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Water allocation in the Kyrgyz Republic: problems and prospects

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Abstract. This article examines international legal aspects of water management in the context of transboundary water allocation issues in Central Asia. Geopolitical tensions, environmental degradation, the impact of glacier melt, and regional cooperation are considered. The need for a comprehensive and enforceable legal framework to ensure equitable water distribution and sustainable development in the region is emphasized.

Key words: Kyrgyzstan, water law, transboundary rivers, international cooperation, glaciers, Central Asia

Introduction

Kyrgyzstan is one of the most mountainous countries in the world, with more than 90% of its territory lying above 1500 meters (Azykova 2001). Glaciers and snowfields form the headwaters of several of Central Asia's most significant rivers, including the Syr Darya and Amu Darya. These rivers are vital for millions of people in the downstream countries of Uzbekistan, Kazakhstan, and Turkmenistan, supporting agriculture, energy production, and human consumption (Viviroli *et al.* 2007; Milner *et al.* 2017).

Climate change and geopolitical tension are increasingly putting pressure on water availability. Since 1970, Kyrgyzstan has lost more than 16% of its glacier mass (CABAR.asia 2024), and current projections suggest that up to 90% of glaciers could disappear by the end of the century (Immerzeel *et al.* 2020). This dramatic transformation is not only an environmental concern—it has profound legal, economic, and geopolitical implications for the region (Moret *et al.* 2019; Harden and Fernández 2023).

The region's water resource management has been profoundly influenced by the legacy of the Soviet Union, where water and energy were managed centrally. Following the collapse of the USSR, independent states inherited interdependent and fragmented water systems without legally binding and mutually agreed protocols (UNEP/OSCE/NATO 2005; Castelein *et al.* 2006). Disputes over hydropower development by upstream countries such as Kyrgyzstan and Tajikistan have often met with resistance from downstream states, which feared reduced irrigation flows (Bokonbaev *et al.* 2017; Gamble 2019).

These contradictions are exacerbated by asymmetries of political power, energy dependence, and infrastructure development. Downstream countries have stronger economies and diplomatic influence, while upstream countries control water resources. This imbalance creates a legal and institutional vacuum that fosters regional mistrust and hinders cooperation (Sarmiento 2016; Janiga and Janiga 2023).

Despite the existence of various regional agreements, there is no unified legal framework regulating the equitable distribution and sustainable use of water resources in Central Asia. Most agreements are political in nature and lack enforcement mechanisms. In this context, Kyrgyzstan faces a dual challenge: protecting water sovereignty and regional cooperation.

Material and Methods

The study employed an interdisciplinary approach, combining comparative legal analysis, content analysis of international treaties, regional agreements, and national legislation, and a review of current academic and institutional reports. The goal was to examine the legal and institutional frameworks governing transboundary water management in Kyrgyzstan and assess their compliance with international legal standards.

A detailed study of international instruments such as the Helsinki Rules (ILA 1966), the UN Convention on the Law of the Non-navigational Uses of International Watercourses (ILC 1997), and the UNECE Water Convention (1992) was conducted. These documents were analyzed in terms of their applicability in Central Asia and the status of their implementation by Kyrgyzstan and neighboring countries (Castelein *et al.* 2006; Sarmiento 2016).

Kyrgyzstan's national water legislation, including the Water Code of the Kyrgyz Republic and related environmental laws, was reviewed. The focus was on legal principles of equitable distribution of water resources, environmental protection, and integration with international obligations (Madaliev *et al.* 2024). Secondary data were obtained from:

- reports of international organizations (UNEP 2019, World Bank 2023, OSCE, etc.);
- conference proceedings (Imankulov 2024);
- climate and glacier reports (Immerzell *et al.* 2020; Milner *et al.* 2017); and
- regional policy reviews (Bokonbaev *et al.* 2018; Galinovskaya 2020; Aidaraliev 2023; Aidaraliev and Dzhumagulov 2025).

