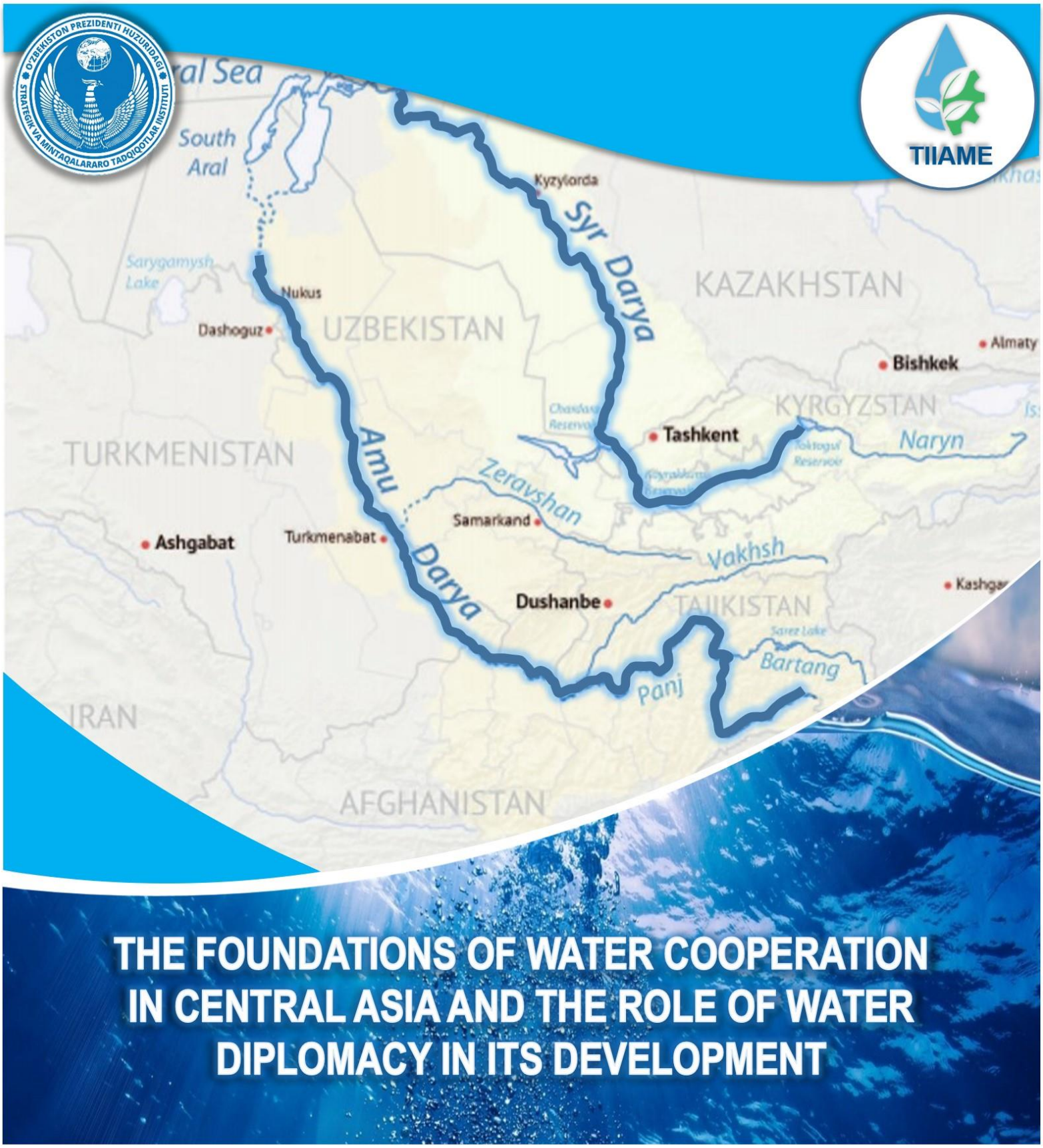

THE FOUNDATIONS OF WATER COOPERATION IN CENTRAL ASIA AND THE ROLE OF WATER DIPLOMACY IN ITS DEVELOPMENT

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giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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This publication was prepared within the framework of the International Scientific and Practical Conference “Water Diplomacy in Central Asia: Trust, Dialogue and Multilateral Cooperation for Sustainable Development”, held on April 10, 2025 in Tashkent.

The objective of this work is to rethink the conceptual vision of the effective use of transboundary water resources in the face of current challenges and threats to water security in Central Asia.

This publication focuses on the research studies conducted by the Institute for Strategic and Interregional Studies under the President of the Republic of Uzbekistan and the national research institutions of Uzbekistan.

The Scientific and Information Center of the Interstate Coordination Water Commission (SIC ICWC), the Agency of the International Fund for Saving the Aral Sea (IFAS Agency) the Center for Water Reforms of the Ministry of Water Resources and other national experts are acknowledged with special gratitude for their active involvement in this work.

This publication is for a wide range of readers and may be useful primarily for diplomats, scientists and specialists, teachers, doctoral students, students of higher educational institutions, as well as for all those interested in current issues of transboundary water flow management in Central Asia and who play a role in water diplomacy in this process.

The publication is intended for a wide range of readers and may be particularly useful for diplomats, scientists and experts, educators, PhD candidates, university students, as well as for anyone interested in current issues of transboundary water resources management in Central Asia and the role of water diplomacy in this process.

The digital version of the document is available on the website isrs.uz

The essentials of water cooperation in Central Asia and the importance of water diplomacy in its growth

Introduction

In recent years, Central Asia has experienced an increase in the influence of natural, anthropogenic, and man-made processes, which together have a complex negative impact on the water and climate balance of the region. The socio-economic development, environmental well-being, and security of the states in the region are impacted by these trends in a significant way.

Considering the transboundary nature of the region's major rivers, the absence of effective coordinated actions could not only adversely affect the sustainable development of the states in the region but also escalate interstate tensions. This situation highlights the necessity for countries to reassess their strategies for the sustainable use of water resources in Central Asia and to enhance collaboration in their comprehensive management.

The sustainable management of transboundary water resources in Central Asia could serve as a foundation for fostering regional cooperation, promoting constructive dialogue, and enhancing institutional frameworks for collaboration.

Effective water management is a key factor in improving economic conditions, environmental sustainability and social stability in the region.

In this context, considering the analysis of present and future challenges to water security in the region amid intensifying climate issues, alongside the effectiveness of existing water cooperation and the extensive experience in this field, it is suggested to establish a framework of core principles, strategies, mechanisms, and tools for transboundary water cooperation, while defining the role of water diplomacy within this process.

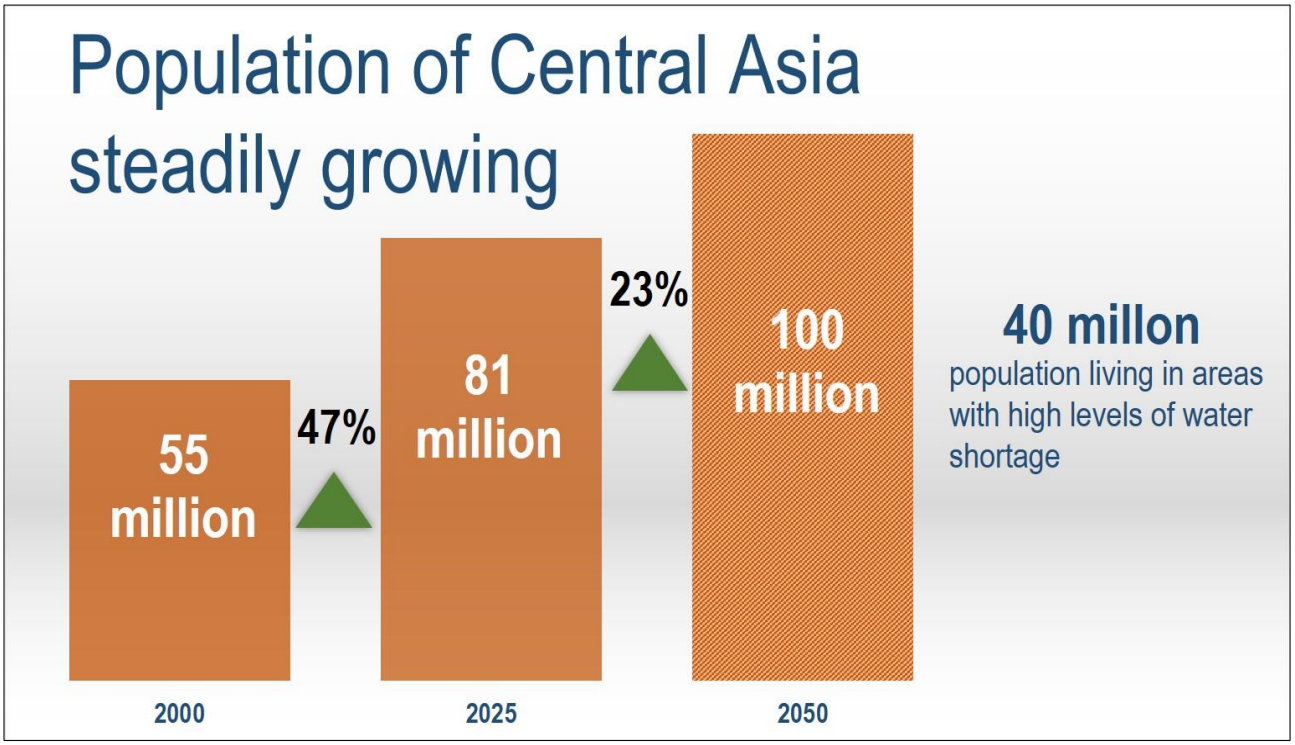
I. Current challenges to water security in the region

Central Asia faces significant challenges in water security caused by increasing water demand, inefficient water use, aging infrastructure, lack of financing, climate change, and the impact of geopolitical factors.

