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WATER RESOURCE PROJECT MANAGEMENT DEFICIENCIES IN UZBEKISTAN AND CENTRAL ASIA AND THEIR SOLUTIONS

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Abstract. This article analyzes existing deficiencies in water resource project management in Uzbekistan and Central Asia, proposing effective solutions. The main purpose is to identify causes of problems in regional water resource management and develop recommendations for eliminating such shortcomings in the future. Based on literature analysis, problems such as declining water resources, aging infrastructure, weak regional cooperation in water management, insufficient financial resources, and inequity in water distribution have been identified in Uzbekistan and Central Asia, and solutions have been proposed.

Keywords: water resources, Central Asia, management, deficiencies, integrated water resource management, transboundary cooperation, water security, sustainable development

Annotatsiya. Ushbu maqolada O'zbekiston va O'rta Osiyo mintaqasidagi suv resurslari loyihalarini boshqarishdagi mavjud kamchiliklar tahlil qilinib, ularning samarali yechimlari taklif etiladi. Mintaqaviy suv resurslari boshqaruvida yuzaga kelayotgan muammolarning sabablarini aniqlash va kelajakda bunday kamchiliklarni bartaraf etish bo'yicha tavsiyalar ishlab chiqish maqolaning asosiy maqsadi hisoblanadi. Adabiyotlar tahlili natijalariga ko'ra, O'zbekiston va O'rta Osiyoda suv resurslarining kamayishi, infratuzilmaning eskirishi, suv boshqaruvi bo'yicha mintaqaviy hamkorlikning sustligi, moliyaviy manbalarning yetishmasligi, suv taqsimotidagi adolatsizlik kabi muammolar aniqlanib, ularni bartaraf etish yo'llari ko'rsatilgan.

Kalit so'zlar: suv resurslari, O'rta Osiyo, boshqaruv, kamchiliklar, integratsiyalashgan suv resurslari boshqaruvi, transchegara hamkorlik, suv xavfsizligi, barqaror rivojlanish

Abstract. This article will analyze the existing shortcomings in the management of water resource projects in Uzbekistan and the Central Asian region and offer effective solutions. The

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main goal of the article is to identify the causes of problems arising in the management of Regional Water Resources and develop recommendations for the elimination of such shortcomings in the future. According to the results of the literature analysis, such problems as reduced water resources in Uzbekistan and Central Asia, outdated infrastructure, slow regional cooperation in water management, lack of financial resources, injustice in water distribution are identified and ways to eliminate them are indicated.

Keywords: Water Resources, Central Asia, management, disadvantages, Integrated Water Resource Management, cross-border cooperation, water safety, Sustainable Development

INTRODUCTION

Water resources in Central Asia, including Uzbekistan, are relatively limited, and the issue of their efficient use is becoming increasingly urgent. Population growth, climate change, and the development of agriculture and industry in the region are leading to increased demands on water resources [1]. However, the current water resource management system does not meet modern requirements and has a number of shortcomings that hinder the efficient use of water resources [2].

The five countries located in Central Asia – Uzbekistan, Kazakhstan, Kyrgyzstan, Tajikistan, and Turkmenistan – are interdependent in their use of water from the two main rivers in the Aral Sea basin – the Amu Darya and Syr Darya. Problems with the distribution and management of water resources in these areas pose a common threat to all countries in the region [3].

METHODOLOGY AND LITERATURE REVIEW

This research is primarily based on theoretical analysis and literature review, examining scientific articles, reports, and regulatory documents in the field of water resource management in Uzbekistan and Central Asia. The methodology includes a systematic analysis of secondary data from peer-reviewed journals, international organization reports, and government publications from 2010 to 2024.

The transboundary nature of water resources in Central Asia requires consideration of both national and regional perspectives. Abdullaev et al. [4] highlight that the transition from Soviet-era centralized water management to independent national systems has created significant governance challenges. According to Sehring [5], institutional fragmentation is a key obstacle to effective water management in the region.

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Climate change poses additional challenges. Reyer et al. [6] predict that Central Asia will experience more frequent droughts and reduced water availability, particularly affecting downstream countries like Uzbekistan. This is compounded by inefficient irrigation practices that, according to Djanibekov et al. [7], waste up to 50-60% of water in agricultural use.

The legal framework for water cooperation remains inadequate. While agreements exist, Bernauer and Siegfried [8] note that implementation is weak and compliance mechanisms are insufficient. Consequently, upstream-downstream tensions persist, especially regarding hydropower versus irrigation needs.

Financial constraints limit infrastructure maintenance and modernization. The World Bank [9] estimates that rehabilitating irrigation infrastructure in Uzbekistan alone would require billions of dollars in investment. Technical capacity gaps further exacerbate management problems, with Zinzani [10] identifying shortages of qualified specialists in water governance as a critical issue.

