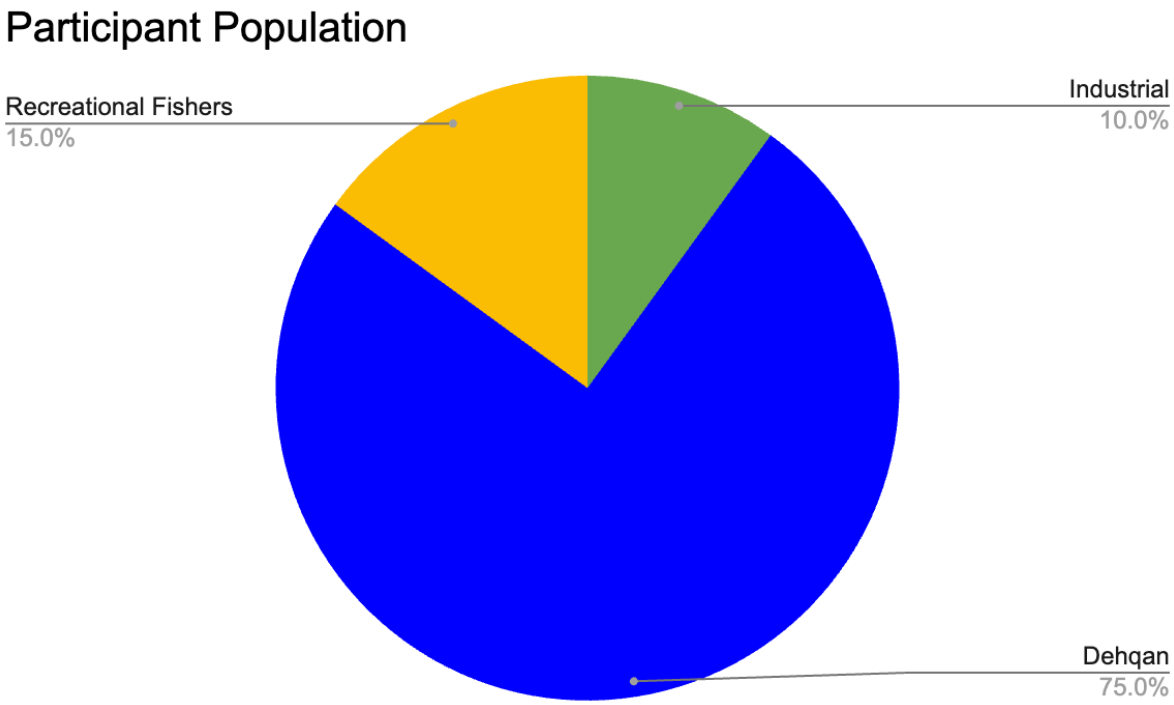


Figure 3. Sites visited in Uzbekistan (Source: Author)

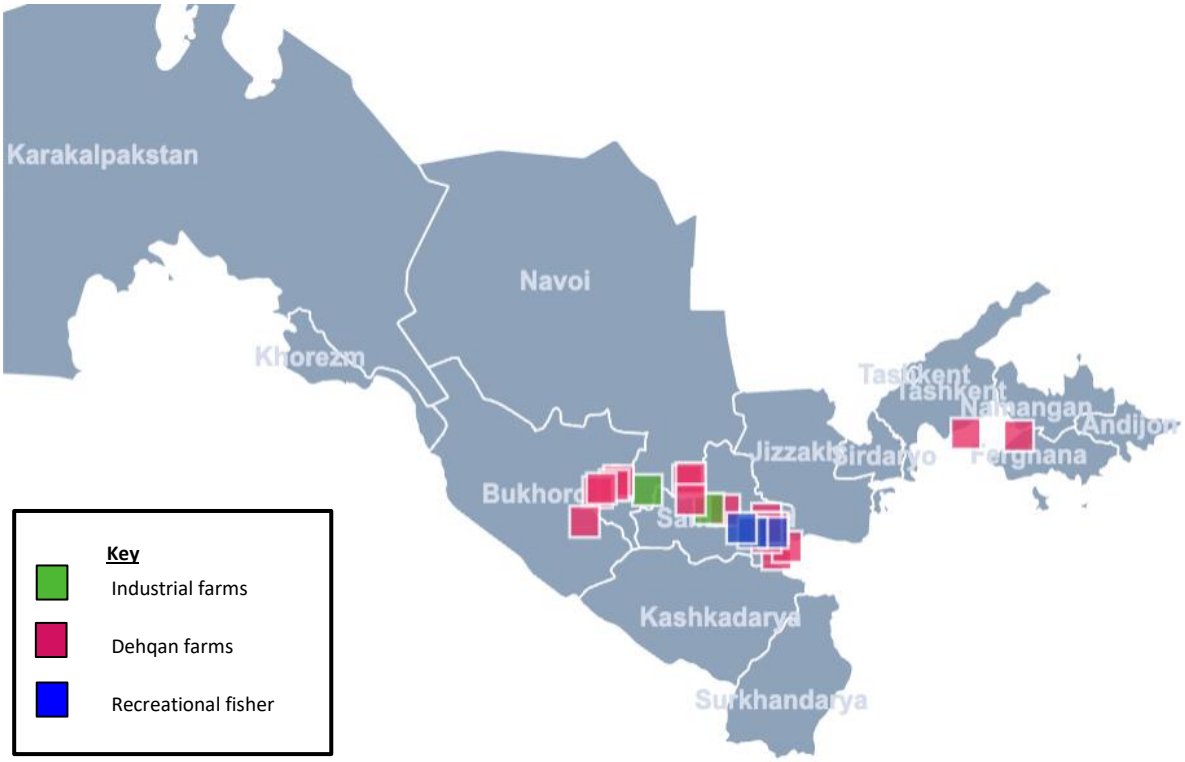
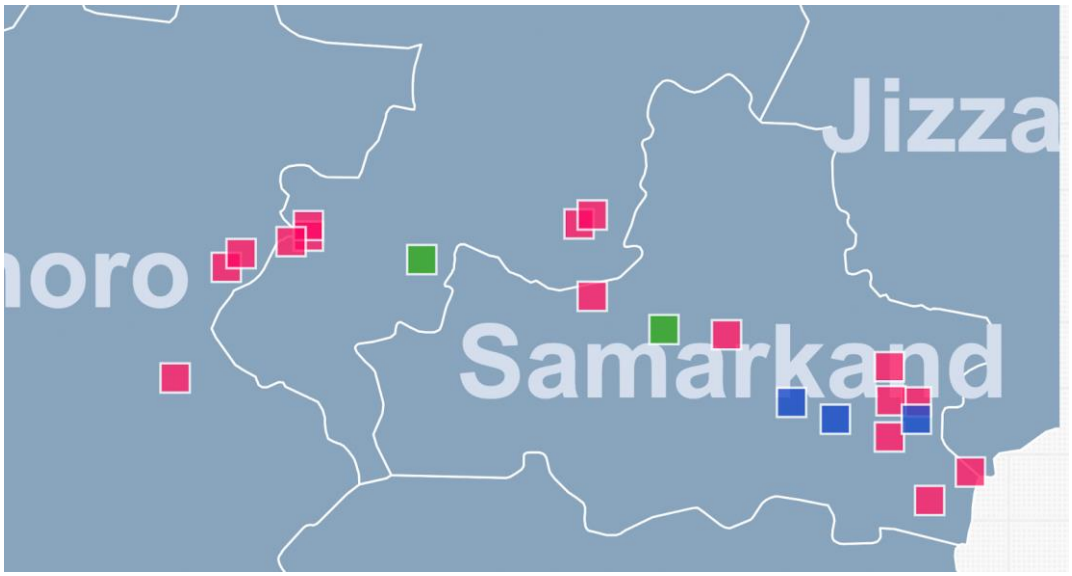