1.1. The key factor that can significantly exacerbate the problem of water security is the growing demand for water caused by population growth, rapid economic development, and urbanization.

Population growth necessitates substantial water resources to meet basic needs such as drinking water, agriculture and industry. This intensifies competition among various economic sectors and states for water access, jeopardizing both the stability of water supplies and environmental security across the region.

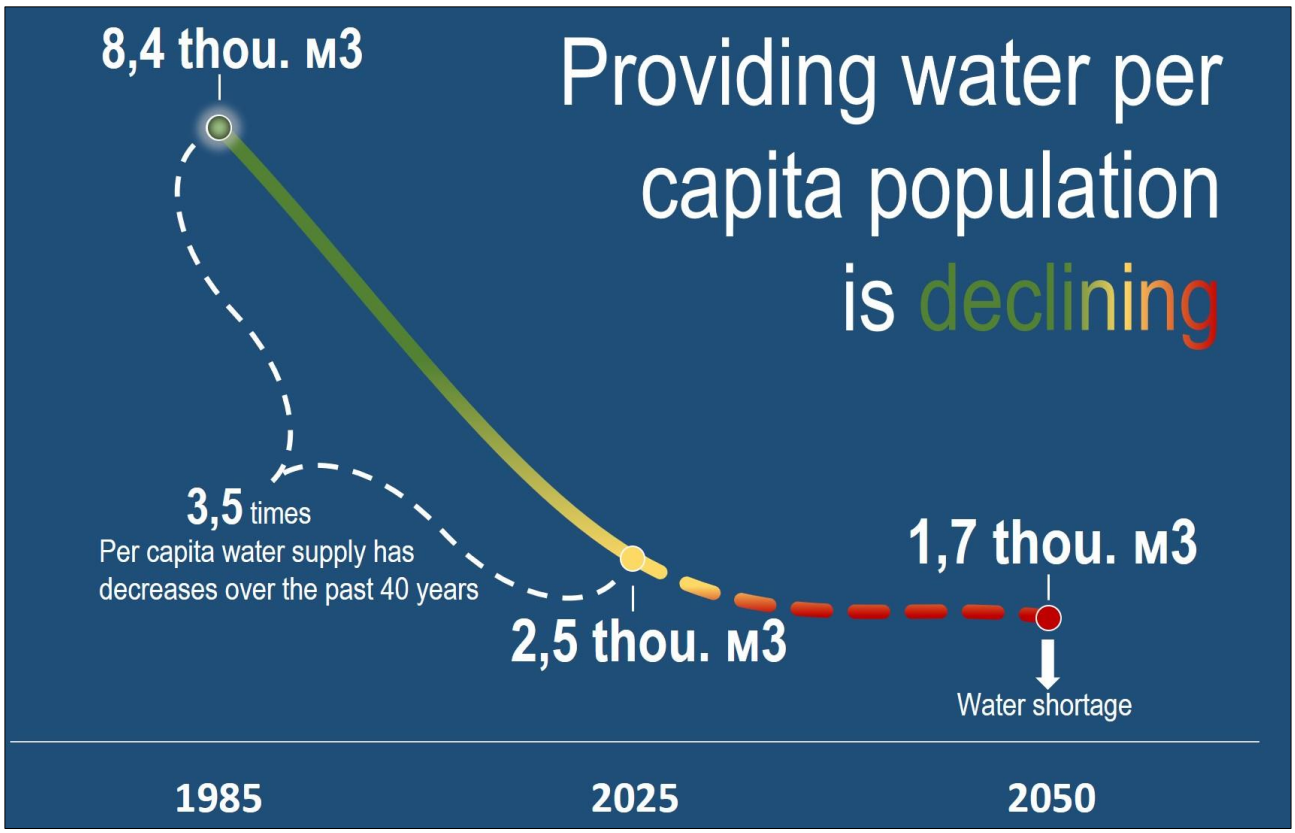
Central Asia is among the world's fastest-growing regions in terms of population. Over the last 25 years, its population has risen by 47%, from 55 million in 2000 to 81 million by 2025, with UN projections suggesting it will surpass 100 million by 2050. This poses a significant challenge in a region where around 40 million people (49% of the population) currently reside in areas experiencing high water stress.



The economic development of the countries in the region is occurring concurrently with the growth of the population. Rapid urbanization, industrialization, and agricultural advancements continue to impact water resources.

This poses the risk of intersectoral and interstate contradictions, especially in the context of the transboundary nature of a significant part of Central Asia's water systems.

Over the past 40 years, the water supply per capita has decreased by 3,5 times, from 8,4 thousand m^3 to 2,5 thousand m^3 annually per person.



Based on various estimates, by 2050, the water supply per capita in Central Asia will reach less than 1.7 thousand m³ annually, which, according to the UN classification, qualifies as a water deficit (with less than 1,700 m³ indicating a deficit and below 500 m³ classified as an acute deficit).

Currently, the countries of Central Asia still possess adequate per capita water resources (2,500 m³); however, the issue in the region lies more in their inefficient utilization than in their scarcity.

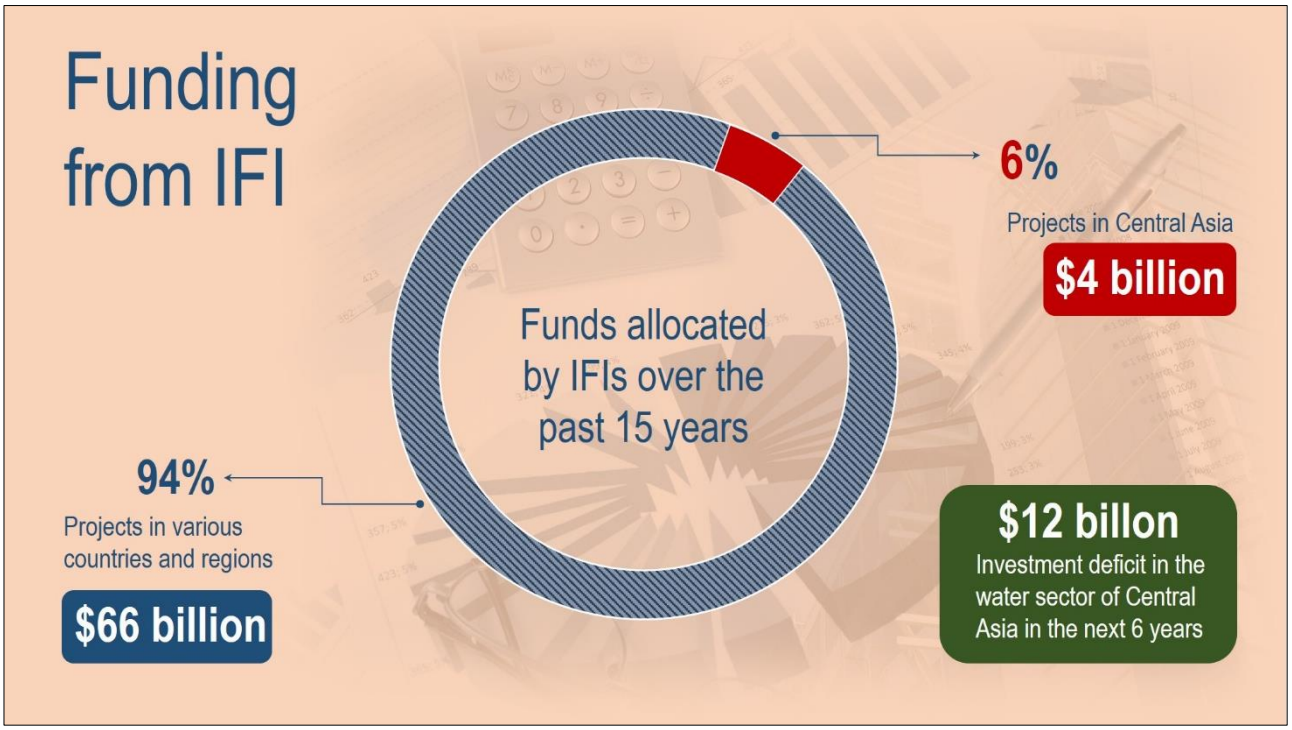
1.2. The existing water management system remains extremely inefficient due to managerial, administrative, economic and technological factors**.**

A significant portion of water is lost due to outdated irrigation infrastructure, limited implementation of modern irrigation technologies, and inadequate regulation of water consumption.

Due to the deterioration of the water management infrastructure built during the Soviet period, a significant amount of water is lost, reducing its efficient use. In some cases, water losses reach 40-50% due to leaks and evaporation, which is especially critical in conditions of water scarcity and the absence of an effective mechanism for managing transboundary water resources.

