EU4Environment in Eastern Partner Countries:
Water Resources and Environmental Data (ENI/2021/425-550)

ENHANCING FINANCE IN AZERBAIJAN'S WATER SECTOR

Funded by the European Union

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ABOUT THIS REPORT

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ABOUT EU4ENVIRONMENT – WATER RESOURCES AND ENVIRONMENTAL DATA

This Programme aims at improving people's wellbeing in EU's Eastern Partner Countries and enabling their green transformation in line with the European Green Deal and the Sustainable Development Goals (SDGs). The programme's activities are clustered around two specific objectives: 1) support a more sustainable use of water resources and 2) improve the use of sound environmental data and their availability for policy-makers and citizens. It ensures continuity of the Shared Environmental Information System Phase II and the EU Water Initiative Plus for Eastern Partnership programmes.

The programme is implemented by five Partner organisations: Environment Agency Austria (UBA), Austrian Development Agency (ADA), International Office for Water (OiEau) (France), Organisation for Economic Co-operation and Development (OECD), United Nations Economic Commission for Europe (UNECE). The programme is principally funded by the European Union and co-funded by the Austrian Development Cooperation and the French Artois-Picardie Water Agency based on a budget of EUR 12,75 million (EUR 12 million EU contribution). The implementation period is 2021-2024.

https://eu4waterdata.eu

CONTENTS

List of abbreviations

ADA..... Austrian Development Agency
ADB..... Asian Development Bank
AFD ..... French Agency for Development
AZN ..... New Azerbaijan Manat(1 AZN =0.6EUR)
Amelioration JSC... National Irrigation Water Supply Company
Azersu JSC..... National Drinking Water Company
Azenerji..... National Energy Production Company
EAP..... Eastern Partnership
EC..... European Commission
EPIRB..... Environmental protection of International river basins
ENI ..... European Neighbourhood Instrument
EU ..... European Union
EUWI..... European Union Water Initiative
GCF ..... Green Climate Fund
GDP..... Gross Domestic Product
GEF..... Global Environmental Facility
GIZ..... German Agency for International Cooperation
IFI ..... International Financing Institution
IWRM..... Integrated Water Resources Management
JICA ..... Japanese International Cooperation Agency
MENR..... Ministry of Ecology and Natural Resources
MAC..... Maximum Allowed Concentration
OECD..... Organisation for Economic Co-operation and Development
OSCE ..... Organization for Security and Co-operation in Europe
RBMP ..... River Basin Management Plan
SDG ..... Sustainable Development Goal
SIDA ..... Swedish International Development Agency
SWC ..... State Water Commission
SWRA ..... State Water Resources Agency
UNDP ..... United Nations Development Programme
UNECE..... United Nations Economic Commission for Europe
UNEP..... United Nations Environment Programme

USAID ..... United States Agency for International Development

WB ..... World Bank

WFD ..... Water Framework Directive

WRSA ..... Water Resources State Agency

WUA..... Water Users Association

WS..... Water Strategy

WWTP..... Wastewater Treatment Plan

Executive Summary

Azerbaijan faces multiple pressures on its water security, including aging infrastructure, the uneven distribution of water resources across its territory, climate change exacerbating existing water scarcity issues, and pollution of rivers and other freshwater bodies. It also faces challenges around inefficient water use by households, industry, and agriculture, high levels of non-revenue water, significant untreated waste discharges, complex water management arrangements, and limited effectiveness of economic instruments to mobilise finance for water. This report provides an overview of how Azerbaijan's water sector is managed and financed, identifying key issues and putting forward recommendations to increase financial and environmental sustainability in the water sector.

Water management would benefit from greater coordination, supported by strengthened Water User Associations

Azerbaijan has a dispersed system of water governance, with a range of different ministries and state-owned institutions involved as well as the Water User Associations (WUAs). The many organisations involved in water management are hampered by weak coordination between them and a complex legal framework that slows collaboration. Further challenges related to the small number of specialists who are closely familiar with the approach to integrated water resources management.

The most important government ministries and state-owned institutions in water management include the Ministry of Ecology and Natural Resources, the State Agency of Water Resources of the Ministry of Emergency Situations, the Republican Center for Hygiene and Epidemiology of the Ministry of Health, the "Azerbaijan Amelioration (Land Reclamation) and Water Management" Open Joint Stock Company (OJSC), "Azersu" OJSC, and "Azerenergy" OJSC.

In addition to increasing coordination between government bodies, WUAs need to be strengthened. WUAs play an integral role in Azerbaijan's water system and are responsible for the distribution of irrigation water to landowners and the collection of respective fees. By increasing the efficiency of their functioning – through training of staff, cooperation and exchange between Associations, and using them as promoters for modern irrigation systems – WUAs can support more efficient water management.

Aging water irrigation is critical for agriculture but not fit for purpose

The agricultural sector is responsible for almost 90% of all water in Azerbaijan, with distribution occurring through a Soviet-era system of reservoirs, canals, pipelines and treatment systems. However, with more than 75% of all water transported via earth channels, significant water losses occur via evaporation and percolation. This contributes to one of the main water security challenges facing Azerbaijan – high non-revenue water levels, with estimates of 25-45%. Although building pipelines and concrete walled channels will increase water use efficiency and reduce non-revenue water, more structural reforms are critical to tackle inefficient water use and outdated infrastructure, compounded by extremely low funding of the development, reconstruction, normal operation, and maintenance of these systems.

Reforming water-related economic instruments is necessary to finance Azerbaijan's water security

While improving coordination between for policy implementation and strengthening WUAs is important, Azerbaijan must improve its domestic finance mobilisation if it is to fund the necessary improvements needed to its water system. Strengthening water pricing and implementation will help mobilise domestic finance, as well as incentivise more efficient water use.

Reforming the current water pricing systems will be critical, with the highest impact expected when targeting the agricultural sector. At EUR 0.30 per thousand cubic meters of water the current price for irrigation water does not cover the true cost for water providers in Azerbaijan, which is estimated to be 100 times higher. This discrepancy necessitates EUR 265 million in state subsidies each year to cover the operating costs of water supply companies. This dependency on outside funding hinders the construction of more efficient water distribution networks. Inefficient water use has a series of negative impacts including increased water scarcity and the discharge of polluted waters into water bodies resulting in environmental and health problems.

Related to water pricing reforms, another key area will be streamlining and facilitating the approach to permitting and licenses. Permits can provide important information about water use, but need to be aligned with actual irrigation use, and responsive to changes.

Beyond domestic finance, water infrastructure in Azerbaijan still needs budget transfers and investment

In order to support the financing of new water infrastructure it is suggested to reform current legislation on public-private partnerships (PPPs) to better clarify the ownership of financed facilities within their operation period. The improved legal certainty is expected to increase financing. In addition to PPPs there are also global environmental facility grants. From 2012 to 2021 there were 16 approved projects of this kind amounting to a total of EUR 29 mln with Azerbaijan as its exclusive beneficiary. Driving in investment to the water sector will be critical. At the same time, budgetary transfers, including directly from the State Oil Fund, are a vital source of finance for the water sector.

Improving finance for water security requires a holistic approach

The report concludes with a series of different targeted interventions, which focus on increasing the efficiency of water use to lower costs for water providers and to prepare Azerbaijan for the impacts of climate change. It also highlights the potential for Nature-based Solutions to be part of Azerbaijan's water approach mix, while noting the importance of factoring in their financing.

In order to have targeted and effective policies it will be critical to understand how water is being used, and where. Approving the rules for water use charges is one integral step of improving the country's knowledge of its water uses. The adoption of the rules for water use charges will also help regulate relations between entities operating in the water sector, establishing the *mechanism of mutual settlements, payments, and control* to ensure the efficient use of water resources, and clarify the purpose of water use charges.

Ultimately, as Azerbaijan moves to a modern approach of integrated water resources management including River Basin Management Planning, improving domestic finance mobilisation in the water sector while strengthening coordination and capacity will be crucial.

1. Main Objectives

Environmental and climate resilience and the promotion of fair and inclusive societies are among the key post-2020 objectives identified within the Eastern Partnership (EAP). The goal is improving people's well being in the partner countries while enabling economies' and societies' green transformation in line with the European Green Deal and a post-COVID-19 green recovery. The EAP is also geared towards achieving global commitments such as the Paris Agreement on Climate Change and the United Nations Sustainable Development Goals (SDGs).