Figure 4. Spatial distribution of visited sites (Source: Author)



Ethnography, with its emphasis on participant observation, informal conversations, and interviews, offers critical insights into the social relations surrounding water governance (Laurier, 2010; van Maanen, 2011; Bernard, 2017). In socio-legal studies, this immersive approach reveals both intended and unintended effects of legal norms and governance frameworks that often remain hidden (Bens and Vetters, 2018; Brunnegger, 2019).

Using a socio-legal lens, this study examines human-fish relations to understand how water governance along the Zarafshan is lived and negotiated through daily interactions, informal practices, and material relations. Ethnographic attention to these entanglements shows how riparian communities navigate their relationship with the river and the laws that regulate access to it, often adapting to or working around formal frameworks. By focusing on fish, whose movements follow the river's flow, this article demonstrates how they offer a way to engage with the river's fluidity and the changing forms of legality that move with it.

TRANSBOUNDARY GOVERNANCE: CONTINUITY AND LEGAL TRANSFORMATION

Having outlined this article's methodological and theoretical approach, the analysis now turns to the legal and institutional terrain that structures everyday water governance in Uzbekistan. This section begins by tracing the historical and transboundary frameworks that underpin the country's contemporary hydro-legal landscape, showing how Soviet infrastructures and governance norms persisted long after independence.

After the collapse of the USSR, Uzbekistan inherited not only the physical infrastructure of the Soviet irrigation empire, including canals, reservoirs, and collective farms, but also the institutional culture that sustained it. This socio-historical context allowed the Soviet "hydrosocial empire [to retain] its force in the 21st century" (Brite, 2018: 124). Agriculture remains central to the national economy, constituting roughly a quarter of GDP, with over 70% of farms classified as small dehqan holdings (Yusupov, 2019). Despite diversification efforts, cotton remains symbolically and economically dominant, perpetuating a form of extractive continuity.

These domestic continuities extended beyond Uzbekistan's borders. Following independence, regional and international institutions inherited the same hydraulic infrastructures and administrative

logics. The following subsections trace this continuity across three scales – international, domestic, and donor-led – showing how post-Soviet frameworks rearticulated Soviet forms of control within new legal and institutional vocabularies.

Regional frameworks and post-Soviet continuities

After independence, Uzbekistan appeared to enter a new era of water governance with the introduction of post-Soviet institutions and international law. These frameworks, however, ultimately maintained Soviet-era infrastructures and governance norms rather than replacing them, a continuity this section traces. The disintegration of the Soviet Union transformed the Aral Sea Basin into a transboundary riverscape shared by the post-Soviet Central Asian republics – Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan – and by neighbouring Afghanistan. Early cooperation took shape within the Commonwealth of Independent States (CIS), where the post-Soviet republics negotiated the basin's governance and affirmed their "historical community" and shared responsibility for rational water use (ICWC, 1992; Zakharchenko, 2009).

Within this framework, the 1992 Almaty Agreement preserved existing Soviet-era water quotas and articulated the principles of "equitable and reasonable utilization" and "no significant harm", which closely align with later UN international conventions on freshwater governance (Ziganshina, 2009). Through the CIS, the republics established the Interstate Commission for Water Coordination (ICWC) in 1992 to oversee river basin organisations, followed in 1998 by the creation of the Scientific Information Centre (SIC) to centralise data and support conservation programs (Wegerich, 2008).

In parallel, the international conventions governing freshwater use – the 1991 Convention on the Protection and Use of Transboundary Watercourses and International Laws (UNECE Water Convention) and the Convention on the Law of the Non-navigational Uses of International Watercourses (UN Watercourses Convention) – supplied complementary global frameworks: The former focused on transboundary harm-prevention and the latter on equitable and reasonable use (United Nations, 1991; United Nations, 1997; Bohman, 2021). Although not all Central Asian states are parties, legal scholars widely treat these instruments, together with the Almaty Agreement, as the normative foundation of the basin's governance (Vinogradov, 2007; Libert, 2018; Ziganshina, 2009).