The situation is further complicated by insufficient funding for the water sector, as countries in the region often struggle to allocate adequate resources for maintaining and upgrading infrastructure, as well as implementing innovative water management technologies, including digital monitoring, automated control systems, and modern irrigation techniques.

In this context, attracting investment to the region's water sector is becoming increasingly important. Currently, the primary sources of funding for the water sector's development are multilateral banks, development agencies, and international financial institutions (IFIs).

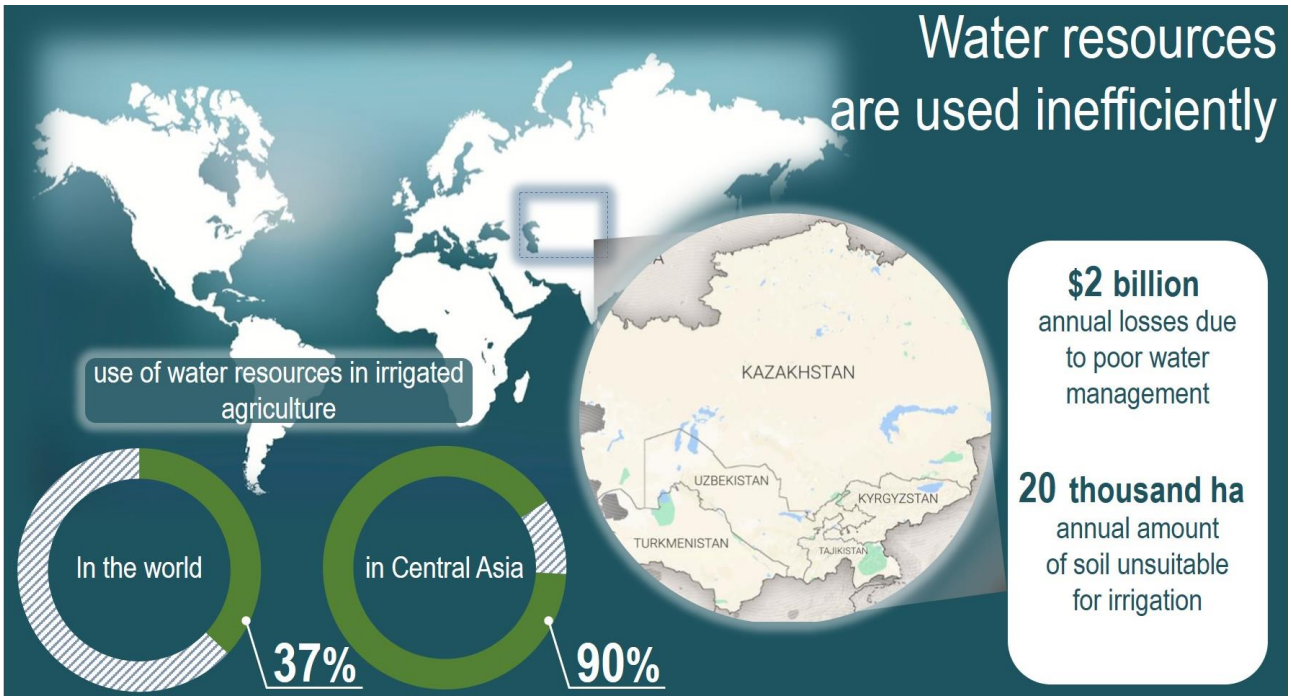


Over the past 15 years, only $4 billion, or 6% of all IFI financing in Central Asia, has been allocated to this sector.

At the same time, according to EDB calculations, the investment gap in Central Asia's water sector is expected to reach approximately $12 billion over the next six years ($2 billion per year), though the figures could be higher.

1.3. Another key challenge to water security is the growing pressure on water resources**.**

Currently, in Central Asian countries, approximately 90% of water resources are used for irrigated agriculture, compared to the global average of 37%. Unfortunately, this places the Central Asian republics among the global leaders in inefficient water usage.



According to the World Bank, the region experiences annual economic losses exceeding $2 billion due to ineffective water management. Each year, approximately 20,000 hectares of irrigated land in Central Asia are withdrawn from agricultural use because of soil salinization, wind and water erosion, deteriorating infrastructure, and insufficient water for irrigation and soil flushing.

This situation heightens the risk of intersectoral and interstate conflicts, particularly given the transboundary nature of most of the region's water resources.

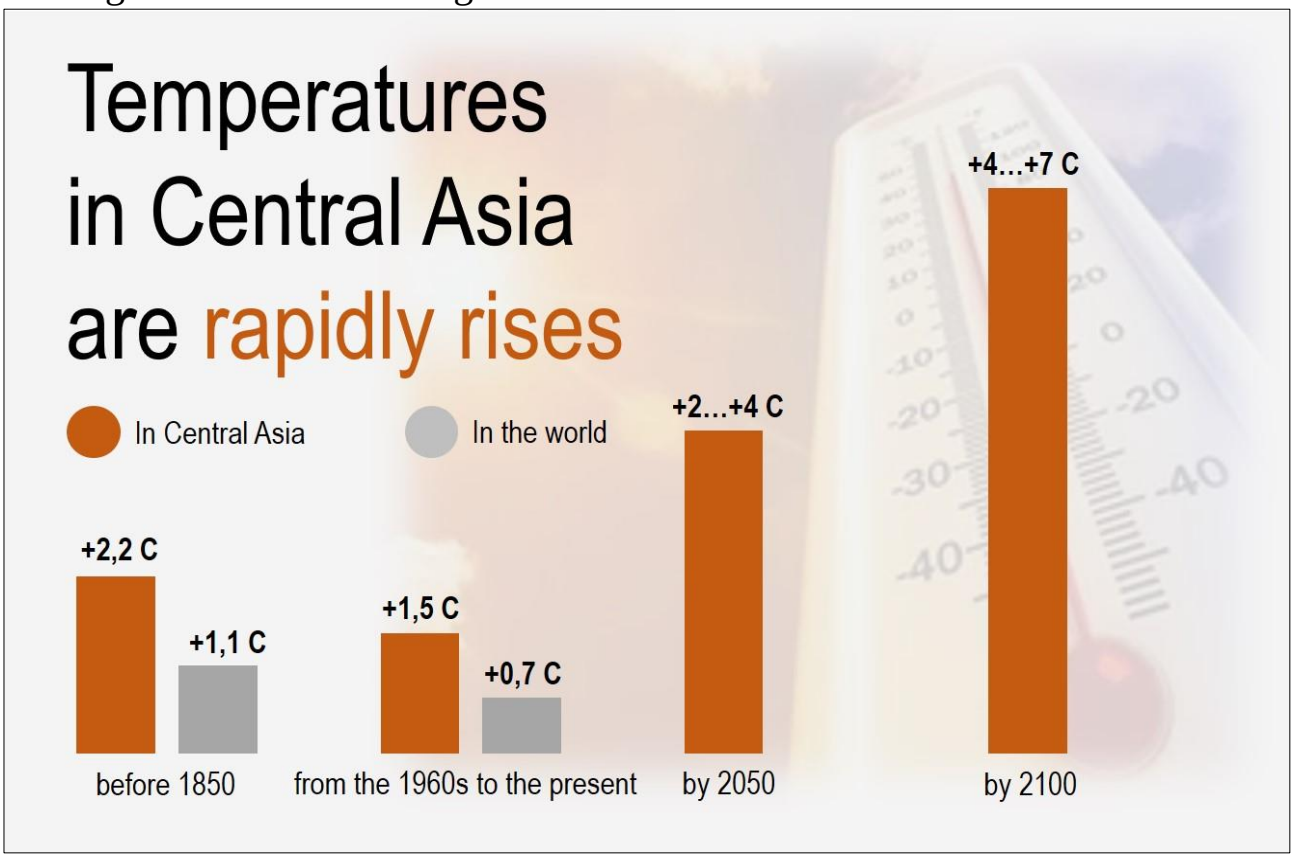
For example, the Amu Darya and the Syr Darya rivers, which serve as the primary sources of freshwater in Central Asia, flow through multiple countries, necessitating coordinated management and mutually agreed approaches to their distribution.

1.4. Global warming, driven by human activities, has caused unprecedented changes in the Earth's climate system, which have no analogues in modern human history.

Climate change adds another layer of complexity by accelerating glacier retreat, altering precipitation patterns, and increasing the frequency of extreme weather events. This, in turn, impacts the region's water balance, making it less predictable and posing risks to agriculture, energy production, and water supply for the population.

Notably, the temperature in the region is rising at twice the global average. While the world temperature has increased by 1.1 degrees since the pre-industrial period, in Central Asia it has increased by 2.2 degrees.

Over the past 60 years, the rate of temperature increase in the region has accelerated, rising by 1.5 degrees compared to 0.7 degrees globally. It is projected that by 2050, the temperature in Central Asia could rise by an additional 2-3 degrees, and by the end of the century, by 4-7 degrees, leading to more severe droughts and extreme weather events.