In this context, the "EU4Environment – Water Resources and Environment Data" Programme has been financed by the EU with an overall budget of 12.75 mln Euro for the EAP countries. The implementation period of the Programme is 2021-2024, and the implementing partners are: Environment Agency Austria, Austrian Development Agency, International Office for Water (France), Organisation for Economic Co-operation and Development (OECD), and United Nations Economic Commission for Europe (UNECE). The Programme aims at preserving the partner countries' natural capital and contributing towards their environmental and climate resilience with a focus on: (i) knowledge-based decision-making, further development of environmental statistics and monitoring and extending access to high-quality data as part of open government; and (ii) better management of water resources and further alignment with EU water law, in particular the Water Framework Directive)/6.10/

Among other things, the Programme supports reforming water policies and governance to strengthen the resilience of economies of the EaP countries through better strategic planning, integrated management of river basins, use of regulatory and economic instruments, including water pricing, and by applying nature-based solutions. Thus, expected outputs of the Programme, led by OECD, relate to further improvement of economic soundness of water strategies and policies in EAP countries through enhancing economic instruments for water management, identifying subsidies that impact efficient use of water, and analysis and providing recommendations on water pricing; and support to the mobilisation of financing for strategic priorities.

The scope of this study is to review the challenges and opportunities of water use in agriculture in Azerbaijan with particular focus on water pricing and water allocation. It also has a specific focus on economic aspects of water resources management in the country. They include water pricing, enabling environments for mobilising finance for water sector, as well as possible application of nature-based solutions for improving efficiency and environmental integrity of water use in the country.

The government of Azerbaijan has developed various legislative frameworks and policies regarding water tariffs in agriculture sector. For example, the government provides farmers with support in the form of direct payments through Water User Associations. Yet, there has been limited evidence on how effective the current water pricing system is and what positive and negative effects of the current water-related policies exist. In this context, this task has focused on:

- Stock-taking of flows of funding for water use in agriculture sector between the government and water users in Azerbaijan. Guiding questions would include: Who pays what (e.g. tariffs, fees, etc.), and why and when?
- Review of governance and decision making processes of the current water pricing and water allocation systems in the country. The focus areas of such review may include: irrigation norms, crop selection based on economic value climatic and soil conditions, water availability, practice of climate risk management in agriculture, technology selection among others. The role and responsibility of basin management organisations will also be reviewed and commented on.

- Identification of benefits and side effects of the current water pricing and water allocation systems, including: inefficient management of water, inadequate adaptation to negative impacts of climate change, increasing salinization in downstream Kura.

Then by the findings from above task have been developed a series of economically and environmentally sound options for practical reforms of the water pricing system in agriculture sector in Azerbaijan and for the proposed options, environmental and socio-economic impacts have been assessed (qualitative), and accompanying measures proposed to reduce or mitigate the possible negative impact. The focus areas of this task include:

- Possible changes to the government's direct payment to water use for irrigation through Water User Associations (WUAs) or other channels;
- Improvement of the financial self-sustainability and technological status of WUAs and other relevant bodies to irrigation water use as appropriate;
- Fair and proportional water delivery to farmers through WUAs by the region on a "shift schedule" (e.g. satisfying reasonable amounts of water demand);
- Identification of linkages and contributions to the government's strategic policy documents on water and climate change, such as the Agriculture Development Strategy, National Adaptation Plan, Joint Action Plan of Ministry of Ecology and Ministry of Agriculture, among others.
- Identification of the prerequisites for the reform, highlighting the required and/or desirable changes to be implemented for supporting the reform.
- Identification of any particular recommendation that may be appropriate for pilot testing in the future. This is to include an outline of the methodology for pilot trialling the particular recommendation.
- Recommendations have been consulted with relevant national stakeholders through a series of meetings and workshops

In this report is also considered the current environment for financing of the water sector and opportunities that may exist for NbS, outlining the current discussion at the national level with regard to NbS and also for projects with a transboundary benefit.

2. Review of the system of water use in agriculture

2.1. Water resources

Limited fresh water is unevenly distributed on the territory of the Republic of Azerbaijan. The country's water resources are formed in transboundary rivers coming from the territory of neighboring republics through the Kura, Aras, Samur and other rivers, and also in local river's surface waters and groundwater on its own territory. The assessment of Azerbaijan's freshwater resources was carried by National Academy of Sciences in the 1970s and 1980s/6.15/.

According to the results of the assessments of these years, freshwater reserves in the republic are estimated at 8.5 billion m^3 of groundwater, 9.5 billion m^3 of local river flow and 20.6 billion m^3 of transboundary surface waters; total - 38.6 billion m^3. The assessment carried within 4^{th} National Communication on Climate changes there is about up to 15% serious reduction in the freshwater resources of the republic during 1991-2020. Thus, the severe decline of water resources was observed for Kura River with the largest water reserves, the Aras River and its tributaries in recent years/6.14/.

The observed reduction of the Republic's water resources, and inefficient management of water use have led to serious problems in irrigation of agricultural land, as well as in providing the population with drinking water. Thus, as a result of the decrease in the water level in the Kura and Aras rivers, a hydro-ecological crisis arose, as a result of which the flow of the Kura River near its mouth to Caspian Sea was very low, and as a counter-movement, the movement of salty seawater in the direction of the Kura River flow to the territory of the Salyan district was observed. This created increasing of salinity for over 50 km along the river from 0.5g/l till up to 8-10g/l and resulting with serious water supply problem for population and agriculture.

The global warming observed so far has a negative impact on the hydrological cycle, water resources, their temporal and territorial distribution, quantitative assessment, and reproduction of the characteristics of extreme currents. The mentioned hydro-ecological impacts cause a reduction in freshwater reserves. Therefore, the need for conservation, integrated management, and rational use of water resources against the background of global climate change is widely reflected in global challenges. Azerbaijan is a vulnerable country to climate change effects, and especially with the increase in the number, duration of droughts and water shortages.

Under the impact of global climate change water resources of Azerbaijan reduced by 15% during last 30 years and declining of amounts of water continues. According to various climate scenarios water shortage will be increased up to 10-20% by 2040, which will have serious negative impacts to whole economy and particularly to agriculture.

A further sharp increase in demand for water in the coming years (including an increase in demand for transboundary water resources from neighboring countries) are predicted. Therefore, considering that water shortage in Azerbaijan will be even more acute in the coming years, ensuring efficient use of water and implementing an effective management model is a priority.

Water cooperation has proven to offer multiple benefits that accelerate progress across almost all the SDGs and that's why it should be upscaled. As a downstream country, Azerbaijan attaches great importance to transboundary water cooperation and formulated its national water policy in line with the 2030 Agenda. Key focuses are improving water treatment, reducing losses, creating alternative water resources and recycling, assessment of water resources, improvement of the accounting system, integration of data into the "Electronic Water Management" information system and transition to an integrated management system.

By the State Climate Change Commission and Water Commission, large-scale measures are considered to minimize negative impacts of climate change and increase climate resilience and take decarbonization pathway.

2.2. Water supply infrastructure

Currently in Azerbaijan there are numerous reservoirs, canals, water pipelines, sewerage, and treatment systems to supply water to the population, industry, irrigation, energy, and other sectors. Further development of water supply facilities will lead to increased consumption of water resources. Despite a large number of water supply facilities in the regions, there are certain difficulties in meeting their water demand. This is due to limited water resources and a lack of water management plans.

Water reservoirs, such as Mingachevir, Takhtakorpu, Jeyranbatan, Shamkir, Yenikand, Varvara, Shamkirchay, Tovuzchay, Agstafachay, Sarsang, Sugovushan, Aras, Khudaferin, Khanbulanchay, Vileshchay etc and main irrigation canals such as Upper Karabakh, Upper Shirvan, Prime Mughan, Southern Mughan, Upper Mughan, Middle Mughan, Downstream Mughan, Prime Mil, Upper Mil, Samur-Valvalachay, Valvalachay-Takhtakorpu, Takhtakorpu-Jeyranbatan, Absheron, Khanarkh, Shamkirchay, Boztapa, Rasularkh, Akkusha have special importance for agricultural development and have great transferring importance for delivering the water to the arable lands.

Drainage waters from the reclaimed territories of the republic are discharged into the Caspian Sea by collectors of 3 main highways - Mughan, Prime Shirvan and Mughan-Salyan. The Mil-Karabakh collector is discharged into the Prime Shirvan collector with amount of water 3-4 cub km annually/6.15/.

Although existing irrigation methods are not very efficient, the irrigation sector is the largest water user that operates extensive irrigation systems. The irrigation systems' water supply consists of classic open and mostly drainage canals that cause high water losses due to leakage and evaporation. Most of farmers receive subsidies from government for their lands and Amelioration JSC is subsidized by government to cover its operational expenses, as collected fees are very low compared to cost of provided services. This is connected with large amount of water losses because of bad status of some irrigation infrastructure, lack of efficiency water use technology and etc.