Ultimately, these arrangements largely re-inscribed Soviet technocracy rather than transforming it. The Almaty Agreement effectively froze existing allocations, while the ICWC and SIC consolidated centralised modelling and quota management, privileging expert hydrological calculation over local, adaptive governance. Though the post-independence architecture spoke the language of cooperation and equitable use, it reproduced Soviet-era hierarchical expertise and administrative centralism across the basin. Notably, Afghanistan, positioned outside the CIS-based regime, remained without recognised basin shares or procedural standing (Kamil, 2021).

Domestic water law: Agriculture and fisheries

Uzbekistan's domestic legal framework for freshwater was long governed by the 1993 *Law on Water and Water Use* (Water Code), replaced by a reformed code in 2025 (Republic of Uzbekistan, 1993). The Code codified state ownership of all waters and divided use into two categories: special use, which required permits for industrial or technical operations, and general use, which applied to household needs (Republic of Uzbekistan, 1993). Water rights were defined broadly, with Article 23 allowing individuals to use water so long as their activities were not contrary to law, and Article 53 placing responsibility for the distribution and management of water for gardens and personal plots on users themselves (Republic of Uzbekistan, 1993: Arts. 23, 53). In practice, this referred to Water User Associations (WUAs), legally established as non-profits, which serve as intermediaries between farmers and state agencies.

WUAs originated from donor-driven reforms under the Integrated Water Resources Management (IWRM) paradigm promoted by USAID, UNDP, and the ADB in the early 2000s (Wegerich, 2000; Veldwisch

and Mollinga, 2013; Hamidov et al., 2020). These reforms sought to decentralise irrigation management by introducing locally governed Water Consumer Associations (WCAs) (Wegerich, 2000). In theory, water quotas set by the Ministry of Agriculture and Water Resources cascade through basin authorities before reaching WUAs. Designed to foster participatory management, these associations were intended to maintain irrigation and drainage systems, allocate water, and resolve disputes (Moss and Hamidov, 2016). In practice, however, they have proven largely nominal, undermined by unofficial withdrawals and the reproduction of Soviet structures of control, including strong administrative centralisation, top-down decision-making, and dependence on state authority (Wegerich, 2000; Abdullaev et al., 2010; Moss and Hamidov, 2016).

At the time of this study, laws governing fish farming were sparse. The Water Code classified fisheries under general water use, assuming that fishing occurred in designated reservoirs under Article 60, requiring state permits for commercial harvesting under Article 65, allowing recreational fishing under Article 64 (Republic of Uzbekistan, 1993: Arts. 60 64, 65). Complementary regulations issued by the State Committee for Nature Protection in 2006 established catch limits for freshwater bodies, and Cabinet of Ministers Resolution No. 21 in 1997 classified man-made fish farms as agricultural enterprises eligible for credit, fuel, and equipment support (Republic of Uzbekistan, 1997; Republic of Uzbekistan, 2006; FAO, 2008). Although discussions to codify a comprehensive legal framework for fisheries began in 2022, no substantive progress has been made (FAO, 2024.

Overall, these domestic arrangements have extended the technocratic logic established under Soviet irrigation governance. While framed as participatory and decentralised, they preserve the concentrated allocation of water and the hierarchical organisation of expertise. This tension between the language of reform and the persistence of inherited bureaucratic norms frames the socio-legal analysis that follows, examining how water users along the Zarafshan navigate and reinterpret these layered structures in everyday practice.

FISH, AGENCY, AND WATER GOVERNANCE

While irrigation has theoretically remained tightly regulated through formal law and Soviet-style bureaucratic structures, aquaculture has occupied the opposite condition: a near-total absence of formal regulation. Drawing on interviews and field observation, this section untangles the growth of an informal fishing industry, showing how farmers develop diverse, adaptive ways of using and sharing water when formal governance is thin. This shift in governance marks a departure from both Soviet and contemporary state efforts to dictate water use (Peterson, 2019; Yusupov, 2019).

Following independence, the industry's formal infrastructure deteriorated, and by 2010, fishing contributed just 0.1% of Uzbekistan's GDP, concentrated around private fish markets like Chinaz Baliksavdo near Tashkent (Woynarovich et al., 2010). Yet dehqan farmers – responsible for over 70% of the country's agricultural output – adapted by integrating aquaculture into household plots (Asfaw, 2020). Leveraging informal networks and Soviet-era knowledge, they have created a decentralised fishing economy that remains largely unregulated.

Makeshift fish stalls adorned with smoked, flayed fish have become a common sight in bustling markets, highways, and rural villages along the Zarafshan River. The UN Food and Agriculture Organization estimates that approximately 60% of farmed fish are distributed live or fresh, hinting at the industry's intricate, informal dynamics (Woynarovich et al., 2010). While fish consumption remains modest at 2.3 kg per capita as of 2016 (FAO, 2018), these observations suggest a thriving informal industry often overlooked by dominant governance narratives.

Fish farming remains folded into the broader agricultural framework for irrigation. Institutions such as WUAs were intended to decentralise control, symbolising a transition from the command economy of the past to a democratic present. Yet, these institutions frequently reproduce the surveillance and control

of the Soviet command economy. In the Fergana Valley, for instance, WUAs have functioned as instruments of state monitoring, ensuring compliance with government cotton and wheat quotas (Abdullaev et al., 2010). This continuity exemplifies how, despite the ostensibly decentralised and democratic framework for water sharing, the tightly controlled agricultural environment perpetuates a form of control reminiscent of the intensive agricultural practices of the Soviet era.