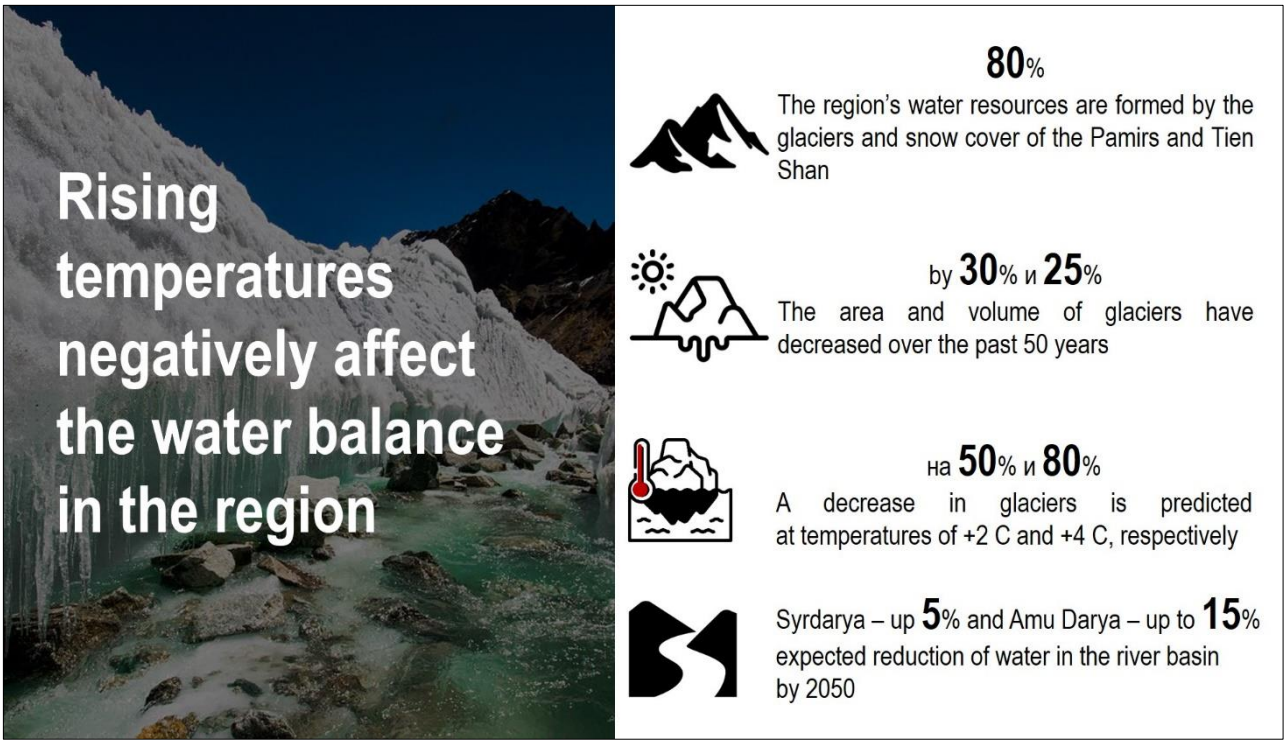


The rising temperatures are already negatively affecting the water-climate balance of the region, and further increases could have catastrophic consequences for the socio-economic and environmental well-being of Central Asia.

First, global warming causes intensive melting of glaciers and snow cover in the Pamir and Tien Shan, which form 80% of water resources of the Central Asian countries.

Over the past 50 years, the area of glaciers has decreased by 30%, and their volume by 25%. According to forecasts, with a temperature increase of 2 degrees, glacier volume will decrease by 50%, and with an increase of 4 degrees, by 80%. By the end of the century, glaciers, the main sources of water resources for the region, may disappear, posing a real threat to the water security of Central Asia.

According to calculations, by 2050, water resources in the Syr Darya basin are expected to decrease by up to 5%, in the Amu Darya basin by up to 15%. Due to glacier melting, the region is experiencing a trend where water flows down in early spring, resulting in shortages during the growing season.



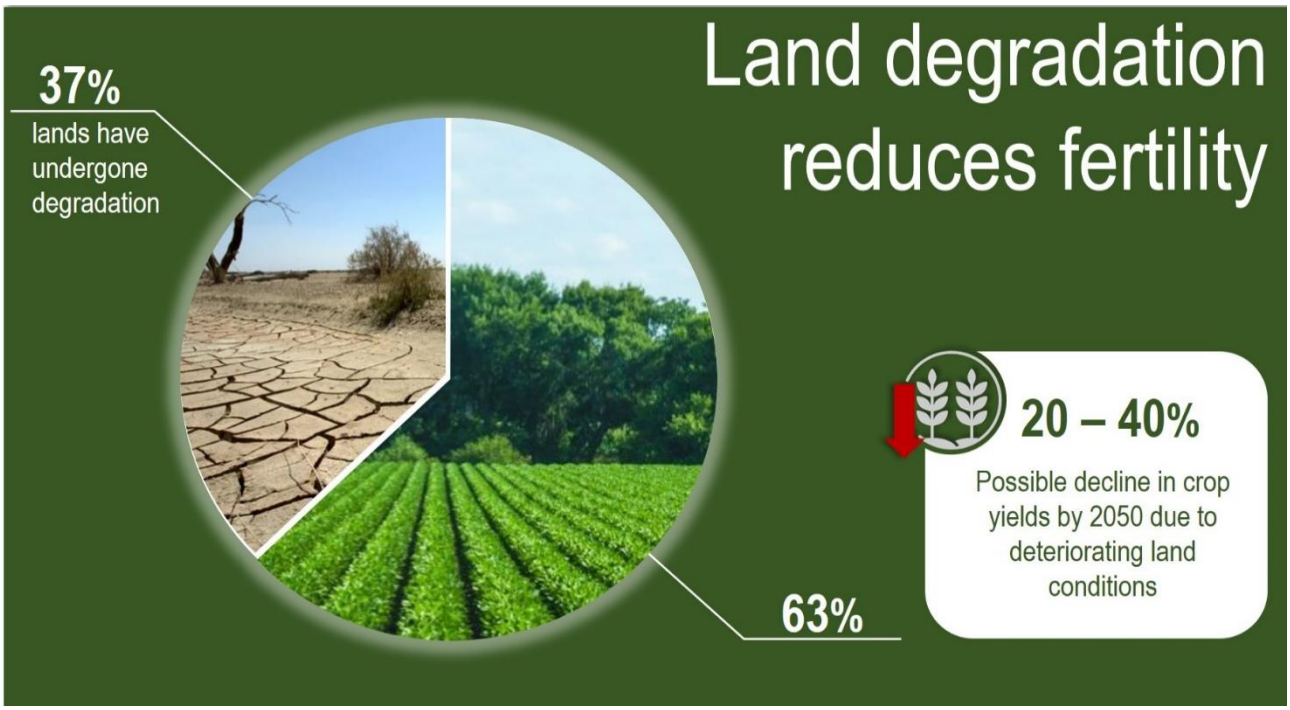
Moreover, glacial lakes are forming in the mountains, which on one hand, create reservoirs of fresh drinking water, but on the other hand, pose risks of making a large amount of debris and proglacial lakes, which under certain circumstances, may break through if timely measures are not taken.

Second, the consequences of climate change in the region have led to changes in the characteristics of atmospheric precipitation. In recent years, a new trend has been observed in Central Asia—intense downpours, during which a month's worth of rainfall falls within a few days.

Excessive rainfall is heightening the dangers of mudflows and flooding, which pose significant threats to human life and socio-economic infrastructure. Additionally, the likelihood of landslides and other natural disasters, such as inundations and floods, is rising.

Moreover, warming causes changes in the hydrological cycle and an increase in extreme weather events, resulting in longer periods of drought, as well as more frequent dust and salt storms.

Third, rising temperatures accelerate soil degradation, intensifying droughts and reducing fertility. According to the UN, about 37% of land in Central Asia has already been degraded.



If land conditions continue to deteriorate, crop yields may decline by 20-40% by 2050, and, considering the rapid population growth, this could trigger a food crisis.

Such developments, accompanied by water shortages and worsening living conditions, may lead to population migration from rural areas to cities or other regions, which would place additional strain on infrastructure and social services.