According to the annual water balance of the Republic of Azerbaijan, the volume of abstracted water resources amounted to 12-13 of which about 4 billion is lost during transportation and used values are about billion 8-9 billion m^3. Of these, in agriculture and irrigation is used 88%, the drinking water demand of the population reached 10%, and 2% is used for other purposes./6/17/.

The irrigation infrastructure needs to be repaired and transferred from earth based ones to pipelines or concrete wall canal systems to reduce water losses due to leakage and evaporation.

The major challenges that increase the tension in regulating water consumption are as follows:

- Uneven distribution of water resources across areas;
- Forecasted further exacerbation of water scarcity as a result of climate change;
- Some rural residents' limited access to safe drinking water due to lack of water supply systems in place;
- Uncontrolled use of water bodies;
- Pollution of rivers as a result of anthropogenic activities;

- Pollution of transboundary rivers;
- Reduction of water flow into the country from transboundary water bodies;
- Higher flooding and increased silting of rivers;
- Safety of dams;
- Failure to develop the country's standards, norms, and regulations to meet international requirements for the quality and safety of drinking water;
- Lacking security/controlled access to protected sanitary areas of water facilities;
- Lacking security/controlled access to protected sanitary areas of water bodies and irrigation systems;
- Water management deficiencies;
- Irrigation canals constructed in river channels and water losses occurring through on-farm irrigation networks;
- Flow losses due to anthropogenic impact on river channels.

Projections about the future water resources require a long-term vision regarding their protection from pollution. It is necessary to ensure the efficient use of existing water resources to provide future generations with sufficient water resources

2.3. General state of water management institutions

The regulation of water resources of Azerbaijan is carried out in accordance with the requirements of the laws of the Republic of Azerbaijan and the normative legal documents adopted on their basis.

Currently at the national level, the use, protection, monitoring of water resources, scientific research and other issues are carried out by various State bodies within their competence under the coordination of the Cabinet of Ministers of the Republic of Azerbaijan by below institutions:

The Ministry of Ecology and Natural Resources carries out qualitative and quantitative monitoring and protection of surface and groundwater, assessment, use and protection of groundwater resources/6.16/.

The State Agency of Water Resources of the Ministry of Emergency Situations organizes the protection of reservoirs of national importance, monitoring of water resources and enterprises, hydro-technical facilities, water supply systems, development of recommendations for integrated water resources management and etc.

Monitoring of the quality of drinking water sources is carried out by the Republican Center for Hygiene and Epidemiology of the Ministry of Health.

“Azerbaijan Amelioration (Land Reclamation) and Water Management” Open Joint Stock Company (OJSC) major responsibilities include the use of surface and underground water resources for irrigation, distribution of irrigation water, improvement of land reclamation, operation of reclamation and irrigation systems, as well as measures to combat floods and floods.

“Azersu” Open Joint Stock Company major responsibilities include centralized provision of drinking water and sewerage services to consumers in the country. The competence of the institution includes the collection, processing, transportation, storage, and distribution of water from sources, as well as the design, construction, operation and maintenance of drinking and wastewater water supply systems.

“Azerenergy” Open Joint Stock Company ensures the functioning of the country's hydropower system, the production and transmission of electricity, the coordination of hydroelectric power plants and their management facilities managed from a Single center and is responsible for the implementation and implementation of state policy in this area.

The use, reproduction and protection of water resources located on municipal lands owned by the state and private property, as well as those not in use by the Association of Water Users (AWU), belong to the competence of municipalities. Land reclamation and irrigation systems owned by the state are transferred for long-term use to the Association of Water Users for the purpose of their management and provision of irrigation water for acreage/6.19/.

In order to manage state-owned companies and enterprises, economic entities with a state share (“Azerbaijan Amelioration and Water Management” JSC, “Azersu” JSC and “Azerenergy” JSC) on the basis of common principles, improving their activities, including increasing the transparency and economic efficiency of their investment programs, ensuring their competitiveness, in particular to improve financial health and sustainability, the Azerbaijani Investment Holding was established by the decree of the President of the Republic of Azerbaijan dated August 7, 2020. However, at present, the coordination activities of water institutions are provided by the Commission based on the Decree of the President of the Republic.

In order to increase coordination among agencies involved into water management Water resources State Commission under the Cabinet of Ministers created by Decree of the Azerbaijani President, Ilham Aliyev, on 15 April 2020 and lead by Shahin Mustafayev - Deputy Prime Minister of the Republic of Azerbaijan includes below members:

- Minister of Ecology and Natural Resources of the Republic of Azerbaijan
- Minister of Economy of the Republic of Azerbaijan
- Minister of Agriculture of the Republic of Azerbaijan
- Minister of Finance of the Republic of Azerbaijan
- Chairman of Azerbaijan Amelioration and Water Farm Open Joint-Stock Company
- Chairman of Azersu Open Joint Stock Company
- President of Azerenergy Open Joint Stock Company
- Chief of the State Agency for Water Resources of the Ministry of Emergency Situations of the Republic of Azerbaijan.

Main goal of the Water Commission is to ensure the efficient use of water resources in the country by coordinating all water sector management activities.

On March 30,2023 The State Water Resources Agency has been established on the basis of the State Agency of Water Resources of the Ministry of Emergency Situations the relevant decree was signed by President Ilham Aliyev. Under the decree, Azersu OJSC and Azerbaijan Melioration & Water Management Company together with the property were transferred to the subordination of the State Water Resources Agency, established on the basis of the State Agency of Water Resources of the Ministry of Emergency Situations.

Unplanned use of water resources negatively affects the ecological state of rivers, which are the main sources of water, disrupting the substance and energy exchange in river ecosystems. The main reason for this problem is that the amount of water taken from reservoirs, mainly rivers, for various needs isn't accounted accordingly and because of excessive water intake, the balance of river ecosystems is disturbed. Human economic activity in river basins primarily affects the abiotic characteristics of the river ecosystem, opiates change the water, heat, radiation regime, water consumption and runoff processes. Changes occurring in the hydrological regime of the river ultimately also affect the biotic characteristics of the ecosystem.

The scheme of integrated use (or the scheme of comprehensive use) of the country's water resources has not yet been developed, which complicates their rational use in conditions of limited and uneven distribution of resources.

The underdevelopment of the public-private relations in the field of providing drinking water, irrigation water for acreage, and the presence of only state institutions among interested parties exacerbate the problem.

Weak coordination between organizations involved in water resources management, weak relevant legal framework for integrated water resources management, a small number of specialists who are closely familiar with the approach to integrated water resources management.

Main reasons of these problems are lack of acting programs to ensure the elimination of deficiencies in the field of water resources management, necessity of the development of integrated management mechanisms, the development of river basin management plans, the regulation of relations with neighboring countries in the management of transboundary waters, lack of capacity water management according to IWRM, bad state of canals and drainage systems, lack of proper water accounting, huge water losses in irrigation channels.

The National Strategy proposes a clear separation of responsibilities for establishing, regulating, licensing, and supervising interagency coordination. From the administrative point of view, the issuance of water use permits should be separated from water use control while ensuring the independence of the water use permit process/6.20/.

While considering watersheds, local basin authorities need to be created to combine coordinated management with unified rules and the development of organizations' functions and activities.

The aforementioned principles of institutional structure and capacity related issues can be summarized as follows:

- Lack of watershed authorities and a watershed council to ensure integrated management of watershed resources;
- Need to specify the role (location) and responsibility of basin authorities at the national and regional levels;
- Low level of the organizational capacity of the water sector to act according to IWRM principles
- Inefficiency use of water resources from technological, methodological and management point of view.

2.4. Main legal-normative basis of water management

Water policy in the country is implemented following the legislation in this area. Water legislation consists of the Water Code of the Republic of Azerbaijan, laws "On water supply and discharge," "On land reclamation and irrigation," "On hydrometeorological activities," "On subsoil," "On municipal water resources management," "On hydro-technical structures' safety," and other normative legal acts.