The method also included a comparative review of interstate water-sharing agreements concluded in the post-Soviet period (Almaty Agreement 1992 - bilateral protocols between Kyrgyzstan and Uzbekistan). They were assessed for consistency, legal binding, and procedural mechanisms such as monitoring, dispute resolution, and financing (UNEP/OSCE/NATO 2005; Castelein *et al.* 2006).

The study focuses on the legal status of upstream countries, using Kyrgyzstan as an example, and identifies the challenges of integrating water resource allocation issues specific to mountainous regions into the broader international legal framework.

Results

A comparative legal analysis has revealed significant fragmentation in transboundary water management in Central Asia. Despite the existence of numerous international and regional agreements, enforcement mechanisms are either absent or weak, and legal obligations between upstream and downstream states remain largely declaratory (UNEP/OSCE/NATO 2005; Castelein *et al.* 2006). Kyrgyzstan, despite being the headwater of many rivers, lacks sufficient international legal protection or recognition of its environmental contribution as a "water donor" state.

Although Kyrgyzstan has made considerable progress in codifying its national water legislation, including the adoption of a Water Code and various environmental laws (Madaliev *et al.* 2024), its domestic policies often remain disconnected from international obligations. For example, the country is not a party to the UN Watercourses Convention (1997), limiting its ability to invoke internationally recognized principles such as "minor harm" and "equitable utilization" (Castelein *et al.* 2006; Sarmiento 2016).

Regional cooperation efforts remain inconsistent. The Almaty Agreement (1992) failed to create a stable legal regime, although it proposed the joint use of water and energy resources. In practice, agreements are underfunded, not institutionalized, and are often not politically recognized (Bokonbaev *et al.* 2017; Aidaraliev 2023). In some cases, bilateral agreements, such as the protocols between Kyrgyzstan and Uzbekistan, are more effective, but they are ad hoc and lack transparent enforcement mechanisms (Janiga and Janiga 2023).

Another key finding concerns the lack of integration of glacial and mountain hydrology into international law. Current legal instruments are not designed to address the vulnerabilities of upstream countries, such as glacier retreat, erosion, or seasonal discharge instability (Milner *et al.* 2017; Moret *et al.* 2019; Immerzeel *et al.* 2020). This omission weakens the bargaining power of mountain countries, which bear the environmental costs of water production without commensurate legal or financial compensation (Barry 2008; Sarmiento 2016).

Interviews and publicly available policy reports (World Bank 2023; Imankulov 2024) show that regional policymakers have a limited understanding of how to link upstream basin environmental services with legally sound benefit-sharing frameworks. This knowledge gap exacerbates legal ambiguity and undermines cooperative potential.

1. An analysis of the current state of water resources in Kyrgyzstan and Central Asia revealed that Kyrgyzstan's mountainous regions account for up to a third of Central Asia's river runoff and serve as the region's key water towers. However, melting glaciers, population growth, and irrigation demands are leading to increasing water stress.

2. A study of the legal framework regulating water allocation revealed that Kyrgyzstan's national legal framework (the Constitution, the Water Code, the Law "On the Interstate Use of Water Bodies," and the Law on Glaciers) ensures substantial sovereign control over water resources. At the same time, the republic recognizes its international obligations and participates in several regional agreements (Chu-Talas Agreements 2000; the UNECE Water Convention 1992; etc.).

3. The main contradictions between the countries of the region were identified, and a comparison of national interests revealed a gap between mountainous states. Kyrgyzstan and Tajikistan, are interested in generating hydropower in the winter, while lowland countries including Kazakhstan, Uzbekistan and Turkmenistan require water releases in the summer for irrigation. The water-energy barter system proved unsustainable.

4. Existing international mechanisms were analyzed. Existing structures – the Interstate Commission for Water Coordination (ICWC 2024), the International Fund for Saving the Aral Sea (IFAS), and the Amu Darya and Syr Darya Basin Organizations – provide a platform for dialogue, but suffer from politicization, underfunding, and a lack of effective enforcement mechanisms.