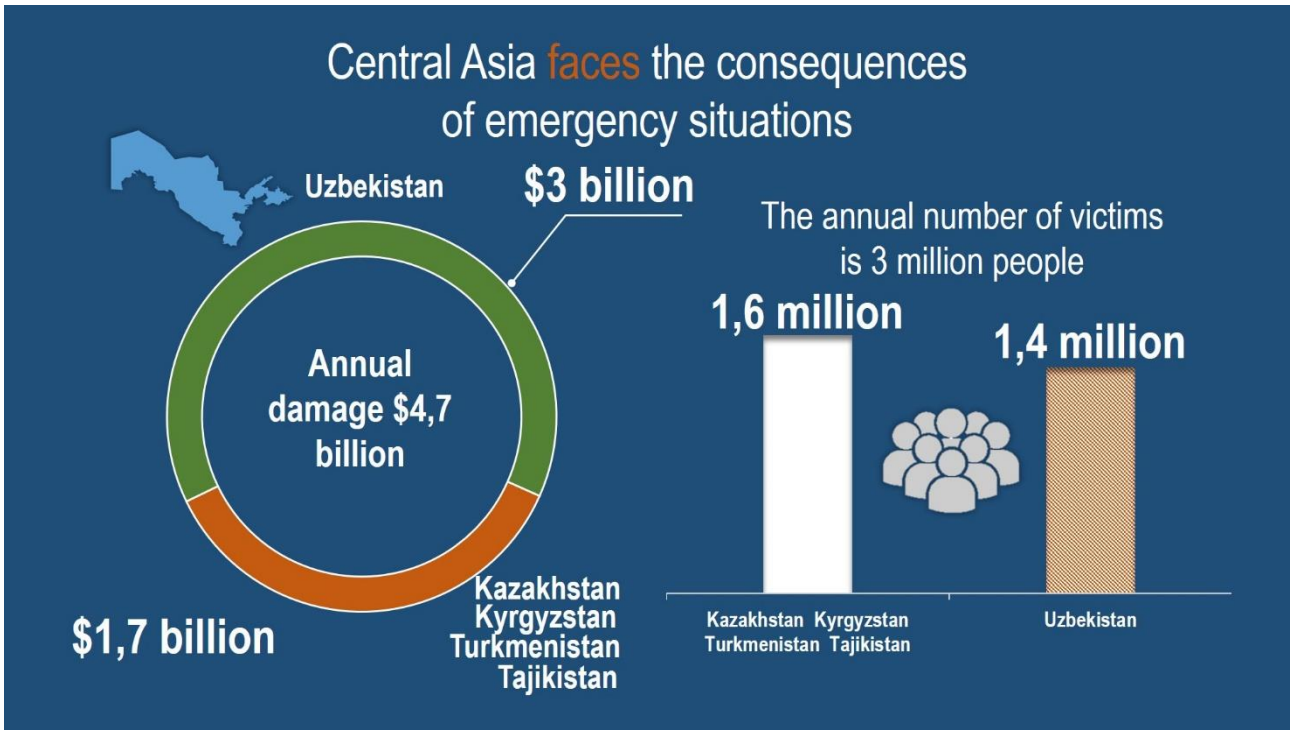
Fourth, climate change, along with the increase in extreme weather events and natural disasters, impacts the existential foundations of the states' livelihoods.

The consequences of global climate change include: 1) alteration in the duration of seasons; 2) drastic changes in precipitation cycles and landscape structures (desertification or waterlogging);

3) deterioration of working conditions in entire economic sectors due to water shortages (e.g., agriculture); 4) increased water consumption and evaporation (including through higher plant transpiration) as a result of rising temperatures; 5) worsening epidemiological conditions due to the spread of infectious diseases, which may escalate as a result of climate change; 6) emergence of environmental migration caused by the uninhabitability of certain areas.

Natural disasters annually affect up to 3 million residents of Central Asian countries, nearly 47% of whom live in Uzbekistan (1,4 million people), with annual damages totaling $4,7 billion, 63% of which fall on Uzbekistan ($3 billion).

The World Bank data indicates that by 2050, approximately 216 million people worldwide will be forced to leave their places of residence and migrate to other regions due to climate change.



The study of this process's impact on Central Asia in the context of the Aral Sea disaster is of particular importance, as climate change in the region forces people to abandon rural areas where droughts and land degradation render agriculture unprofitable.

The migration of people from rural areas to cities, **especially those with access to water resources**, increases the burden on urban areas, creating social tensions.

1.5. An important factor in ensuring water security in the region is the establishment of mutually beneficial cooperation with Afghanistan, as the potential increase in water intake in the Amu Darya river basin by Afghanistan, particularly through the construction of the Qosh Tepa Canal, will change the water balance in Central Asia.

This project may significantly alter the long-established water balance of the region, necessitating a thorough analysis of its consequences and the development of coordinated international approaches to managing shared water resources.

Certain concerns arise regarding the potential environmental impact of the canal's construction in the region. Furthermore, the location of the canal in a desert area without protective concrete lining could lead to rising groundwater levels and soil salinization in the canal's irrigation zone.

In this context, it is important to involve Afghanistan in water cooperation in a spirit of good neighborliness, as the country is interested in establishing contacts with regional states on water use issues, while maintaining a balance of interests regarding water resources.

This issue becomes particularly relevant in light of the absence of a legal framework and multilateral mechanisms for interaction between the region's countries and Afghanistan to regulate the management, use, and protection of transboundary water resources, particularly the Amu Darya River.

The reduction of water resources and the impact of climate change also threaten ecosystems such as river deltas, the Aral Sea, mountain forests and steppes, as well as the loss of biodiversity.

II. Transboundary Water Cooperation in Central Asia

Today, the strengthening political atmosphere of trust and cooperation in the region opens up new prospects for developing mutually beneficial solutions that meet the interests of all Central Asian countries.

Political trust also creates favorable conditions for enhancing water cooperation. In recent years, the Central Asian countries have been actively working on developing joint solutions for the rational use of water resources, which is especially important in the face of growing challenges to the region's water security.

Recognizing the seriousness and complexity of water-related issues, the countries of the region, in addition to national measures, are productively developing cooperation at the regional level.

The Central Asian states interact on water and related issues on the platform of the International Fund for Saving the Aral Sea (IFAS) and its two commissions, the Interstate Commission for Water Coordination (ICWC) and the International Commission for Sustainable Development (ICSD).

In recent years, there has been an increase in initiatives to strengthen cooperation, including those aimed at developing integrated water resources management, introducing water-saving technologies and finding compromises between the water and energy sectors.

A water-climate dialogue has been launched in Central Asia, and the Regional Program "Green Agenda" for Central Asia as well as the Regional Strategy for Adaptation to Climate Change have been adopted.

Work is also underway on the adoption of a Regional Strategy for the Rational Use of Transboundary Water Resources.

The region's commitment to joint actions in the field of sustainable development and climate adaptation continues to draw the attention of the United Nations, which supports the efforts of Central Asian countries, recognizing that climate change in the region poses not just a challenge, but a significant threat.

In December 2023, the UN General Assembly unanimously adopted a resolution initiated by Uzbekistan **"Central Asia Facing Environmental Challenges: Fostering Regional Solidarity for Sustainable Development and Prosperity"**.

The document, submitted on behalf of all Central Asian countries, contains **specific tasks** for effectively addressing climate and environmental threats in the region, including rational use of water resources, ensuring energy efficiency, developing sustainable agriculture and other important areas.

By adopting this Resolution, the General Assembly recommended that the UN system, international and financial institutions, the private sector, investors and donors continue to mobilize resources, build capacity and provide assistance to tackle water-climate issues in Central Asia.

As part of the comprehensive measures to combat water-climate security challenges, several large-scale events are planned in the region over the next 3-4 years to address pressing issues related to water resources and climate.

For reference: the first Samarkand International Forum "Central Asia Facing Global Climate Threats: Solidarity for Common Prosperity" (2025), the International High-Level Dushanbe Conference on Glacier Preservation (2025), the Central Asian Regional Climate Summit in Astana (2026), the second Global Mountain Summit "Bishkek +" (2027), and the High-Level Conferences on the Final Comprehensive Review of the Implementation Progress of the International Decade for Action "Water for Sustainable Development" 2018–2028 in Dushanbe (2028).

These initiatives will not only draw the attention of the international community to the issues of water resource management and climate resilience in Central Asia but also serve as an important contribution to the development of regional cooperation and the creation of new mechanisms to address common environmental challenges.

The adoption of comprehensive solutions aimed at combating the consequences of climate change, improving water management, and enhancing ecosystem resilience will contribute to improving the lives of local communities, ensuring the sustainable development of the region amidst global challenges.

At the same time, in the face of increased challenges to water security, further development of water cooperation in Central Asia requires a special approach and long-term sustainability, since, unlike other areas of interaction, it is directly linked to the vital aspects of the economy and the well-being of the population.

This is due to the high dependence of all sectors on water resources, which emphasizes the need for coordination, long-term planning and integration of efforts by the countries of the region.

In the near future, it is evident that the region's development can focus only on increasing the efficiency and productivity of the use of available water resources, where one of the main ways to achieve this goal is the development and improvement of fair and mutually beneficial water cooperation. One of the many, but the main features of water resources is that they are a common resource (public good).

In this regard, with the strengthening political atmosphere in the region, there is an opportunity to use the management of transboundary water resources as a basis for developing regional cooperation, fostering constructive dialogue, and improving institutional mechanisms for managing these resources at the regional level.

III. Conceptualization of Principles, Approaches, Mechanisms, and Tools of Water Cooperation

Effective water cooperation requires harmonization of its principles, approaches, mechanisms and instruments.

Principles set the ethical and legal framework, **approaches** shape a strategic vision, **mechanisms** provide an institutional basis, and **tools** help to put all of this into practice.

A balanced application of these elements contributes to sustainable and equitable water resource management.

Given the common problems, the interdependence of water resources and the willingness of the countries of the region to cooperate, of transboundary water cooperation and the role of water diplomacy in this process.

Considering the shared challenges, the interdependence of water resources, and the willingness of the region's countries to cooperate, there is a growing need to conceptualize a common vision of the Central Asian states for the joint development of principles, approaches, mechanisms, and tools for transboundary water cooperation, along with enhancing the role of water diplomacy in this process.

3.1. Key Principles for Developing Water Cooperation in the Region

When addressing the issues at hand, it may be appropriate for Central Asian countries to apply the following key principles of water cooperation:

First, cooperation in the field of water resources should be based on the principles of sovereign equality and mutual respect for interests. The principle of equality assumes that water resources in Central Asia are common and each state in the region that has access to transboundary water resources should have the opportunity and right to participate in decision-making regarding the use, conservation and management of these resources.