The Cabinet of Ministers has adopted multiple normative-legal acts (regulations, rules, norms, instructions etc. with the view to ensure enforcement of Water Code and other relevant laws related to water sector/Annex 6/. These normative and legal acts include the following:

- "Rules on norm-setting in the use and protection of water bodies" (15 October 1998, № 206);
- "Rules on preparation and enforcement of water use limits" (15 October 1998, № 206);
- Rules on development, agreement, state examination, approval and implementation of schemes of integrated use and protection of water resources (15 October 1998, № 206);
- Rule on approval of plans of domestic use of water and general system plans of water use (15 October 1998, № 206);
- Rules on use of water bodies for hydropower needs (6 December 2000, № 216);
- "Rules on use of water bodies for fishery and hunting economy needs " (8 May 2000, № 82);
- "Rules on transferring specially protected water bodies into categories " (1 May 2000, № 77);
- "Regulations on use of water bodies for resting and sport" (22 October 1998, № 216);
- Rules on the identification of the places intended for construction of enterprises, installations and other facilities affecting condition of waters, coordination of construction design, state examination and commissioning thereof; (28 September 1998, № 197);
- "Rules on exercising state control over the use and protection of water bodies" (25 September 1998, № 195);
- "Rules for identification of the sizes, borders and use of water protection zones, their coast protection strips" (24 March 2000, № 56);
- "Rule of state recordation of waters " (17 January 2000, № 7);
- Decision of the Cabinet of Ministers of the Republic of Azerbaijan on conducting state water cadaster (5 December 1995, № 261)
- Rules for passporting amelioration and irrigation systems (29 January 1997, № 24)
- Regulations on chargeable (paid) use of water in the Republic of Azerbaijan (26 October 1996, № 150).

Although the Water Code contains a provision to bring water resources management in line with the administrative-territorial and basin principle (Article 16), the legislation does not currently specify the mechanisms applicable for applying the IMWR and basin approach to water resources management.

Regulation of water use rights should be considered a priority. This can lead to the emergence of categories of different water needs, creating opportunities for increased legal security and private sector participation in projects.

Areas where the regulatory framework and regulations need to be in compliance with IWRM requirements are:

- system of water use rights and permits;
- Area of granting permission to use water facilities for special purposes;
- protection of water resources;
- irrigation water use rules;
- promoting economic factors concerning water management;
- use of alternative water sources;
- cooperation in transboundary water use.

There is a high need to take into account below water management elements when improving legislation:

- harmonization of legislation with IMWR principles;
- feasibility and applicability of changes made to the law;
- regulation of water rights and prioritization of different water users by importance;
- determination of entities to permit the use of water facilities for special purposes and ensuring their autonomy;
- preventing excessive use of groundwater and banning groundwater pollution;
- creating opportunities for multipurpose use of river systems and reservoirs.

Areas requiring legislative changes:

- amending the Water Code regarding management following the basin principle and IMWR approach;
- introduction of control over water pollution sources;
- increasing opportunities to access safe drinking water;
- increasing the consistency between the price and supply of water services and the introduction of payment for the cost of water services.

2.5. The role of Water User Associations (WUA) in the organization of irrigation, the current situation, problems, suggestions for solutions.

The total land fund of the republic is 8,655.5 thousand hectares, of which 4.78 mln. hectare is suitable for agriculture. Of the lands suitable for agriculture, 2049.8 thousand ha are arable land, 39.2 thousand ha are fallow land, 274.1 thousand ha are cultivated crops, and 2417.5 thousand ha are highfields and

pasture land (Table 1). The area of land suitable for agriculture has increased by 35.8 thousand ha in the last 20 years.

Table 1. Land suitable for agriculture, by the end of the year

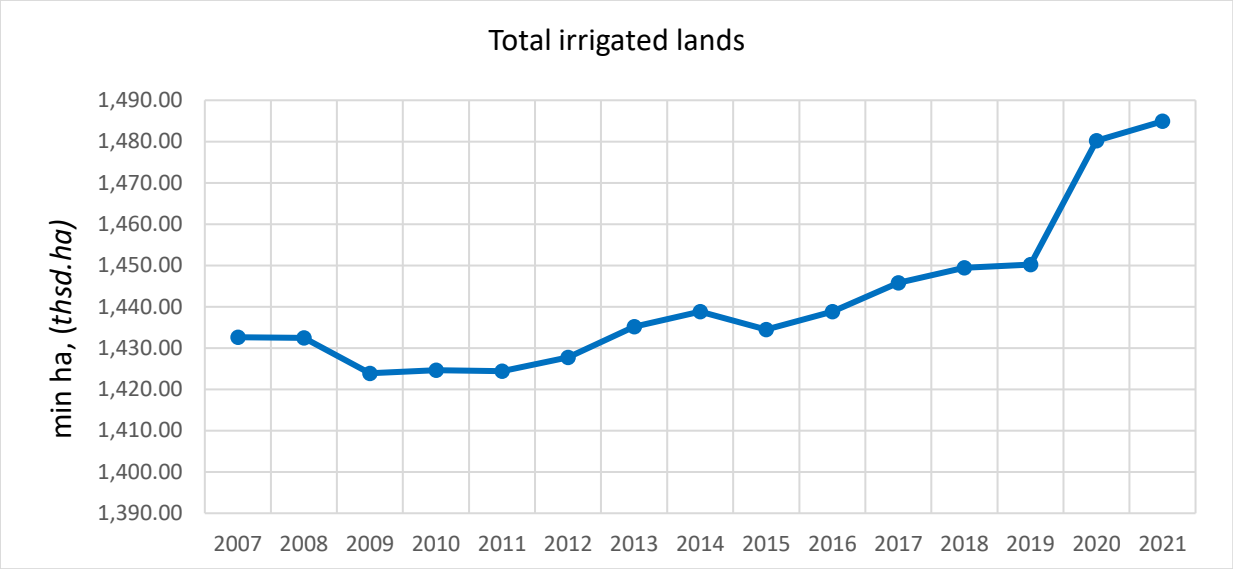
Years	*Utilised agricultural area*	*Including*			
		Arable land	*fallow land*	*permanent crops*	*hayfields and pastures*
	thousand hectares				
2003	4 754,6	1 785,6	53,0	225,7	2 690,3
2013	4 769,8	1 884,3	41,0	230,3	2 614,2
2014	4 769,7	1 885,6	40,9	233,5	2 609,7
2015	4 769,8	1 897,5	40,2	237,0	2 595,1
2016	4 772,9	1 959,1	39,8	241,1	2 532,9
2017	4 777,5	2 054,7	39,8	246,8	2 436,2
2018	4 779,5	2 057,9	40,0	255,0	2 426,6
2019	4 779,7	2 056,5	39,5	260,3	2 423,4
2020	4 780,1	2 045,2	39,2	272,7	2 423,0
2021	4 780,6	2 049,8	39,2	274,1	2 417,5

About 1.5 million ha area in the territory of the Republic is irrigated land. In the last 20 years, 77.5% of the irrigated lands are crops, 8.6% are perennial crops, and 13.9% are other areas (mower, pasture, yard, etc.). When analyzing the dynamics of the area of irrigated areas, an increase over the years is observed(Table 2.and Figure 1.)/6.20/

Table 2. Irrigated lands, end of the year in thsd.ha

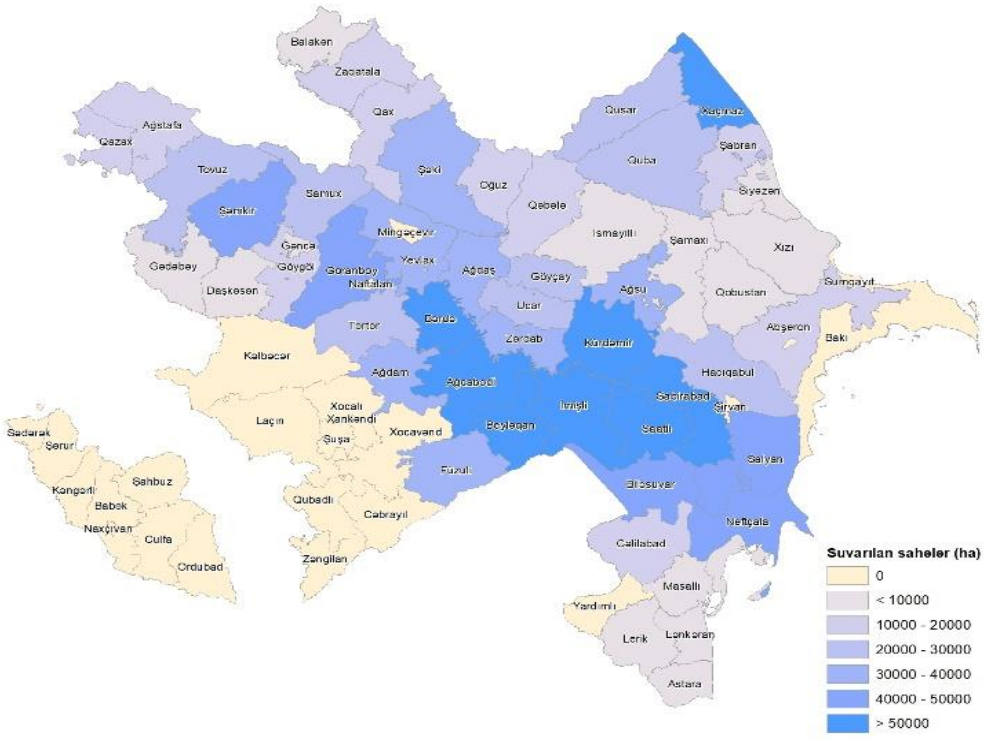
Years	*Total irrigated lands*	*of which*		
		utilised agricultural area	*of which*	
			arable land	*permanent crops*
2003	1 426,0	1 422,9	1 191,7	161,4
2013	1 435,2	1 431,8	1 209,1	158,8
2014	1 438,8	1 435,3	1 211,6	161,8
2015	1 434,5	1 431,0	1 210,4	163,8
2016	1 438,8	1 435,4	1 210,5	168,1
2017	1 445,8	1 442,4	1 213,7	172,7
2018	1 449,4	1 445,9	1 214,2	176,2
2019	1 450,2	1 446,7	1 213,0	178,7
2020	1 480,2	1 476,7	1 243,0	178,8
2021	1 484,9	1 481,1	1 246,4	179,5