On the other hand, the Uzbek government has articulated no coherent vision for aquaculture, whether household or industrial. Fishponds built on dehqan farms are largely ungoverned. A dehqan farmer in Bukhara province shared that he had worked for a Soviet-constructed 'Navoi combine' for 20 years. As a fisherman, he "only caught fish" and was regularly monitored by a "scientist inspector" who would "[come] from the institute to check on us from the government". The fall of the USSR gave him the unprecedented opportunity to acquire his own land and start fishing on his own terms. Referring to the command economy, he explained that "at the time of the USSR, there was no place to raise fish". But in 2016, he had acquired the funds to purchase three hectares of land and set aside a portion for a fishpond. This contrast highlights a broader governance shift: from formal surveillance and quota enforcement under the Soviet system to today's fragmented, quasi-legal order where farmers regulate themselves amid the absence of aquaculture law.

Interviews and participant observation conducted at 18 fishing sites revealed that there were no discernible trends in water-sourcing practices. Instead, each farm exhibited improvised and location-specific water management strategies, utilising water from agricultural canals, the river channel, or groundwater to fill ponds. In the case of industrial farms, farmers commonly obtained water from nearby agricultural canals and paid a 'water tax' to the local irrigation council, a fee calculated based on the volume of water used and its intended purpose. However, the payment status of dehqan farms, which also relied on local irrigation canals, varied.

In Navoi's Khatirchi district, a fish farmer simply shrugged when I asked about legal or tax regimes. His farm was located on the banks of the Zarafshan River, where he simply "[got] water from the river through a pump" and was not aware of any payments. Groundwater also went largely unregulated. Though a representative from the Centre of Hydrometeorological Service would periodically test levels, these examinations were carried out for scientific purposes rather than for tax. Farmers, on the other hand, acknowledged the financial responsibility of covering the costs associated with electricity required to operate the groundwater pump.

While farmers in upstream Samarkand and Navoi gravitated to groundwater or irrigation largely out of convenience, farmers in Bukhara struggled with water scarcity and aridity. Though formerly flowing through Bukhara and joining the Amu River at the modern-day Uzbek-Turkmen border, the Zarafshan now concludes in the plains between Navoi and Bukhara. A farmer lamented the loss of the Zarafshan. Employed on a collective farm in the 1980s and 1990s, he recounted how "this entire area was once filled with water".

Since unsustainable water consumption has dramatically shrunk the Zarafshan, he struggles to find water for his pond. He oscillates between the canal and groundwater depending on availability:

> We usually get it from the canal, but now that water has dried up. Now we are digging an underground well. We hoped that after digging a well there would be no more problems, but the well is dry now. I can only hope it's because it's the winter season, when water levels are usually low. We will wait to see if water will come again in the spring.

The diversity in water usage techniques observed in fish farming contrasts with the historically monotonous farming practices inherited from the Soviet era, marking a significant departure from tradition. For the first time since Soviet rule, farmers now have the jurisdiction to determine how water resources are used for fish farming, allowing for adaptation, innovation, and the growth of informal fishing.

These informal systems, however, are not disorganised. Across the sixteen dehqan farms I observed – most established within the past decade – all practiced carp polyculture, suggesting a shared knowledge base. Farmers described learning through a mixture of old Russian-language Soviet-era manuals, neighbours, and the Chinaz Baliksavdo market, a fishmarket in Chinaz (a city outside Tashkent near the Syr River). Chinaz not only sells fish meat, but is a hub for fish larvae, equipment, and experts (Woynarovich et al., 2010). This shared repertoire of techniques and information functions as a 'knowledge commons' – an open, collective resource that has enabled aquaculture to operate outside formal law (Hess and Ostrom, 2007; Becker and Fortmann, 2009).

By uprooting local knowledge systems and establishing a commercial fishing industry in Uzbekistan, the Soviet Union codified norms, behaviours, and practices associated with fishing (Wheeler, 2021). This legacy has persisted. The Food and Agriculture Organization (FAO) notes that dehqan aquaculture continues to rely on a variant of carp polyculture that was inherited from the Soviet-era (FAO, 2018).

My observations confirmed the durability of this model: All farms practiced carp polyculture, and all but one sourced their larvae from Chinaz Baliksavdo. Chinaz consequently represents more than just a fish supplier but rather functions as a de facto centre of technical authority, distributing advice, feed, and equipment in support of a shared idea of how fish should be raised.

Self-identification further marks the informal character of this economy. Dehqan farmers consistently refer to themselves as 'farmers' rather than 'fishermen', reserving that title for industrial fish farmers who trace their lineage to Soviet combines. This linguistic and social divide reinforces the boundary between formal and informal domains: The former are recognised by the state, the latter legitimised through practice and mutual recognition. By reproducing carp polyculture without official sanction, dehqan farmers both inherit and transform Soviet knowledge hierarchies, crafting a post-Soviet vernacular of expertise that exists between legality and livelihood.

Wheeler (2021), in his ethnography on contemporary fishing communities in the Aral Sea Basin, narrates how the Soviet Union institutionalised the role of the professional fisherman. Modern industrial fish farms have claimed this legacy. In Kattakurgon, a father-and-son team running a ten-hectare intensive fish operation proudly identified themselves as "proper fishermen". The son, Murad, had trained at the Tashkent Institute of Irrigation and Agricultural Mechanization under one of the country's leading fish ecologists, acquiring not only technical expertise but the social authority attached to the professional fisherman. For them, aquaculture was framed as the continuation of a Soviet project interrupted by independence and water scarcity: a way of restoring the reservoir's historic identity as a centre of fish production.