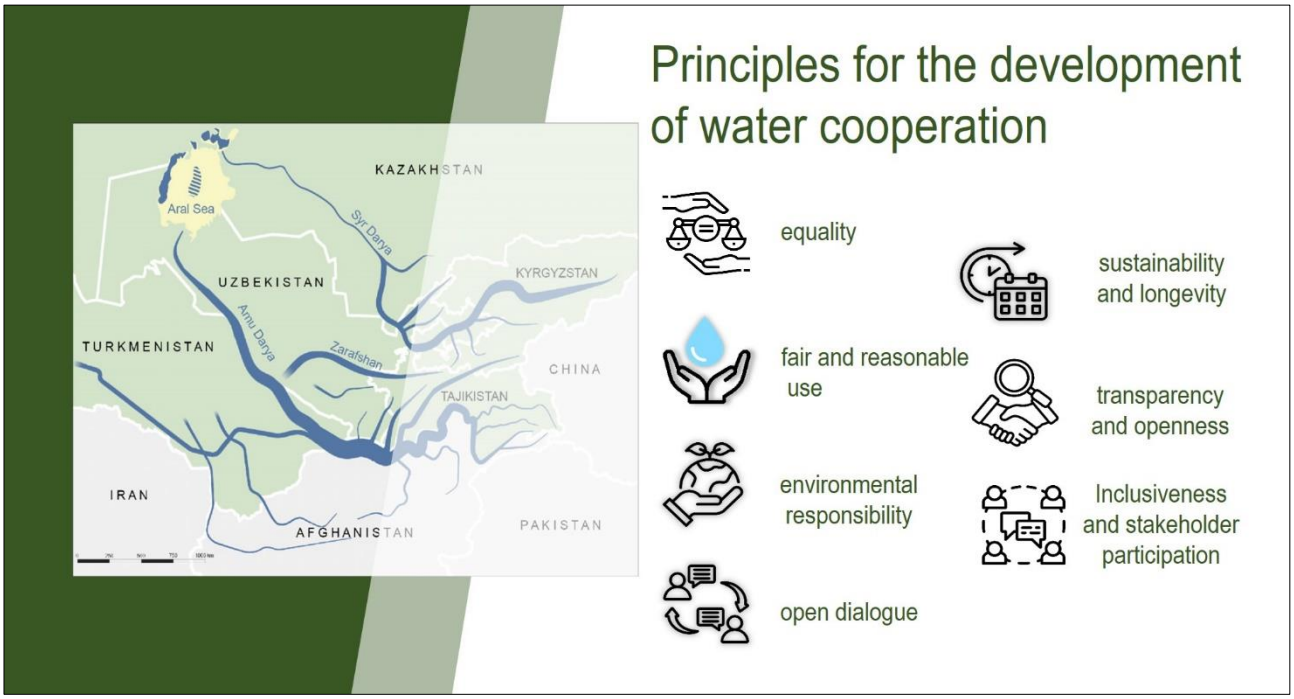
The principle of mutual respect for interests includes recognition of various national needs, such as those related to agriculture, energy, water supply, and ecology, while preventing the use of water resources to the detriment of other countries' interests.

Second, cooperation should rely on the key principles of international water law namely, the principle of equitable and reasonable use of transboundary water resources and the prevention of significant harm.

Equitable and reasonable use includes the right of riparian states to use the watercourse within their territory in a fair and reasonable manner, as well as their obligation to cooperate in its protection and development. According to the principle of no significant harm, riparian states, when using an international watercourse within their territory, must take all appropriate measures to prevent causing significant harm to other riparian states.

This emphasizes the need to find fair, constructive and balanced solutions that meet the interests of all parties and take into account the needs of ecosystems and future generations. Equitable water distribution among the countries of the region is crucial to preventing water conflicts and ensuring mutual respect for each other's interests.

Third, countries using transboundary water resources should be guided by the principle of environmental responsibility. This involves caring for future generations, protecting ecosystems, and preserving water resources while taking accountability for the environmental impacts of water resource usage, including water pollution and ecosystem disruption. Countries should strive to minimize negative impacts on the environment, human health and act in the interests of long-term ecological sustainability.



Fourth, the development of cooperation in the water sector, based on the promotion of **open and constructive dialogue** among the countries of the region, should be grounded in the principles of solidarity and mutual benefit. This approach will help develop joint strategies for managing and efficient use of transboundary water resources.

Countries should act as a single community, combining their efforts to address water-related issues and jointly overcome environmental challenges.

In situations where water resources are limited and shared among multiple countries, instead of competing for resources or acting independently, nations should seek solutions that bring benefits and mutual advantages to all parties. This includes the construction of joint reservoirs, the establishment of water distribution systems for agriculture and industry, the restoration of ecosystems and reduction of environmental impacts on water bodies, collaborative efforts to prevent ecological risks such as droughts, water pollution, or resource depletion, as well as cooperation in water technologies, monitoring, and scientific research.

Fifth, in the context of climate change, population growth, and the worsening scarcity of water resources, the principle of sustainability and long-term planning becomes critically important. Strategies for water resource usage must be long-term, focused on sustainable development, and designed with a forward-looking perspective, taking into account both current and future needs. This includes the development of approaches such as water-saving technologies, joint projects for the restoration of waterbody ecosystems, and programs to improve water quality.

Sixth, the development of regional cooperation for the effective use of transboundary water resources in Central Asia should be based on the principles of transparency and openness.

This necessitates transparency in decision-making and openness in the exchange of data and information about water reserves, which fosters mutual trust among the countries in the region and reduces the likelihood of conflicts and disputes.

Transparency and information exchange play a pivotal role in creating a stable foundation for joint water resource management, ensuring the region's sustainable development and ecological security.

Seventh, successful water cooperation requires the implementation of the principle of inclusiveness and the participation of all stakeholders – from governments and international organizations to local communities and businesses.

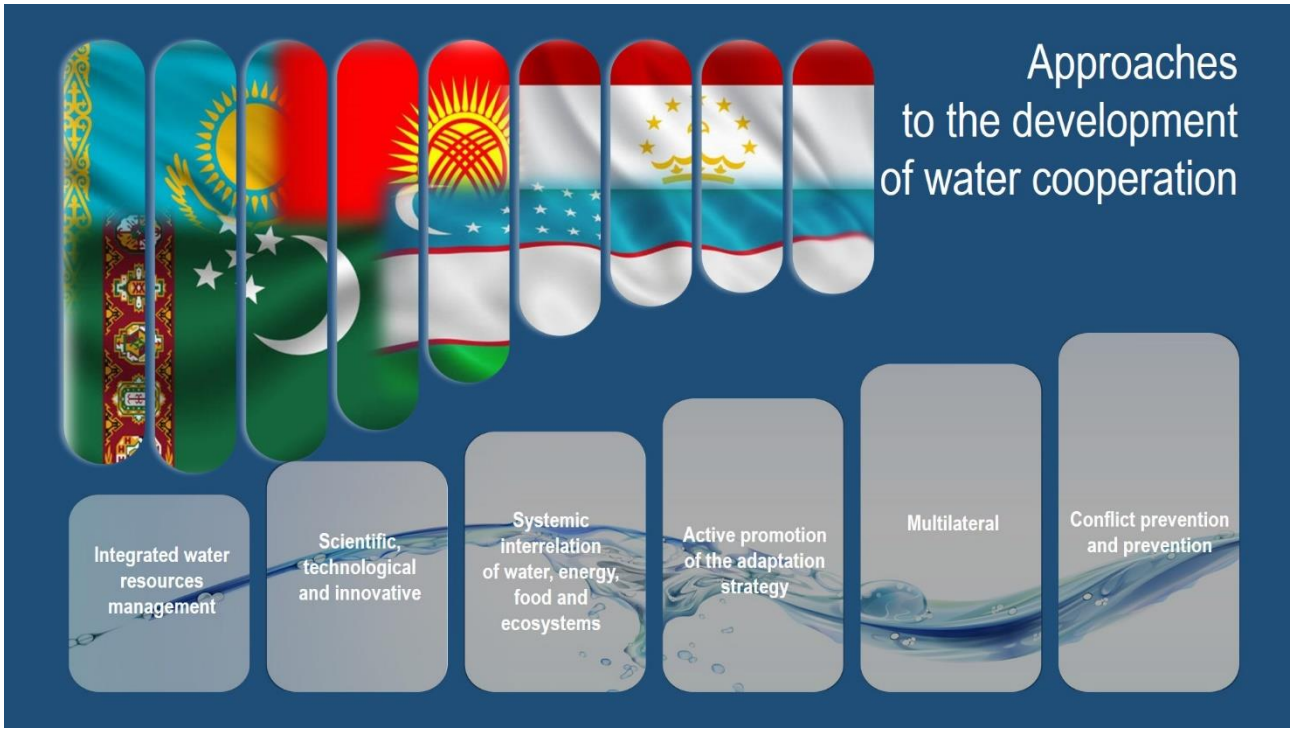
It is important that all groups have the opportunity to influence decision-making processes and jointly develop solutions for water resources management. This ensures that the interests of all parties are taken into account and strengthens the resilience of decisions made. At the same time, the active involvement of local communities, whose interests are directly tied to the state of water resources, plays an important role.

Inclusiveness in decision-making, consideration of traditional knowledge from local populations, and their engagement in water resource management enhance the effectiveness of water cooperation and foster trust among different population groups and states.