Figure 1. Irrigated land area



The area of irrigated land in agricultural areas differs from one another by administrative regions. The irrigated lands are mainly the lands of the Aran economic region. The least irrigated lands are widespread in the Nagorno-Shirvan economic region.

Figure 2. Distribution of irrigated land areas by administrative regions



The water demand of plants during the growing season depends on their type, the climate and soil conditions of the area, the depth of groundwater, the applied irrigation technique and other elements. A change in any of these factors leads to a change in the irrigation regime.

The average annual rainfall in the Republic of Azerbaijan is less than 400 mm, being one of the countries with limited water resources. The Kura and Araz rivers, the two largest rivers of the South Caucasus, flow throughout the country and form fertile lowlands and irrigation systems suitable for irrigated agriculture.

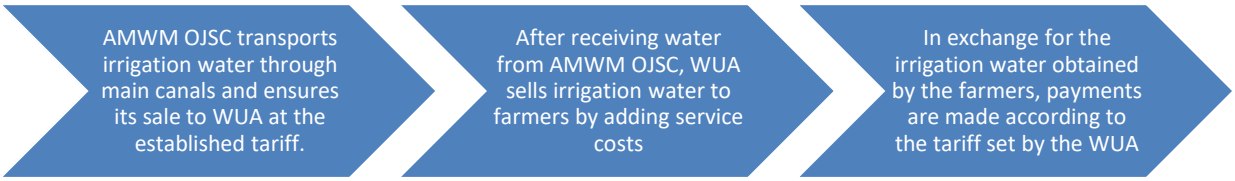
Analyzing the availability of water resources and their use, determining water demand, eliminating existing problems in this area and taking other relevant measures are very important in terms of ensuring sustainable development.

Basic water infrastructure throughout the republic, including large dams, reservoirs, irrigation distribution networks, etc. is available. Most of the irrigation canals are earthen canals built between 1950 and 1985. Most of them are physically worn out, the residual value on the balance sheet has decreased significantly.

Water User Associations (WUAs) are the last link in the organization of the irrigation chain. Water Users' Unions is an institution operating on a public basis, which buys water from the Azerbaijan Amelioration and Water Management Open Joint-Stock Company (JSC), which is authorized to take water from natural sources and deliver it to farms (at a fixed rate), and sells it to farmers. Distribution of irrigation water to landowners and collection of water consumption fees are carried out through WUAs.

In accordance with international practice, the establishment of public associations (WUAs) in the irrigation of agricultural fields was started in 1998 with the proposal of the World Bank. In 2005, the Charters of WUAs were agreed with the Ministry of Justice and approved by the former Reclamation and Water Management Agency. Until that date, the organizations registered under the name of Water User Associations were reorganized in the WUA format.

In the current situation, the working mechanism of WUAs is carried out according to this scheme:



In this case, the amount of payment by WUAs is calculated as follows:

S=A/B

S - Water fee sold by WUA to farmers (AZN);

A - Total annual storage costs of WUA (AZN);

B - Total annual water demand for the area served by WUA, 1000 m3

Funds received by WUAs for every 1000 km of water vary between 1-20 AZN, which is influenced by the following factors:

- Total expenses spent on maintenance of melioration-irrigation systems used by WUAs;
- Energy costs of subartesian wells and pumping stations;
- Price increase in water shortage conditions.

According to the decision of the meeting of the Tariff (price) Council of the Republic of Azerbaijan dated April 12, 2006 below irrigation tariffs exist (Table 3).

Table 3. Irrigation water tariffs

SN№	**The name of the services**	**Unit of measurement**	**Tariffs (in manats with VAT)**
1.	Irrigation water	1000 м^3	0,50
2.	Water supplied to winter pastures and meadows	1 hectare	0,40

About the funds collected from water users for the payment of operation and other expenses by WUAs (for some regions)

№	**Regions**	**The tariff determined by the tariff council (1000 kbm AZN)**	**Funds received by WUA for every 1000 km of water (AZN)**	**Total water fee (AZN)**
1	Siyazan	0.50	4.50	5.0
2	Tovuz	0.50	2.46-2.60	2.96-3.10
3	Fuzuli	0.50	4.50-7.0	5.0 - 7.50
4	Yevlakh	0.50	1.35	1.85
5	Lankaran	0.50	1.0-2.20	1.50-2.70
6	Samukh	0.50	1.70	2.20
7	Shamkir	0.50	2.0-3.34	2.50-3.84
8	Shamakhi	0.50	1.20-1.40	1.70-1.90
9	Agsu	0.50	3.0	3.50
10	Neftchala	0.50	1.07-1.47	1.57-1.97
11	Saatli	0.50	1.20-2.10	1.70-2.60
12	Aghdam	0.50	1.0	1.50
13	Imishli	0.50	3.0	3.50
14	Sabirabad	0.50	1.44-4.02	1.94-4.52
15	Masalli	0.50	0.80-1.02	1.30-1.52
16	Kazakh	0.50	1.50	2.0
17	Kurdamir	0.50	1.14-1.82	1.64-2.32
18	Ujar	0.50	2.0	2.50
19	Agdash	0.50	2.60-3.0	3.10-3.50
20	Barda	0.50	1.50	2.0
21	Absheron	0.50	3.0-3.5	3.50-4.0
22	Bilasuvar	0.50	1.50	2.0
23	Jalilabad	0.50	0.50	1.0
24	Goranboy	0.50	20.0	20.50

Current status and comparison of water used in agriculture:

- **Water taken and given**
- Taken water = 8.6 billion. m3
- Losses = 2.6 bln. m3
- Used water = 6.0 billion. m3

o Irrigation = 5.6 bln. m3

- fodder plants = 2.6 billion m3

- grain and grain legumes = 2.2 billion. m3

- potatoes, vegetables and melon plants = 0.6 billion. m3

- technical plants = 0.2 billion. m3

o Pasture = 0.4 bln. m3

• Cost, tariff and subsidy

- Used water = 6.0 billion. m3

- cost = 3.78 kopecks/m3 (total = 226.86 million manats)
- tariff = 0.05 kopecks/ m3 (total = 3.00 million manats)
- subsidy = 3.73 kopecks/ m3 (total = 223.86 million manats)

o Through channels = 4.3 bln. m3

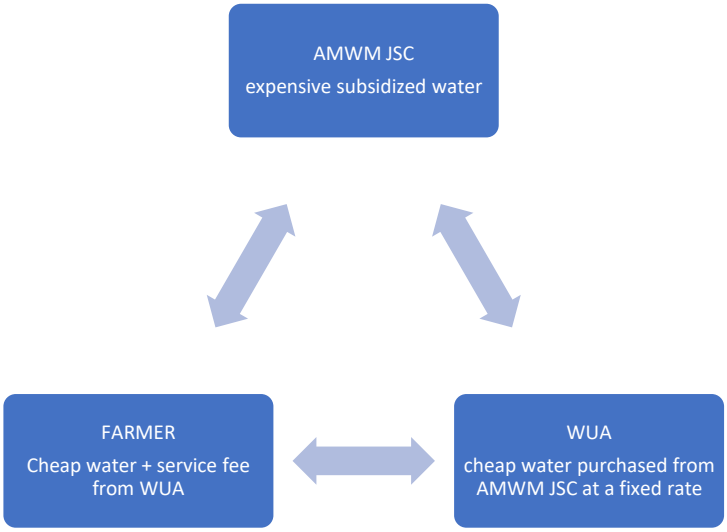
- cost = 2.71 kopecks/m3 (total = 116.53 million manats)
- tariff = 0.05 kopecks/m3 (total = 2.15 million manats)
- subsidy = 2.66 kopecks/m3 (total = 114.38 million manats)

o Through Subartesian wells = 1.7 bln. m3

- cost = 6.49 kopecks/m3 (total = 110.33 million manats)
- tariff = 0.05 kopecks/m3 (40 kopecks/ha) (total = 0.85 million manats)
- subsidy = 6.44 kopecks/m3 (total = 109.48 million manats)