Dehqan farmers, by contrast, actively disavowed this identity. At a household pond outside Bukhara, a farmer proudly showed off his pond but insisted that he was not a fisherman. Referring to Soviet-era collective farms that were established around the Aral Sea, he explained, "[N]ow, they were the real fishermen and we have replaced them". His point was not humility but distinction. By rejecting the title, he differentiated small-scale household aquaculture from the professionalised fishing of the Soviet period.

FISHING AMID UNCERTAINTY IN UZBEKISTAN

As we have seen, ruptures in the post-Soviet water governance order have given rise to an informal fishing industry built around household ponds on dehqan farms. The opportunity to acquire property after the collapse of the USSR, combined with climate change, water scarcity, and a stagnant legal environment that still fails to recognise water uses beyond crop irrigation, has created space for farmers to experiment with limited resources. This kind of agency is new in a region where water was historically managed under a command economy. Within these conditions, farmers increasingly operate in legal grey zones, using household plots for small-scale fish farming and quietly skirting formal regulation. Yet, the

memory of the period when fishing was professionalised and regulated remains deeply ingrained, and many dehqan farmers consciously avoid the label of 'fisherman'.

Building on the preceding discussions of Uzbekistan's legal architecture and the grey zones that have enabled an informal fishing economy to emerge, this section discusses how water governance is lived and negotiated through human and more-than-human relations. Moving from the legal to the relational, this section examines how human-fish assemblages, relational interdependencies forged by humans and fish, navigate the socio-political and ecological realities of the Zarafshan Basin.

I draw from Todd's (2014, 2018) "slipperiness of fish-as-beings" to capture how fish exist as different entities among dehqan farmers, industrial farmers, and recreational fishers. In the Zarafshan Basin, these dynamics are governed by international environmental frameworks and domestic regulations, with fish reflecting the socio-economic and legal impacts of local and global governance. Attending to this plurality spotlights how law and its consequences are not only institutional but embodied in the flesh of aquatic life (Haraway, 1991; Probyn, 2014). Through participant observation, interviews, and informal conversations, this study highlights the critical role of fish in shaping riparian life and contesting dominant governance narratives (Haraway, 1991; Mol, 2002).

Family-owned subsistence farms

As the preceding analysis showed, the gaps and ambiguities in Uzbekistan's water laws have enabled informal aquaculture to flourish. These observations traced how these grey-zone practices were sustained not only by legal absence but by economic pressures: scarcity, market volatility, and the search for livelihood security. Household fishponds on dehqan farms reveal how the absence of specific regulation produces de facto legal orders, where farmers negotiate access through canals, pumps, and common practices outside state oversight. Dehqan farmers turned to fishing as a strategic response to various forms of insecurity. Participants linked the rise of fish to economic volatility triggered by recent events like the Covid-19 pandemic, riots in Kazakhstan, and Russia's invasion of Ukraine. These regional events, in addition to generalised economic uncertainty, prompted dehqan farmers to diversify their crops by adding aquaculture to their household plots. For dehqan farmers and consumers, fish farms have become instrumental in surviving economic volatility. In practice, this meant creating ponds on household land without permits, taxes or oversight – a form of governance by omission.

A marketgoer in Samarkand gestures to the vendors preparing their fish stand at the bazaar and says, "You would never see that many fish two years ago!" A PhD student at a university in Tashkent, Aziza splits her time between Tashkent and Samarkand. As a young mom, her parents play a big role in raising her young son while she finishes her education. "It's so strange that suddenly fish is available year-round!" she exclaims, explaining that supermarkets also carry local Uzbek fish. She links the rise of fish production to the consecutive economic shocks that have rocked Uzbekistan since 2019. Covid-19 alone devastated the workforce, in addition to earlier massive labour migration to Russia. Since the mid 2000s, approximately 2.6-3 million Uzbek citizens, largely men from rural areas, have travelled to Russia as labour migrants to take on low-skilled and low-paying jobs (Abashin, 2013; Eraliev and Urinboyev, 2020; Prague Process, 2020). In 2021, remittances accounted for 13% of Uzbekistan's GDP (World Bank, 2021). With the start of the Covid-19 pandemic, not only did income from labour migration drop, but nation-wide, Uzbeks faced decreased domestic employment opportunities, increased living prices, and general concern over financial stability. According to the World Bank, "[the] share of households with at least one working member fell by more than 40 [percent] in April – equivalent to almost 2.8 million households" (Seitz, 2021). Aziza's comment underscores how informal fish production has become normalised despite its lack of legal codification.

As Uzbekistan recuperated from Covid, the country absorbed economic shocks from regional political emergencies. Since Russia's invasion of Ukraine, many Uzbek migrants have returned home due to decreased work opportunities and the real and perceived fear of being forcibly sent to Ukraine as cannon

fodder for the Russian army. "Just as they did during the Great Patriotic War!" Aziza exclaims, referring to World War II, when Central Asians were sent to fight on the frontlines (Shin, 2015). Aziza herself shares that she's started buying more fish products for her family due to rising beef prices. Beef, imported from neighbouring Kazakhstan, "started to get really expensive" after civic unrest rocked Kazakhstan in January 2022 and now costs "10% more than it usually does". Aziza captures the level of economic volatility that Uzbeks have been experiencing since 2019. In addition to reduced remittance flows and rising meat prices, living costs have increased due to inflation. In 2020, prices for food products increased by 15.6% and non-food items by 10.7% (Kun.uz, 2023).

In Bukhara, Farhod, a dehqan farmer who started out with only subsistence crops on his three-acre household plot, decided to raise fish after taking note of rising demand three years ago:

> It's a good way of earning money. I knew that if I raised fish, I would get extra income. There is now an increased demand for fish because beef has become expensive. Fish is cheap and it's good for the human body. So, we take live fish to the market and sell them to people.

Farhod, like Aziza, paints Uzbekistan's economic landscape as particularly volatile in recent years. In a country of "meat eaters", fish has emerged as a viable, cheaper, and "healthier" protein source in the past three to five years.