3.2. Approaches to Developing Water Cooperation

It is important for the Central Asian states to apply the following approaches when fostering cooperation in the management of water resources in the region:

First, an integrated approach to water resource management is essential. This approach requires the participation of all stakeholders and sectors, taking into account the full range of geographical, hydrographical, hydrological, climatic, ecological, and demographic factors, as well as the socio-economic needs of the countries in the region.



Particular attention should be paid to the requirements that meet urgent human needs and the needs of ecosystems for sufficient water resources.

In a region where water is both a scarce and strategic resource, integrated management ensures a balance between economic demands, ecological constraints, and social requirements. It facilitates consensus among all stakeholders and helps identify optimal solutions for the sustainable use of water resources.

Second, to achieve better water resource management, minimize environmental risks, and make effective decisions, **a scientific, technological, and innovative approach is essential**. This includes the use of modern scientific data, monitoring technologies, forecasting, and water resource management systems, as well as the exchange of knowledge, technologies, and innovative solutions among the countries in the region.

The adoption of innovative solutions, such as water-saving technologies, efficient irrigation, water purification, and ecosystem restoration, can significantly enhance the outcomes of joint water resource management, improving both the efficiency and sustainability of decisions in the water sector.

Third, the use of water resources is directly related to other sectors and affects ecosystems. In this regard, **the Nexus approach linking water, energy, food, and ecosystems is crucial**. This approach aims to optimize interactions between these sectors, prevent conflicts, enhance the efficiency of natural resource use, minimize environmental risks, and adapt to climate change.

Fourth, in the context of climate change, which affects both the quantity and quality of water resources, water cooperation should focus on **actively promoting adaptation strategies**. These include flood management, combating droughts, and preventing **the depletion of surface and groundwater reserves**. Joint efforts by countries may include the development of new technologies for efficient water use, protection against soil erosion and enhancing the water retention capacity of ecosystems.

Fifth, in order to effectively address water issues in Central Asia, it is necessary to follow a **multilateral approach**, which involves actively use platforms for regular dialogue and negotiations, such as interstate commissions and working groups. This also includes working with international organizations such as the UN, the World Bank, the Global Environment Facility and others.

These platforms provide the countries of the region with the opportunity to maintain political cooperation, jointly discuss water issues, exchange experiences, address environmental challenges, and attract international financial and technical resources for the implementation of sustainable water projects.

It is important that such international platforms not only contribute to resolving water resource issues but also help establish trust and strengthen regional cooperation

Sixth, in the context of water scarcity, unequal distribution of water resources, and historical conflicts related to water issues in Central Asia, one of **the key approaches is conflict prevention and resolution**.

This implies the need for early identification and prevention of possible water disputes between states, dispute resolution through compromise and peaceful means.

In turn, this requires the creation of systems for monitoring, data exchange and forecasting of water situations, active involvement of parties in joint planning, discussion and development of measures for sustainable use of water resources, as well as the development of legal and diplomatic tools in order to minimize the risks of conflicts, prevent the escalation of disputes and resolve them on the basis of mutual consent.

3.3. Water Resources Management Instruments and Mechanisms

Based on the above principles and approaches, it is extremely important to form a developed system of instruments and mechanisms for water cooperation.

1) First and foremost, it is essential **to develop a common vision for the sustainable development of water resources in the long term**. Countries should collaborate on crafting **joint strategies and programs** aimed at the efficient and rational use of water resources, preventing pollution, and reducing environmental risks.

This approach fosters a unified perspective and coordination of actions, which, in turn, ensures the effectiveness of collective efforts.

2) Furthermore, an important condition for the fair use of transboundary water resources is **the strengthening of legal and institutional mechanisms** that regulate relationships between countries in the water sector. This may include the establishment of bilateral and multilateral agreements, the creation of joint bodies to coordinate water cooperation, and the development of standards and regulations for the use of water resources, as well as the protection of water bodies and ecosystems. Harmonization of legal and institutional frameworks will help eliminate uncertainties and enhance trust among states.

3) To ensure effective water resource management in Central Asia, transparency in water usage, **reliable monitoring mechanisms, and data exchange systems are essential**.

Joint systems for monitoring, data sharing, and forecasting enable timely access to information on the state of water resources, support informed decision-making, and help prevent potential environmental and technological threats while avoiding conflict situations.

This approach helps to avoid misunderstandings and suspicions, as well as foster trust-based relationships. In particular, considering the transboundary impact of glacier and snow cover melting, the implementation of interstate monitoring mechanisms has become increasingly relevant. These mechanisms could include the organization of coordinated satellite, aerospace, and expeditionary research efforts.

On one hand, such initiatives would help understand the nature of ongoing natural and climatic processes and take scientifically based measures to mitigate the negative impacts of global warming on natural resources. On the other hand, they would assist in predicting natural disasters and responding to them in a timely manner.

Moreover, due to the interconnectedness of hydrological, glaciological, biological, and other factors, it is very challenging to analyze and accurately forecast the impact of climate change on the water balance of the region and the flow of transboundary rivers, even through the use of satellite models and aerospace monitoring.

In this regard, there is an objective need to conduct comprehensive field researches based on an interdisciplinary and cross-sectoral approach.

The issue of developing prompt and adequate response measures to extreme weather events (droughts, precipitation and mudflows) is also becoming increasingly relevant, including the establishment of an early forecasting, warning, and alerting system for extreme climate phenomena.

4) Another essential tool is the **stimulation of mutually beneficial cooperation**. Joint use of water resources and the construction of infrastructure, such as hydraulic facilities and irrigation systems, as well as the collaborative implementation of water-saving technologies, can benefit all parties involved.

It is important that these projects usually contribute not only to solving water problems, but also to the development of other areas, such as the economy, ecology and the social sector. Mutually beneficial cooperation helps to strengthen trust between countries and opens up new opportunities for expanding cooperation in other areas. Thus, against the background of unfavorable forecasts regarding the reduction of water resources in the region, the widespread adoption of water-saving technologies could offer a way out of this difficult situation.

In this regard, the biggest problem and at the same time the main task that the states of the region must address is the study of the experiences of foreign countries and the mechanism for implementing best practices that can ensure the efficient use and management of water resources in order to reduce consumption.

This will allow the countries of the region to use available water resources efficiently and rationally, as well as to improve water management infrastructure as much as possible.

5) Active **participation in international and regional initiatives** will allow the Central Asian states to unite their efforts to tackle global environmental problems such as climate change, land degradation, droughts and desertification that affect water resources. This collaboration will enable them to speak with a "single voice" in the international arena, promoting initiatives, positions and interests of the region in the water-climate sector at a global level.

Regional initiatives and programs create platforms for joint actions, fostering trust and cooperation not only in the area of water resources but also in other fields of sustainable development.

6) The existing urgent problems in the water management sector, including improving the efficiency and productivity of water use, the widespread introduction of water-saving technologies, and other adaptation measures, indicate the need to attract financing.

This is especially important in the context of global and regional crises, trade disputes, and tightening financing conditions, which result in capital outflows from developing countries.

Taking into account the above, it is necessary to consolidate efforts in the joint mobilization of financial resources, technologies, and innovations through coordinated cooperation with international partners. This will help attract international and private investments for the implementation projects aimed at water resource management and the adoption of innovative technologies designed to enhance the efficiency of water use.

This also includes attracting financial resources for the implementation of infrastructure projects, restoration of water body ecosystems, and improvement of quality of the water supply and sewage systems.

It is important to study and implement best practices and leading experiences in developing the market for “blue” finance, public-private partnerships, and outsourcing in the water sector, as well as attracting private investments in projects related to sustainable water resource management and climate change adaptation.

The development of joint projects and creation of conditions for public-private partnerships can attract private companies and investors willing to finance projects with environmental and climate focus. In this context, water diplomacy helps build trust and provides mechanisms for engaging the private sector.

7) Another important tool is **raising awareness among the public**, businesses and government agencies about the importance of rational use of water resources. This includes conducting educational and information campaigns, training the population and organizations in water-saving practices and water-bodies protection. Increasing awareness helps reduce the risks of depletion of water resources and maintains their quality for future generations.

In this context, the creation of a common educational space in the water sector within the region appears promising. According to experts, the expected demand for specialists in water management in Central Asia could reach about 180,000 to 200,000 by 2035-2040. In this regard, the key task is to improve national education programs and training standards for water specialists.

IV. The Role of Water Diplomacy in Shaping and Implementing an Effective Model of Water Cooperation in Central Asia

Achieving regional consensus on the principles, approaches, tools, and mechanisms of water cooperation, along with their coordinated promotion, is a key condition for ensuring mutually beneficial and effective collaboration in the use and management of transboundary water resources.

Water diplomacy plays a crucial role in this process. It should serve as an effective tool not only for reaching and maintaining consensus on a mutually advantageous model of water cooperation but also for integrating this model into the practical activities of water cooperation stakeholders.

Water diplomacy includes negotiation processes, the establishment of trust-based relationships, and international cooperation to achieve compromise solutions in water resource management.

As a political and diplomatic tool, it helps prevent conflicts related to water resources and create a platform for multilateral cooperation, especially in the context of climate change and increasing water demand.

Water diplomacy also ensures a balance of interests related to national sovereignty and strengthens regional cooperation in Central Asia, where countries share common water resources.