- Subsidy from the state budget to Azerbaijan Melioration and Water Management OJSC for subsidized water supply in 2017: 222.5 mln. manats

Currently, water production costs (transportation and other services) are paid annually by the state in the form of subsidies to Azerbaijan Melioration and Water Management JSC. The sequence is completed as follows:



Today exists below problems in organizing WUA activity:

Weak material, technical and also services provision capacity of WUA.

1. Low theoretical and technical knowledge of WUA members.
2. In most cases, the intra-farm canals at the disposal of WUAs and othe rinfrastructure are old and need rehabilitation.
3. Determination of liability limits between WUAs and covered farmers.
4. Limited ability of WUAs to measure the amount of water they receive from the state and the amount of water lost.
5. Implementation of state control of WUA by the institution that sells water to them (Azerbaijan Melioration and Water Management JSC)
6. Failure to conclude an act of agreement regulating relations between WUA and farmers, etc.

Due to the mentioned reasons, the WUA institutional management form does not justify itself in the current situation. Thus, there are serious deficiencies in water distribution, fair supply , promotion of efficient use of water, accounting , collection of irrigation water service fees and establishment of transparent accounting, as well as regulation of farmer- WUA relations within the legal

Despite the fact that a long time has passed since its creation, the development trends of WUAs are not observed. On the contrary, a situation has arisen that leads to a lower level of service year after year. As a country with limited water resources, there is a serious need to improve the WUA institutional approach and develop the mechanism for the efficient use of water. Renewal and rehabilitation, improved management (including appropriate operation and maintenance) are required to improve irrigation efficiency and crop production. As part of the development of the Development Plan, the Water Commission should comprehensively assess the basic infrastructure and management system to identify priority opportunities to improve performance, and then develop a physical renewal program based on the results of the assessment.

Should be prioritized and classified the systems given to WUAs as internal systems so that to be of interest to different potential donors.

3. Payment for water services

3.1. Irrigation water price

Currently the area of irrigated land in the country has a general tendency of increase of about 4% compared to 2000 (when 76 percent or about 1.6 million hectares of arable lands and 84 percent or about 231 thousand hectares on perennial crops area belonged to irrigation lands).

As a result of the land reform carried out in 1996, the land suitable for agriculture in the country was distributed among the farmers. Since 1997, in order to achieve efficient and economically favorable use of water resources, in the agricultural sector paid use of irrigation water started to be applied.

By the decision of the Tariff Council of the Republic of Azerbaijan dated April 12, 2006, the tariffs for the paid use of water were approved based on new principles. According to the new rules, payment for the consumed irrigation water in a volumetric manner, based on the principle of actual water volume payment has been adopted. According to the new tariffs, the sales price of irrigation water for farmers is 0.5 AZN/1000 m3, and for winter grasslands and pastures, it is 0.4 AZN /ha, taking into account the dimensions of the service area in hectares.

In terms of farmers' access to irrigation water and the management of the irrigation system in general, the main role belongs to WUAs (Water Users Association). By 2014, 535 WUAs were registered, covering an area of 1.3 million ha, which accounted for 98% of the total irrigated land in the country. Currently there are 372 WUAs, which buy water from the Amelioration and Water Management OJSC (0.50 AZN per 1,000 m^3), and they sell it to farmers at their own tariffs pre-agreed upon with the OJSC.

The main challenge for the water economy of Azerbaijan still is substantial water losses during transportation. According to the data provided by the State Statistical Committee, in 2020 they amounted to a bit more than 25 per cent, and the lion's share goes to irrigation and agricultural water supply. According to informal data, the share of losses ranges within 40–45 per cent. One of the reasons is that more than 75 per cent out of 54,000 km of irrigation channels and drainage and collector networks go along earth channels and are open-type networks.

For example, amount of collected by Amelioration JSC fees from servers almost 100 time is less the cost of delivery services provided by company, which is covered by state subsidies

In 2022 state subsidies to Amelioration JSC is about 459,7 mln. AZN (1 AZN = 0.60 EUR), which is 13,3% more than it was in 2021.
Source: https://static.president.az/upload/Files/2021/12/23/95yknyk5n4_QANUN_BUDCE.pdf

In spite of the fact that for ensuring proportional distribution of irrigation water among farmers, serious work has already been done in the country (electronic irrigation schedules have been drawn up and farmers receive irrigation water based on this schedule) it should be noted that problems related to irrigation still remain and increases.

3.2. Permitting and licensing

Water use in Azerbaijan from legislative point of view occurs by issued by relevant state agency permits or licenses. Ministry of Ecology and Natural Resources (MENR) for water abstraction from such water bodies as rivers, water reservoirs, lakes, ground water sources and wastewater discharge issues special permit for special water use. But water abstraction for irrigation purposes from water reservoirs (managed by Water Resources State Agency of Ministry of Emergency Situations) is conducted by

Amelioration and Water Farm OJSC. Groundwater is also carried out based on the special water use permits by MENR according to provided detailed information of source and abstraction infrastructure.

Information regarding permits and licenses in portal opened in 2016 managed by the Ministry of Economy and the State Agency for Public Service and Social Innovations through the E-Government Development Centre by an electronic signature (e-signature) but water use related permits are also issued by State Environmental Expertise Agency of MENR.

Environmental permits and licenses are presumed to be issued through the following portal: https://lisenziya.gov.az and from State Environmental Expertise Agency of MENR.

Water abstraction fees vary according to the water quality (1992 Decision No. 122 of the Cabinet of Ministries on the application of payments for natural resources, payments for discharges of pollutants into the environment and the use of funds generated from these payments).

Currently Amelioration JSC sells distributes water to farmers via Water Users Associations and users pay for it according to water tariffs.

3.3. Total subsidies paid to farmers for agricultural crop production

The government, in order to help farmers in agricultural crop production, subsidies them, which in certain capacity also includes irrigation related expenses. Subsidies to farmers are paid depending on type of crop they grow.

In order to receive subsidies, producers of seedlings and seeds with land plots of more than two hectares must submit one agrochemical analysis of soil for every two hectares of land, and producers of other agricultural products with land plots of more than five hectares - one agrochemical analysis for every five hectares of sown area.

Agrarian Credit and Development Agency under the Azerbaijan's Ministry of Agriculture paid subsidies in the amount of 21.6 million AZN (EUR 12.7 million) to 44,423 farmers for autumn crops in 2021. According to the agency, the subsidies cover about 111,500 hectares of sown area.

The amount of subsidies paid from 2021 through 2022 totalled 173.3 million manat (EUR101.9 million). The area under crops, for which subsidies were paid, exceeded 880,000 hectares. The subsidies were transferred to the "farmer cards" of agricultural producers.

In accordance with the law, farmers can cash out 25 percent of the funds transferred to the card through ATMs while spend 75 percent (non-cash assets) to purchase the fertilizers, pesticides, herbicides, seeds and agricultural products.
https://atm.gov.az/en/news/65/azerbaijan-s-council-of-agricultural-subsidies-dec

Starting from 2022 agricultural subsidies issued according to the coefficients determined by Azerbaijan's Council of Agricultural Subsidies, according to the Ministry of Agriculture.

The council made the corresponding decision in accordance with clause 2.4 of the "Rules for subsidizing agricultural production" approved by the decree of the president of Azerbaijan on the distribution of crop production and crops by region, production and seed ratios, quotas for seedlings and determining the need for sowing.

As per the decision, the sowing coefficients and the amount of subsidies for agricultural plants were determined at a base cost of 200 manats (118 EUR) in the following order, starting from 2020 (Annex 1).