The rise of dehqan aquaculture signals a remarkable shift in a country with a long history of meticulous state control over land and water. Fish farming grows in space that is not explicitly regulated, taxed, or monitored, and it is precisely this absence that allows smallholders to assert new forms of agency. A comparison with Wheeler's (2017) ethnography of Kazakh fishing villages on the Aral Sea situates these observations within broader post-Soviet transformations of governance and fishing livelihoods. In Kazakhstan's portion of the Aral Sea, the Soviet state had built a professional fishing industry that the Kazakh government post-independence sought to sustain through a system of quotas. Wheeler shows how "over-quota" fishing emerged as fishers adapted those regulations to local economic and environmental realities, revealing the selective reinterpretation of rules within a shifting property regime.

By contrast, on the Zarafshan, where fishing was never formalised, dehqan farmers adapted to an absence of regulation through similarly pragmatic ways, governing access and use through everyday negotiation and improvisation rather than bureaucratic enforcement. The fact that dehqan families can raise fish at all illustrates how governance is made through absence of law as much as through its presence. In Uzbekistan's post-Soviet order, the flourishing of aquaculture embodies legal pluralism: an industry expanding not because it is regulated, but because it is *not*. These two parallel cases exemplify how post-Soviet governance gives rise to distinct human-fish relations and modes of order: in Kazakhstan through quota-based regulation and property claims and in the Zarafshan, through situated practices of access, maintenance, and exchange.

Industrial farms

Large-scale enterprises show how fish farming becomes folded into state food-security agendas, transforming policy incentives into quasi-legal regimes of tax breaks, subsidies, and preferential land access. In contrast to dehqan fishponds that thrive in regulatory absence, industrial farms operate through institutional arrangements and policy presence, where state incentives themselves function as instruments of the law.

Since 2018, the Uzbek government has invested heavily in aquaculture as part of an aggressive food policy campaign. Industrial farmers have strategically aligned their operations with the government's food security initiatives, leveraging fish farming as a means to access government support and resources for their commercial endeavours (Diffey and Kurbanov, 2022). For these enterprises, fish have become a vehicle for securing additional subsidies and institutional backing.

Sherali, an Uzbek water specialist with over 25 years of experience in water management in Central Asia and Afghanistan, shares that food security has been a "historic insecurity" for the Uzbek government. Uzbekistan was reliant on food imports during the Soviet-era, as its own agricultural lands largely supported a cotton monoculture. After the fall of the USSR, Uzbekistan was left in a precarious situation. He shares his observations on the history of food security in Uzbekistan, an underexplored topic:

> Fish farms are all about food security. During the Soviet period, we imported all our food because we only grew cotton. When everything collapsed, Uzbekistan faced a food crisis and realised things had to change. Since then, we have done quite well in ensuring food security, though this deserves more study. Fishing – whether in reservoirs, ponds, or rivers – is part of that. Farmers don't just fish; they often grow vegetables alongside their ponds. Still, all this water is also taken from rivers, and most fish species in reservoirs are local. Central Asians are picky eaters. For example, 20 years ago we tried importing food from India and Pakistan. These imports failed because people wouldn't buy them. Not even rice! I think food policy is pushing for local fish species. But the fish raised on ponds are different from the river. They have different tastes and people know it. They will be quick to point it out.

Since 2018, the Uzbek government has aimed to boost domestic fish production as part of broader food security goals, proposing tax exemptions for industrial fish farms (Diffey and Kurbanov, 2022). In early 2022, following a presidential resolution to boost the fishing industry, the Uzbek government increased support for fish research and mulled over restricting reservoir fishing to private companies, framing fish as "untapped potential" for food security (Vorotnikov, 2022; EU, 2024).

One such private corporation, tasked with engaging in intensive fish rearing in the Aydar-Arnasay Lake System, oversees farmer outreach, introducing aquaculture to dehqan farmers. A representative reiterated government talking points:

> The purpose of fisheries is to provide food. It is a product like meat; it is very useful for humans. From the medical point of view, every citizen should eat 13-14 kilos of fish per year in our republic. This is our main goal, and it has been achieved. We want all the population to eat fish in the future. (…) Our priority is to reach price stability. If fish is sold at the same price in winter and summer, the population can be satisfied. That's the goal.

The Uzbek government's focus on aquaculture as part of its aggressive food policy campaign presents a significant opportunity for industrial farms to tap into support and resources. By aligning with state food-security goals, industrial farmers strategically engage in fish farming to bolster domestic production and strengthen relations with government ministries. In this way, policy priorities translate directly into material incentives – tax exemptions, preferential land, and subsidised inputs – that function as quasi-legal instruments shaping the sector.

Zarafshani fish

While the previous sections traced household and industrial aquaculture, this shorter vignette turns to *Zarafshani* fish as a site of memory, illuminating what has been lost in the process. Throughout my interviews with dehqan and commercial fish farmers, a clear distinction emerged between farm-raised fish and Zarafshani fish, meaning native fish species from the Zarafshan. All my participants unanimously agreed that river fish, specifically *marinka* (trout), had significantly declined in numbers in recent years. They described the taste of Zarafshani fish as "sweeter" compared to farm-raised fish. Trout living in the "free" waters of the Zarafshan River were fresher, benefitting from the mountain water, higher oxygen levels, and increased nutrients due to the river's constant churning motion. These fish could freely move about as opposed to farm-raised fish and were caught by fishing rods, reaching weights of up to nine kilograms. With one kilo of marinka costing 120,000 Uzbek soms (roughly US$12), compared to 30,000-50,000 soms (US$3-4) per kilo for carp, the exorbitantly higher price of trout reflects its status as a higher-quality yet hard-to-come-by fish.