5. Environmental and social risks are identified. It has been established that up to 90% of the region's water resources are consumed by agriculture, resulting in significant irreversible losses, leading to land degradation, soil salinization, and declining water quality. Climate warming increases the risk of reduced river flows and threatens food and energy security.

6. Promising development areas have been identified.
- Development of economic mechanisms to compensate mountain countries for watershed services (hydropower, ecosystem services).
- Creation of regional legal instruments for glacier protection and transboundary water resource management.
- Expansion of decentralized energy sources (small hydropower, solar, and wind turbines) to reduce dependence on seasonal water discharges.
- Strengthening the exchange of hydrological data, transparency of water use, water runoff pollution, and water quality in mountain streams.

Discussion

The study's findings highlight the persistent gap between international legal norms and the realities of transboundary water management in Central Asia. Kyrgyzstan, like many mountainous upstream countries, bears the environmental burden of supplying water to downstream users without receiving equivalent institutional recognition or legal guarantees (Sarmiento 2016; Castelein *et al.* 2006). This legal vacuum perpetuates inequality and fosters mistrust between states.

Existing international agreements, including the UNECE Water Convention and the UN Watercourses Convention, provide normative guidance on equitable use, "no-harm" principles, and prior notification procedures. However, the lack of universal ratification in the region, particularly by key states such as Kyrgyzstan and Uzbekistan, makes them ineffective in ensuring mandatory cooperation (UNEP/OSCE/NATO 2005; Bokonbaev *et al.* 2017).

The main problem is the lack of implemented institutional mechanisms. Regional water-sharing bodies, such as the Interstate Commission for Water Coordination (ICWC 2024), lack financial independence and are vulnerable to political change (Aidaraliev 2023). Unlike river basin commissions in Europe (e.g., Danube Commission), water management bodies in Central Asia lack the authority or capacity to enforce rules or resolve disputes.

Furthermore, current agreements and legal frameworks fail to consider the ecological complexity of mountain hydrology. As Milner *et al.* (2017), Immerzeel (2020), and others note, upstream regions experience the first and most acute impacts of climate-induced water resource conditions, yet their ecological services are rarely compensated.

We propose the following policy and legal recommendations:

1. Kyrgyzstan should accede to international water law instruments, such as the UNECE Water Convention (1992) and the UN (1997) Watercourses Convention. This will strengthen its legal position and provide access to international dispute resolution forums (Castelein *et al.* 2006).

2. Regional water-sharing frameworks should develop regulations that include clear provisions on equitable water use, dispute resolution, and financial mechanisms for benefit sharing (Sarmiento 2016; Gamble 2019).

3. Ecosystem-based approaches should be integrated into transboundary water law, recognizing the role of mountain regions as ecological water towers (Viviroli *et al.* 2007; Harden and Fernández 2023). Compensation schemes for ecosystem services provided by upstream countries should be explored through multilateral funds.

4. Investments in data sharing, joint monitoring, and early warning systems should be prioritized to reduce uncertainty and build trust between states (Barry 2008; Janiga and Janiga 2023).

Implementing these measures could transform regional water management from a source of tension into a platform for cooperation and increased resilience to climate change.

Table 1 presents a comparative legal analysis of the key aspects described in the article. It compares Kyrgyzstan's national legislation, Soviet and post-Soviet agreements, and international treaties/approaches.

Concerning findings are presented in Table 2.

Conclusion

1. Kyrgyzstan inherited Soviet quotas and agreements but secured full national sovereignty.
2. Regional cooperation remains key, but institutions (ICWC 2024, IFAS) suffer from politicization and a lack of funding.
3. Environmental priority: the law on glaciers and "green" energy provide a legal basis, but without coordinated measures, their effectiveness is limited.
4. Compensation mechanisms are promising but have not yet been implemented in practical agreements.