3.4. Irrigation water use subsidies

In order to increase efficiency of water use one of option can be subsidizing farmers as well depending of amount of water they use. For example, amount of collected by Amelioration JSC fees from servers almost 100 time is less the cost of delivery services provided by company, which is covered by state subsidies (about 450 mln AZN (265 mln EUR) annually). Therefore, cost of irrigation water can be presumed to be about 5 AZN cent per cubic meter.

If of this money large proportion (for example 80-90%) is subsidized to farmers depending on delivered them amount of water (taking into account established irrigation water norms depending on type of crop they grow) and also on total planted area. For extra use of water no subsidies can be provided to increase efficiency of water use. In this case Amelioration JSC will also try to increase efficiency of water canals to reduce water losses as they will not be subsidized for lost water.

As it has already been mentioned in the second EPR, institutional mechanisms for the establishment of the water user association (WUA) have been created at the local level in order to manage the irrigation system. Farmers' associations, buy water from the Amelioration and Water Management OJSC (50 manats per 1,000 m^3), and sell it to farmers at their own tariffs pre-agreed upon with the OJSC.

In 2022 state subsidies to Amelioration JSC was about 459,7 mln AZN, which is 13,3% more than one was in 2021.
Source: https://static.president.az/upload/Files/2021/12/23/95yknyk5n4_QANUN_BUDCE.pdf/

Currently, 51 agricultural parks and large farms are being created in 240,000 hectares of land in 32 regions. Modern irrigation systems are widely used to increase productivity in these agricultural parks. Out of 80,000 hectares of irrigated land in 43 agroparks, 40,000 hectares are irrigated by pivot irrigation, 7,000 hectares by drip, 2,000 hectares by sprinkler irrigation system, and 31,000 hectares by traditional methods.

4. Policy framework

4.1. Sustainable Development Goals and Targets

The "Transformation of our World: the 2030 Agenda for Sustainable Development" reflects 17 goals and 169 tasks that will contribute to creating extremely important opportunities for human development, ensuring the sustainability of global development by protecting our planet, approved by the resolution of the United Nations General Assembly as a continuation of the Millennium Development Goals. It focuses on the principle that no one should lag behind: putting an end to poverty, hunger in all forms and sizes in the name of humanity, forcing people to use their potential in a decent and equally healthy environment, sustainable consumption and production for the sake of the planet, sustainable management of natural resources and meeting the needs of present and future generations by taking urgent measures, protecting the planet from spoilage, supporting peaceful, fair and non-discriminatory societies, free from fear and violence in the name of peace, ensuring a prosperous and happy life for all people in the name of progress, ensuring harmony of economic, social and technological progress with nature, in the spirit of enhanced global solidarity, with special attention to the needs of the poorest and weakest, ensuring global peace for sustainable development with the participation of all countries and stakeholders, it is planned to revive the partnership and mobilize the necessary funds.

As some of the 17 sustainable development goals such as "End hunger", "Clean water and sanitation", "Fighting against climate change", "Protection of marine ecosystem", "Protection of soil ecosystem" are directly related to the protection of water resources, effective water management and efficient use, the developed National Water Strategy also aims to achieve the mentioned goals in parallel with main priorities.

Azerbaijan is among the countries with relatively low water resources. Water scarcity is observed in many regions due to the uneven distribution of water resources in the country. In this context, one of the most critical issues is effective water resources management and ensuring the environmental sustainability of water bodies.

As part of the UN Sustainable Development Goals, clean water and sanitation (6), affordable and clean energy (7), combating climate change (13), protection of marine ecosystems (14), and other issues represent the main focus of state policy implemented in the Republic of Azerbaijan. At the same time, our country has identified the targets of SDG 6 regarding the accessibility and sustainable management of water supply and sewage services as the overall priority.

SDG 6 (Clean water and sanitation) and its 8 indicators out of the 11 international indicators have been prioritized as national indicators in our country.

Ministry of Ecology and Natural Resources of the Republic of Azerbaijan lead work on indicators:

- 6.5.1: Degree of integrated water resources management implementation,
- 6.5.2: "Proportion of transboundary basin area with an operational arrangement for water cooperation"
- 6.3.2: "Proportion of bodies of water with good ambient water quality".

Particularly regarding indicator 6.5.1. during last 3 years relevant legal-institutional, planning and coordination work was carried out and degree of implementation of IWRM raised to 40%. Regarding other indicators it should be noted that proportion of securely treated waste waters exceed 50% (SDG

6.3.1) and weight of water bodies with good quality increased during last 12 years from 42 to 67%. Currently water abstraction is about 57% of total values of the flow.

4.2. Water management strategy

The main water management problems of the Republic of Azerbaijan include the lack of integrated approach for water resources, low and uneven distribution of water resources in the country, pollution of transboundary rivers, threats to water security, etc.

The mechanism of using the river basin approach to water resources management has not been defined in Azerbaijan. It is necessary to create a single state body responsible for the integrated water supply of all sectors, including population, agriculture, and other areas as well as for the implementation of measures to improve the condition of all water bodies (rivers, lakes, reservoirs, etc.).

While the average annual precipitation in Azerbaijan is about 479 mm, some basins have water shortages due to even lower precipitation levels, thus facing possible difficulties acquiring sufficient quantities of water. Recent studies show that soon Azerbaijan will become hotter, drier, and more unstable in terms of humidity, which means that there may be problems with water.

Global climate changes in recent years have led to a significant reduction in surface water reserves, precipitation and water content in rivers coming mainly from neighboring countries. These processes increase the risks in terms of meeting the water needs and ensuring food security, which will further aggravate the situation in the coming years, making the sustainability of water resources unreliable. On the other hand, the demand for water is increasing as a result of rapid population growth, an increase in living standards, the development of the country's economy, including agriculture, the expansion of agricultural land, irrigation networks and drinking water supply.

The National Water Policy Dialogue (NWPD) was established in 2010 as an inter-ministerial platform to support water sector reforms. The NWPD aims to develop Water Strategy based on the Integrated Water Resources Management in Azerbaijan (IWRM), the European Union (EU) Water Framework Directive, the UN Economic Commission for Europe Convention on the Protection and Use of Transboundary Watercourses and International Lakes, and its Protocol on Water and Health.

Urgent priorities have been identified in the Draft Water Strategy to solve existing problems in the area of water use and the protection of water resources. They play an important role in the sustainable socio-economic development of the country as measures continue to be implemented in this area. Particular attention is paid to the water deficit in the country and the provision of the population with drinking water. With the support of the state budget, numerous projects have been implemented in recent years to develop the water sector, and this work is still underway. Large-scale measures are currently implemented to ensure efficient use and access of all consumers to water, including protection of water resources, reduction of losses, application of water-saving technologies, and prevention of wastage |WS|.

The main policy principles in the water sector according to the National Water Strategy is to ensure increased and efficient use of water resources and improvement of the water quality. The existing problems in this area and relevant principles of water policy represent major priorities of the National Strategy.

The compilation and application of water balance with due regard for interests and share of all water users, water users' classification and prioritization by their respective climatic conditions, water resources, water quality, water demand, demand for agricultural products, and other similar factors, and

the creation of new water sources and transport infrastructure represent the main scope of the National Strategy, laying the groundwork for the efficient and integrated use of water resources.

The main priorities of the National Strategy are as follows:

- improvement of water legislation to ensure application of IMWR principles in Azerbaijan;
- achieving sustainable water resources management based on the basin approach;
- development of river basin management planning;
- strengthening the organizational and regulatory framework in the water sector;
- strengthening the system of monitoring to determine the ecological status of water facilities, creating a database on surface and groundwater (including the study and management of thermal and mineral waters);
- improving the drinking water supply and the system of wastewater treatment;
- ensuring the use of water in energy production;
- solving/ensuring legal regulation of existing problems related to transboundary rivers;
- supporting investments in water protection and new technologies (especially irrigation);
- building the capacity of water structures on national and basin levels.

The priority is to solve the problems related to the integrated management of water resources in the Republic of Azerbaijan, to determine the mechanism of the approach to management based on basin principles, to ensure the effective use of water.

As a result of the implementation of the National Water Strategy of Azerbaijan, taking into account the reduction of water resources against the background of global climate change in the coming years, water resources will be re-estimated, effectively managed, efficiently used and provided with safety as a top priority in order to preserve the health and social well-being of the population.