The idea of Zarafshani fish held a nostalgic significance, evoking memories of a time during the Soviet period when the river-water was more abundant and the fishing population was plentiful – a more peaceful era, as opposed to the unlawful and chaotic present. During the Soviet period, the river was higher. A recreational fisher in Samarkand claimed that the Zarafshan was "at least seventeen metres" as opposed to its current height of "five to six metres". In contrast, the post-Soviet period has been marked by lawlessness: Overfishing during the off-season has decimated newly spawned fish, agricultural activities have intensified, depleting the Zarafshan's water at alarming rates, and the offloading of irrigation responsibilities onto WUAs has blurred accountability between the Uzbek government, foreign aid workers, and local water users in maintaining irrigation systems. In Samarkand, the Zarafshan's bed eroded as industrial companies began mining the main channel for pebbles. Such comparisons double as a vernacular audit of governance, locating responsibility for loss and demanding accountability.

A dehqan farmer from Samarkand shared his memories of growing up on the banks of the Zarafshan River and expressed sadness over the loss of the river and the "sweet marinka" that accompanied it:

> I was raised right here, by the river. When I was a boy, there was a lot of water. It was great. There were fish as well. If you just dipped your net in one spot, it would fill up with fish! I finished school in 1998 and the river was still strong, and the river water still reached its bank. It's not empty like it is today. There were these tall, shady trees on its banks. In the past year, they've been cutting down the trees. I don't know who these people are but there have been so many changes in the past five years. I am not a specialist, but I can see the changes. Who knows who these people are?

Here, nostalgia acts as legal consciousness, invoking recollections of abundance and order to critique present inequities. This sentiment echoes widespread regional nostalgia for the Soviet era, particularly among older Central Asians raised in the USSR, who, while acknowledging the racial, religious, and cultural abuses of the Soviet administration, continue to "recall Soviet times with a sense of longing and nostalgia" (Dadabaev, 2020). In this sense, the memory of wild Zarafshani fish evokes real and perceived memories of stability, improved infrastructure, consistent electricity and gas, economic security, and healthcare, among other material and social benefits.

Urban recreational fishers

Along the Zarafshan's urban stretches through the city of Samarkand, recreational fishing has become a quiet conversation between humans and fish, a way of maintaining contact as the river is steadily enclosed by urban development and beautification efforts. Through these encounters, fishers reassert their right to the Zarafshan as a common resource. Amid government-led redevelopment that restricts access to the Zarafshan, fishing itself becomes a performance of rights: a claim that persists beyond formal law.

During my 400-km expedition tracing the course of the Zarafshan River, my encounters with recreational fishers were predominantly limited to the city of Samarkand. The Zarafshan flows through the Uzbek-Tajik international border into Samarkand province. Home to a thriving agricultural industry, Samarkand also possesses two agricultural canals that feed the commercial and dehqan farms that dominate the province: The province's northern and southern regions are traversed by the 160-km-long Ak-Darya and Syr-Darya, aptly named the 'White River' and the 'Black River' in Uzbek. These canals ultimately reunite with the Zarafshan River at the Samarkand-Navoi border. The diversion comes at a cost for Samarkand city, however. Though the Zarafshan gave rise to this historic oasis city, the river running through it is now reduced to a shallow stream. During winter months, the river is mostly dry, revealing a barren riverbed with smooth pebbles.

Driving through Samarkand's outer limits, I spotted a fisher wading through the river. He introduced himself as a local who picked up fishing in the eighth grade. Ill with hepatitis, his mother had purchased fish for "its curative properties". After instantly recovering, he grew more interested in fish and turned

to local recreational fishers for pointers on starting himself. Fishing became a stress-relieving holiday and a rare opportunity to engage with nature:

> I just come here to relax. Today is the weekend and on the weekends, I come here by myself. There are no more forests or trees left in this city. I must get away from the stress of everyday life. I go to work to earn money every day. At home, my wife orders me to do this or that. It makes my head spin. I come here to relax a bit. But back then, I would be able to catch fish weighing up to one kilogram. Now I'm lucky to get even two hundred grams!

Green spaces are increasingly shrinking in Samarkand. In 2022, Samarkand's provincial governor announced that 389 hectares of land on the banks of the Zarafshan River had been allocated for the construction of *Shirin,* a modern neighbourhood (Republic of Uzbekistan, 2023). It is intended for Shirin to boast of 25-story luxury apartment buildings, modern sports and entertainment facilities, shops, and schools (Samarkand Regional Government, 2023). Parks and bridges are to be erected around the Zarafshan River, exclusively for Shirin residents. The river itself is undergoing a beautification project; a dam was constructed a few metres downstream from Shirin to improve the river's aesthetic appeal. The Zarafshan thus appears fuller, a far cry from the bare river channel most private citizens have access to.

I came across a father with his children perched with fishing rods on the concrete embankment outside Shirin's dam. They revealed that this was as close to Shirin as they could come. The father shared that he began fishing a year ago out of curiosity and now visits Zarafshan on the weekends as a way of spending time with his family. He chuckled when I asked him if he ever caught fish, and he answered that he wasn't even sure that fish existed in the Zarafshan, since he had never caught or seen one before. He recalled that his family elders would fondly speak of the "sweet" trout that lived within the Zarafshan's currents but maintained that fishing was more of a way to enjoy time in nature with his family. He complained of the lack of green spaces. "Samarkand is growing while the Zarafshan is slowly disappearing".

For urban residents like him, I interpret fishing as a claim-making practice, a low-stakes yet symbolic means of negotiating access amid infrastructural and ecological change. Writing on catch-and-release practices for salmon conservation, Daniels and Mather (2017) note that "socio-material practices are political, and they are also performative in that they generate orders and enact objects". Recreational fishing along the Zarafshan similarly enacts legality: It re-produces the river as a public good even as formal governance privileges agricultural and urban development, erecting new physical barriers to water. Casting a line thus becomes an act of vernacular water governance as residents materially reassert access to an increasingly enclosed river.