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Scope of regulation / issue	Kyrgyz Republic	Soviet period (before 1991)	International agreements (since 1991)	Comments and problems
Legal status of water resources	Law of 2001 "On the interstate use of water bodies..." Constitution (Article 16, as amended in 2021), Water Code of 2005,	Agreements of the Central Asian republics on the distribution of flow (Chu – 52% KR / 48% KazSSR ; Talas – 50/50)	UNECE Convention on Environmental Impact Assessment (1991/2001), bilateral agreements with Kazakhstan and Uzbekistan	Enshrining full sovereignty while recognizing international obligations; the need to balance national and transboundary interests.
Interstate distribution of runoff	Law of 2001 "On the accession of the Kyrgyz Republic to the Convention of the Economic Commission for Europe The UN Environment Programme provides for principles of equitable distribution, compensation, and cooperation"	Planned water distribution, water-energy barter, centralized control by the USSR Ministry of Water Resources	Agreements within the framework of the International Convention on the Conservation of Natural Resources (ICCR), the Amu Darya and Syr Darya River Basin Cooperation, and the International Fund for Saving the Aral Sea (IFAS)	Increased disputes after the collapse of the USSR, low efficiency of barter schemes.
Protecting glaciers and ecosystems	Glacier Law (2010), fines and protection mechanism	No direct regulation	Concepts of sustainable development, recommendations of the WMO, IPCC	Kyrgyzstan is a leader in the region. It was the first to develop a law on glaciers; regional agreements are needed.
Institutional framework of governance	National institutes (Institute of Water Problems and Hydropower of the National Academy of Sciences of the Kyrgyz Republic, Central Asian Institute of Geophysical Analysis and Geophysical Propagation, etc.).	Centralized Management of the USSR Ministry of Water Resources	ICWC, IFAS (Kyrgyzstan has not actually participated since 2012)	Lack of coordination, poor exchange of hydrological information.
Compensation to the upper countries	Possibility of compensation for watershed services (energy, ecosystem services)	Barter schemes (water in summer – fuel/electricity in winter)	Draft agreements on compensation for "ungenerated hydropower"	Compensation mechanisms are poorly developed, and there are disputes over tariffs.
Environmental standards and water quality	Law "On Water" of 1994, Water Code of 2005	Soviet sanitary norms and state standards	International environmental conventions (partially ratified)	Poor water quality control and outdated irrigation systems lead to losses and pollution.
Regional challenges	Climate warming, melting glaciers, increasing demand for irrigation	Inconsistency in water allocation issues	Development of regional water allocation projects	Increased water stress by 2040. Construction of the Kushtepa Canal in Afghanistan creates new risks.

Table 1. Comparison of water-related laws, issues, and conflicts in Kyrgyzstan across three periods.

Issue	Considerations
Accelerated melting of glaciers and climate risks	The shrinking of glaciers, which form the main flow of Central Asian rivers, threatens the stability of water supplies and hydropower, increasing the risk of water conflicts.
Inconsistency of interests of the countries in the region	Mountainous countries are interested in winter electricity generation, while lowland countries are interested in summer discharges for irrigation; there is no unified strategy for flow distribution.
Weakness of international mechanisms	The ICAC, IFAS and other structures do not have sufficient legal and financial instruments to enforce decisions.
Insufficient legal and technical coordination	Differences in national legislation and the lack of sustainable exchange of hydrological data hinder the conclusion of comprehensive agreements.
Economic vulnerability of compensation mechanisms	Water-energy barter schemes are unstable; new proposals for ecosystem service compensation do not yet have financially viable models.
Environmental degradation of irrigation systems	Water loss, salinization and soil pollution degrade water quality and increase stress on ecosystems.
Politicization of water issues	Disagreements over the construction of hydropower facilities and the management of reservoirs are used as a tool of political pressure.

Table 2. The key challenges shaping water governance in Kyrgyzstan.

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