In the region, water diplomacy plays a pivotal role, as rivers like the Amu Darya and the Syr Darya are vital for agriculture, energy, and drinking water supply. It fosters trust among nations and supports economic stability. Effective cooperation in this area can become an example for other regions addressing transboundary water resource management issues.

Key Tasks of Water Diplomacy:

- ✓ Building political will for decision-making in transboundary water cooperation.
- ✓ Developing dialogue platforms for discussing water issues at interstate and international levels.
- ✓ Engaging international organizations and partners for assistance.
- ✓ Finding compromise solutions to water-related issues and preventing disputes.
- ✓ Strengthening trust among countries through information, experience, and knowledge sharing.
- ✓ Promoting cross-sectoral collaboration to identify mutually acceptable solutions.
- ✓ Advancing scientific cooperation to address water-related challenges effectively.

Through the dialogue, transparency, compromise solutions, and joint projects, water diplomacy fosters strong relationships founded on mutual respect and mutually beneficial cooperation. It aims to promote peaceful coexistence among states, sustainable water resource use, and the preservation of waterbody ecosystems, thereby turning potential conflicts into opportunities for joint development. This, in turn, ensures sustainable water resource use and long-term stability in the region.

Today, water diplomacy plays a pivotal role in the foreign policy and economic strategies of all Central Asian countries. It serves as a critical tool for addressing environmental and political issues related to water scarcity and its uneven distribution.

In Central Asia, where water is both a strategic and limited resource, vital for agriculture, energy, and ecosystems, and often a source of interstate tension, the further development and advancement of water diplomacy is becoming an increasingly pressing issue on the regional agenda.

Actors of Water Diplomacy

The success of water diplomacy largely depends on the actors responsible for its development and practical implementation. In this regard, water diplomacy should involve a wide range of actors and ensure their effective and coordinated interaction.

The government bodies, including the ministries of foreign affairs, water resources, ecology, and energy of Central Asian countries, as well as parliaments and local representative bodies, should play a leading role in formation and implementation of water policy. These entities are involved in negotiations, the development of interstate agreements, ensuring compliance with the terms of international treaties, and monitoring the implementation of existing agreements.

International and regional organizations also contribute to water diplomacy by providing technical, advisory, and financial support. An essential aspect of effective water diplomacy is the participation of civil society institutions and academic organizations, which monitor and propose solutions for the efficient use of water resources, as well as raise public awareness.

Local communities and the private sector, particularly those reliant on water resources for agriculture and fishing, play an important role in water diplomacy. The private sector is also actively involved in developing new technologies and investing in water infrastructure.

Thus, water diplomacy extends beyond being a mere political direction in international cooperation or a scientific discipline.

It is a multifaceted and comprehensive tool for sustainable development, that covers a wide range of aspects, including environmental, social, and economic dimensions. It fosters inclusivity, dialogue, and interaction at various levels, playing a critical role in balancing societal needs with the preservation of natural resources.

V. Successful practice of water cooperation in Central Asia

After gaining independence, the Central Asian countries (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan) established a new system for distributing water resources in the region.

A forward-looking approach to maintaining cooperation among states in jointly using water resources was formalized in the Agreement between the Republic of Kazakhstan, the Republic of Kyrgyzstan, the Republic of Uzbekistan, the Republic of Tajikistan and Turkmenistan "On cooperation in the sphere of joint management of the use and protection of water resources of interstate sources", signed by the heads of water management agencies of the countries of the region on **February 18, 1992 in Almaty.**

According to this Agreement, the Interstate Commission for Water Coordination (ICWC) was created as a mechanism for managing Central Asia's transboundary water resources.

A year later, on January 4, 1993, in Tashkent, the presidents of the Central Asian states endorsed this decision and established the **International Fund for Saving the Aral Sea (IFAS)**, which has played a significant role in the peaceful and equitable distribution of water resources in Central Asia.

Amid growing concerns over climate change, accelerating glacier melting, and increasing water demand, IFAS remains the region's sole resilient institution, serving as a robust mechanism and a unified platform for addressing water and environmental issues in the Aral Sea basin.

Over the years, IFAS has contributed to fostering new intergovernmental relations, strengthening regional collaboration, and resolving complex water-related challenges without conflict.

IFAS and its institutions have implemented measures to ensure that water allocation, ecological safety, and socio-economic development are addressed equitably, considering the interests of all countries. Over its 30-year existence, IFAS has provided a regional platform for dialogue and collaboration on water and environmental issues.

The decades of experience have demonstrated the importance of IFAS in maintaining dialogue, understanding, and addressing practical issues related to water, hydropower, ecology, and socio-economic matters.

Notably, IFAS operates under the Council of Heads of States, a unique governance structure on a basin-wide scale. The leaders of Central Asian countries have been actively supporting and strengthening IFAS structures.

The ICWC serves as the regional body within IFAS, addressing matters of management, sustainable use, and conservation of interstate water resources in the Aral Sea basin.

Cooperation under the ICWC has developed unique approaches and practices for managing the water resources of the Amu Darya and the Syr Darya rivers. This collaboration includes coordinated planning, adjustments, and ongoing resource allocation.

More than 30 years of work of the ICWC have ensured the coordinated management of interstate water resources. Through collaboration, Central Asian countries have implemented systems for decision-making support, including annual planning, flow monitoring and management, information exchange, joint regional projects, and research. Practical mechanisms for responding to droughts and floods have also been established, along with analytical reporting systems.

In general, the ICWC is a key instrument of regional water cooperation in Central Asia, that has proven its effectiveness in strengthening cooperation at the political and technical levels in the region.

Currently, Central Asian water cooperation is evolving both multilaterally—within the frameworks of IFAS and ICWC—and bilaterally, through joint working groups and commissions on water resource use.

These efforts are welcomed and perceived by the international community as a very positive trend, which has already become the driving force behind effective regional cooperation and integration. This approach is already yielding positive outcomes, with countries in the region finding efficient solutions to numerous challenging water management issues.

Almost all contentious issues regarding water management facilities in border areas and their operation have been resolved, water intake regimes and volumes from the main transboundary rivers are promptly agreed upon, and joint efforts are being made to mitigate the impact of low water levels.

As an example, it is worth noting that, to ensure the rational and efficient use of transboundary water resources, particularly the Toktogul Reservoir, as well as to provide irrigation water for agricultural consumers in Uzbekistan and Kazakhstan during the growing season, Kyrgyzstan, Uzbekistan, and Kazakhstan are jointly addressing the issue of additional water releases from the Toktogul Reservoir in the summer. This is achieved through electricity transfers, taking into account the interests of all states.

Uzbekistan, Kazakhstan, and Kyrgyzstan are also successfully cooperating in the joint use of the water and energy resources of the Naryn River.

Notably, in March 2021, during the visit of the President of the Kyrgyz Republic to Uzbekistan, an Agreement on the joint preparation of the investment project "Construction of the Kambarata HPP-1" and a protocol on mutual supplies of electricity were signed.

In January 2023, the energy ministers of Uzbekistan, Kazakhstan, and Kyrgyzstan signed a "Roadmap" for the implementation of the Kambarata Hydropower Plant-1 construction project.

Additionally, Uzbekistan, Kazakhstan, and Tajikistan are jointly determining the operating regime of the Bahri-Tojik Reservoir during the summer on mutually beneficial terms.

At the same time, the interests of all parties are taken into account, ensuring the rational and efficient use of the region's water and energy resources.

Tajikistan and Uzbekistan advocate for comprehensive and mutually beneficial utilization of water and energy resources in Central Asia. To this end, the two countries are developing sustainable, long-term mechanisms for productive cooperation on the joint implementation of hydropower projects in the Republic of Tajikistan.

In particular, an agreement was signed between Tajikistan and Uzbekistan on the joint construction of two hydropower plants on the Zarafshan River in Tajikistan. Additionally, the issue of Uzbekistan's participation in the construction of Rogun HPP, the largest in Central Asia, is being worked out.

As part of the Swiss government's Blue Peace Central Asia initiative, work was completed in February 2024 to rehabilitate and automate the transboundary hydroposts "Patar" and "Sarvak", located on the cross-border Great Fergana and North Fergana canals. Water flows into these main canals from the upper reaches of the Syr Darya River and is delivered by gravity to irrigate agricultural lands, first in Uzbekistan and then in Tajikistan.

The automation of water consumption monitoring and real-time data transmission to Tajikistan and Uzbekistan at the "Patar" and "Sarvak" hydroposts has enabled more efficient management of water resources on transboundary canals. It has also helped build trust between the countries through the provision of timely and reliable information.

It is worth noting that the region still has great potential for further development of cooperation on the rational use of transboundary water resources.

Conclusion

Water resources play a crucial role in achieving sustainable development in Central Asian countries, and transboundary water cooperation is an essential component for ensuring socio-economic stability and prosperity in the region.

Well-established water cooperation can become a catalyst for development, while the absence of such cooperation can cause significant risks and costs, negatively impacting the overall economic and social situation.

In the context of climate change and its negative impact on the water balance of Central Asia, especially against the backdrop of population and economic growth in the region, water diplomacy is designed to promote the creation of conditions for peaceful cooperation, effective water management and protection of ecosystems.

It should become a vital tool for addressing global and regional challenges related to water resources.

Through successful water diplomacy, Central Asian countries will be able to prevent conflicts, enhance resilience to climate change, and contribute to the social and economic development of water-secured regions.