MORE-THAN-HUMAN ASSEMBLAGES IN THE ZARAFSHAN RIVER BASIN

As the Zarafshan has been fragmented by irrigation and industry, its waters have ceased to function as a natural ecosystem and have become a managed one. Intensive irrigation and agricultural runoff have rendered much of the river toxic (Groll et al., 2016; Aladin et al., 2018). Dams have slowed the current, choked its channels, and blocked fish migration routes. The result is a landscape where fish now rely on human-made systems to survive. They inhabit ponds, canals, and reservoirs sustained through law, infrastructure, and daily labour rather than their original home, now fundamentally altered.

Fish survive by occupying the watery spaces created by humans. Their biological needs – feeding and water quality – draw farmers and institutions into situational forms of legality that move between law, regulation, and informal practice. Ponds must be filled, subsidies justified, and water quotas recalculated. Daily work is also functioning as a form of lawmaking.

These more-than-human relations illuminate the lived practice of law, where legality takes shape through ordinary actions rather than formal decree. On industrial farms, fish are integrated into the state's food-security programs. Farmers must report fish stocks, growth rates, and mortality figures,

which are used by state agencies to assess compliance and determine eligibility for audits, subsidies, and tax benefits. Dehqan farms, positioned on the banks of the Zarafshan, compel even more acute care. Farmers negotiate access to shared canals and over-drafted groundwater reserves, increasingly restricted by climate change and agricultural quotas. They dig and line ponds and closely monitor water quality in an ever-polluted waterscape.

Farmers' and fish's dependence on one another, the first for economic stability and the latter for survival in the face of a watery home now turned toxic, produces a form of governance built on maintenance rather than formal decree. This arrangement, however, is also deeply contradictory; the same irrigation canals that drain the Zarafshan also keep fishponds alive. Only by entering these infrastructures do fish secure the water, oxygen, and attention they need to survive in light of a polluted river-home.

In Samarkand, where the river has receded into concrete channels, fish persist mostly in memory. Anglers recall the "sweet marinka" as a measure of abundance, beauty, and belonging. In being remembered as "sweet", the fish are granted dignity: They are not just inputs into state food-security programs or sources of cash for dehqan households navigating an unstable economy but emblems of beauty, abundance, and order. They are tied to a time when both fish and people belonged to the Zarafshan's waters and shorelines, a vision now distant in light of pollution and enclosure.

Across these settings, fish are not passive subjects of regulation: They activate it. Their survival needs draw farmers and institutions into ongoing practices of maintenance, demonstrating how the law operates through more-than-human relations that organise how water, labour, and life are managed. The work of keeping fish alive – filling ponds, and monitoring water – produces legal effects even when it takes place outside formal legal arenas. Legality here is not a fixed set of rules but a lived and contingent practice, sustained through the interdependence of species, people, and infrastructures in a river system that has been profoundly transformed.

CONCLUSION

Approaching the Zarafshan River Basin through a socio-legal lens reveals that water governance in Uzbekistan is lived and negotiated through daily practice. Along its banks, humans and fish sustain one another within fragile ecologies of dependence, showing how order persists through improvisation as much as through rule. Rather than a vacuum left by institutional decay, the basin presents a plural legal landscape. Following fish as they move through the river exposes the institutional arrangements and social relations that regulate water beyond the reach of formal law. Through these interactions, law itself becomes fluid, produced through everyday negotiations between people, infrastructures, and more-than-human life.

The analysis traced this plurality across scales. At the transboundary and domestic levels, international conventions, national legislation, and donor reforms introduced after independence largely re-inscribed Soviet hierarchies of control, adopting the language of reform while preserving older bureaucratic structures, knowledge systems, and governance norms. Against this background, an informal fishing economy has taken root in the legal grey zones surrounding fish farming on dehqan farms, where household ponds and shared canals sustain new livelihoods. Dehqan farmers participate in a form of rule-making within an informal industry, shaping access to water and fish through everyday use and shared understanding. Industrial producers, by contrast, have aligned with state food-security campaigns, turning aquaculture into an instrument of policy and promotion that reproduces bureaucratic authority through compliance and incentive. Urban anglers' activities reveal a quiet reassertion of water rights along Samarkand's redeveloped riverbanks, framing access to water as a public right and reimagining the Zarafshan as a shared resource. Meanwhile, the memory of wild *Zarafshani* fish, now rare due to the river's rising toxicity, has taken root among riparian communities. Residents' recollection of past abundance appears to function as a critique of ecological and legal stability.

Across these settings, fish reveal how people live with and through the contradictions of governance. They illuminate how law moves through work, memory, and relationships as citizens translate abstract policy into material practices that keep water and life circulating. Fish are not only objects of regulation but agents that draw human and institutional attention, generating forms of coordination, maintenance, and care that sustain governance from below.

Conceptually, this article advances human-fish relations as a framework for the socio-legal studies of water. As 'slippery' beings, fish show how riverscapes can be narrated through the lives within them, challenging static understandings of law and management and pointing towards frameworks that recognise water's dynamic and plural realities. This perspective reveals a hydro-legal order characterised by overlapping and negotiated forms of authority, where international conventions, domestic regulation, and local practice intersect unevenly.

As fish flow with the river's currents, their movements link multiple spaces of encounter: the epistemological and material, the imaginative and institutional. Following them along the Zarafshan through a socio-legal lens reveals a form of governance that is plural, relational, and more-than-human. For international water law and regional policymakers, the implication is clear: Aquaculture is not a marginal activity but a site where law already takes shape in practice. Attending to these everyday forms of legality offers a path toward more plural, responsive, and just water governance in a region where law, like water, never stands still.

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