RESULTS AND DISCUSSION

The literature review reveals several interconnected deficiencies in water resource management in Uzbekistan and Central Asia. Following the collapse of the Soviet Union, water management institutions were divided along national lines, disrupting the previously integrated system. Each country established its own water management priorities, often conflicting with neighbors' interests. In Uzbekistan, responsibilities are divided among multiple agencies, leading to coordination problems and inefficient decision-making [4]. This institutional fragmentation results in overlapping responsibilities, bureaucratic inefficiency, and accountability gaps. Much of the region's water infrastructure was built during the Soviet era and has exceeded its design life. Irrigation canals, pumping stations, and reservoirs suffer from inadequate maintenance and investment. In Uzbekistan, an estimated 70% of irrigation infrastructure requires rehabilitation [9].

This deterioration leads to significant water losses through leakage and inefficient conveyance, exacerbating water scarcity issues. The geographical reality that major rivers originate in upstream countries (Kyrgyzstan and Tajikistan) before flowing into downstream nations (Uzbekistan, Kazakhstan, and Turkmenistan) creates inherent tensions. Upstream countries prioritize hydropower generation, especially during winter, while downstream countries need water for summer irrigation. This temporal mismatch in water needs frequently leads to disputes over reservoir operations and water releases [8]. Agricultural water use dominates consumption in the region but remains highly inefficient. Flood irrigation

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predominates in Uzbekistan, with water application rates far exceeding crop requirements. Water pricing mechanisms are inadequate, with water provided virtually free of charge to agricultural users, removing economic incentives for conservation [7].

Despite the transboundary nature of water resources, data sharing among countries remains limited. Hydrological monitoring networks have deteriorated since Soviet times, with fewer monitoring stations and reduced frequency of measurements. This lack of reliable, shared data hinders evidence-based planning and dispute resolution [5]. Water management institutions face chronic underfunding. Revenue collection from water users is minimal, maintenance budgets are inadequate, and dependence on external donors is high. This financial instability prevents long-term planning and sustainable management [9]. The region faces increasing climate variability, with projections indicating reduced water availability. Glaciers feeding the major rivers are retreating, affecting long-term flow patterns. Adaptation capacity remains limited due to governance and resource constraints [6].

Based on the identified deficiencies, several integrated solutions are proposed. Existing regional agreements need reinforcement with clear implementation mechanisms and dispute resolution procedures. A basin-wide approach to water management should be institutionalized through strengthened river basin organizations with meaningful authority and resources [3]. Significant investment in rehabilitation and modernization of irrigation networks is needed. This should include both large-scale infrastructure (reservoirs, main canals) and on-farm improvements. Water-saving technologies like drip irrigation, sprinklers, and canal lining should be prioritized [9]. IWRM principles should be fully adopted at national and regional levels, considering all water uses and stakeholders.

This requires legal reforms, capacity building, and institutional reorganization to ensure coordinated decision-making [4]. As the largest water user, agriculture offers the greatest potential for conservation. Measures should include improved irrigation scheduling, crop diversification, water-saving technologies, and gradual introduction of appropriate water pricing to reflect scarcity value [7]. Investing in monitoring networks, establishing data-sharing protocols, and developing joint information systems would improve planning and reduce mistrust. Remote sensing and other modern technologies can complement traditional monitoring approaches [5]. Water management requires stable funding through a combination of user fees, government budgets, and international support. Cost recovery principles should be gradually introduced while ensuring affordability for essential uses [10]. Adaptation strategies must be mainstreamed into water management planning. This includes developing climate-

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resilient infrastructure, improving forecasting capabilities, and creating flexible allocation systems that can adjust to changing conditions [6].

The implementation of these solutions requires coordinated action at multiple levels. At the regional level, strengthening existing institutions like the International Fund for Saving the Aral Sea (IFAS) and the Interstate Commission for Water Coordination (ICWC) is essential.

CONCLUSION

Water resource management in Uzbekistan and Central Asia faces significant challenges stemming from institutional fragmentation, deteriorating infrastructure, competing national interests, inefficient water use, and climate change. These deficiencies threaten not just water security but regional stability and economic development. Addressing these challenges requires a comprehensive approach combining strengthened regional cooperation, infrastructure modernization, improved efficiency, institutional reforms, and sustainable financing. The integrated water resource management paradigm offers a valuable framework for developing such solutions, emphasizing coordination across sectors and stakeholders.

Progress will require political commitment at the highest levels to overcome historical tensions and prioritize regional cooperation over narrow national interests. International partners can play an important supporting role through technical assistance, capacity building, and financial support, but sustainable solutions must ultimately be driven and owned by the countries themselves.

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