Short-term strategic vision until 2026 **includes** development of measures and reconciling of them with the "Action Plan for ensuring the efficient use of Water Resources for 2020-2022" approved by the Order of the President of the Republic of Azerbaijan No. 2178, dated July 27, 2020, and the "Socio-economic development strategy for 2022-2026" approved by the Order of the President of the Republic of Azerbaijan No. 3378, dated July 22, 2022. These measures include revaluation (reassessment) of Water Resources, increase of Water Resources, implementation of optimal management model, effective and integrated management of Water Resources, use of potential water resources of liberated territories, management of wastewater and rainwater, improvement of water quality, expansion of water infrastructures, reduction of water losses and efficient use of Water, provision of Water Security, etc.

At the second stage, the model of the medium-term strategic vision of development, in 2027-2030, on the basis of strengthening the fundamental conditions, water resources will be effectively managed, rational use of water and water security will be fully ensured, the strategy will be enhanced and certain Sustainable Development Goals such as "End hunger", "Clean water and sanitation", "Fighting against climate change", "Protection of marine ecosystem", "Protection of soil ecosystem" will be achieved along with other priorities selected as the targets.

At the third stage, being the long-term strategic target vision model, for the years of 2031-2040, in conditions of adaptation of water resources to the trend of reduction in the coming years against the background of global climate change, by continuing effective management of hydro-ecological crises

based on innovative technologies, increasing water resources, expanding the use of alternative water sources, the need for sustainable and high-quality water will be met to preserve the health and social well-being of future generations

To ensure efficient use of water resources in the country and improve water resource management and coordination of activities in this area, a Commission was established by the Order of the President of the Republic of Azerbaijan "On measures to ensure the efficient use of water resources" dated 15 April 2020.

The Order of the President of the Republic of Azerbaijan dated 27 July 2020 approved the "Action plan on ensuring the efficient use of water resources."

To apply common principle-based management to state companies, enterprises, and economic entities involving the state ownership (state-owned enterprises) and promote their activities as well as to increase transparency and economic efficiency of their investment programs and improve their competitiveness, financial health, and stability, the President of the Republic of Azerbaijan signed a Decree dated 7 August 2020 to establish the Azerbaijani Investment Holding.

The National Water Strategy considers to implement an integrated approach to the management of water resources as well as to ensure sustainable socio-economic development of the country and water security. For this purpose, applying the principle of integrated management of short, medium, and long-term water resources constitutes one of the major strategic activities.

5. Main actors involved in financing the water sector in Azerbaijan

5.1. Financial support for the implementation of the National programs and strategies

The following sources have been envisaged to finance the implementation of the measures provided for by the National Strategy:

- funds provided in certain years by the state budget for the relevant executive authorities under the action plan;
- extra-budgetary funds;
- funds of agencies, enterprises, and organizations regardless of their form of ownership;
- domestic and foreign investments;
- grants, technical and financial assistance from international organizations and foreign countries;
- other sources stipulated by law.

5.2. Expenditure on environmental protection

According to the State Statistics Committee, public expenditures in environmental protection are presented in Table 3.7. Total government expenditures related to environmental protection increased between 2011 and 2012, before decreasing to achieve their lowest point in 2015. Since then, public expenditures have been increasing steadily (by 184.6 per cent between 2015 and 2019)/6.17/

The sharp decrease in 2020, compared to 2019, is to be interpreted with caution, as it is likely due to the Covid-19 pandemic and does not necessarily reflect a trend in government expenditures. The largest share of expenditures corresponds to capital investments in air, water and land protection. Expenditures for environmental protection contribute to progress towards SDG Target 11.4 (Strengthen efforts to protect and safeguard the world's cultural and natural heritage).

5.3. Public-private partnerships (PPPs) in support of green economy

As of April 2022, Azerbaijan allows PPPs in different areas that may have a positive environmental impact, including reservoirs, water treatment facilities, irrigation, drinking and household water, as well as sewerage systems.

In 2019, the Public-Private Partnership development Centre was established under the Small and Medium Business Development Agency in order to ensure systemic approach in promoting and supporting PPP projects (2019 Decision of the Board of the Ministry of Economy). Its aims are to:

- Make proposals on the development of legislative base and institutional infrastructure of public-private partnerships;
- Prepare, implement and coordinate programs and projects on public-private partnerships;

- Ensure and broaden the participation of SMEs in public-private partnership programs and projects;
- Raise awareness and capacity building for all stakeholders in PPPs;
- Analyse and screen projects in accordance with the criteria of public-private partnership and taking relevant.

The current legislation on PPPs can be strengthened by improving of ownership rules by providing clear guidance as to who is considered as the owner of the facilities within the operation period—the Investor, the State or the Project Company.

A reform in the PPP legislation would contribute to progress towards SDG Target 17.17 (Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships).

5.4. Environmental funds and other environment-related funds

There are a number of funds that are under the control of the Ministry of Ecology and Natural Resources. They are budgetary funds, which are integrated into the overall State budget system. The largest fund is the State Fund for the Protection of the Environment. The Law on Environmental Protection specifies the types of measures that can be financed by the State Fund for the Protection of the Environment, which include research, education, infrastructure building and provision of incentives. Pollution charges and fines are the main sources of revenue for the State Fund for the Protection of the Environment.

5.4.1. State Oil Fund (SOFAZ)

The assets of SOFAZ are managed in accordance with the Rules on management of currency assets of the State Oil Fund, approved by 2001 Presidential Decree No. 511 and amended by 2001 Presidential Decrees No. 607 in 2001, No. 202 in 2005, No. 216 in 2010, No. 519 in 2011, No. 1376 in 2017 and No. 450 in 2018 and Investment Policy of the State Oil Fund approved by Presidential decrees on an annual basis (www.oilfund.az/en/investments/information).

According to EPR report as of 31 December 2021, SOFAZ Fund has a total of EUR 45,025 million assets, with a portfolio composed of 61.8 per cent fixed income and other market instruments, 19 per cent equities, 6.1 per cent real estate and 13.1 per cent gold. SOFAZ has financed some projects that contribute to environmental protection. Since 2011 these projects include the Oguz-Gabala-Baku water supply system (779.6 million AZN), the reconstruction of the Samur-Absheron irrigation system (1,469.6 million AZN) and the Baku-Tbilisi-Kars railway (746.6 million AZN).

The Fund also makes significant annual contributions to the State Budget. Over the period 2011–2021, around 97 billion AZN were transferred.

5.4.2. Foreign direct investment

The 2018 Presidential Order No. 497 on additional measures to support competitive domestic production in the non-oil sector[1] lists several measures aimed at promoting investments in non-oil sectors, including the creation of (i) "First in Azerbaijan", an investment promotion mechanism for the production of goods not previously produced in the country and of (ii) "Investing in Azerbaijan", a mechanism to support direct investment in the country's economy. Most of the FDI received in Azerbaijan concerns the oil sector (Table 4).

Table 4. FDI received by Azerbaijan, 2011-2020, EUR, million

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
FDI for oil	4,443.9	5,289.4	6,278.0	8,049.2	7,483.1	7,326.6	5,713.8	4,109.1	4,275.2	4,527.7
sector (%)	78	81.10	82.40	83.60	88.50	76.70	86	76.50	78.30	86.60

Source: Azerbaijan Central Bank, 2021.

Net official development assistance and official aid received (current US$) in Azerbaijan was reported at 9240000 USD in 2021, according to the World Bank collection of development indicators, compiled from officially recognized sources. Azerbaijan - Net official development assistance and official aid received - actual values, historical data, forecasts and projections were sourced from the World Bank on May of 2023.

5.4.3. Official Development Aid (ODA)

The Azerbaijan International Development Agency (AIDA) was established in September 2011 under the Ministry of Foreign Affairs of the Republic of Azerbaijan. AIDA is responsible for the provision of international humanitarian and development assistance by the Republic of Azerbaijan and coordinates activities of all relevant government bodies in this field.

AIDA supports the efforts of developing countries through its programs in the areas of poverty reduction, development of science, culture and health, application of information-communication technologies, various scholarship programs, and humanitarian assistance. AIDA's annual budget is formed by relevant allocations from the state budget. AIDA's activities are structured in line and concurrent with the foreign policy of the Republic of Azerbaijan.

The main objective of AIDA in development assistance is to provide technical assistance to developing countries around the world and to support their sustainable growth in various fields. According to the OECD, 2020 official development assistance from Azerbaijan decreased by 7% to US$26 million.[4]

[1] www.e-qanun.az/framework/40086

AIDA, together with Azerbaijan's universities, scientific and research institutes arranges capacity-building courses and workshops in various areas for specialists from developing countries to facilitate the growth of human capital in those countries.[8]

5.5. Mobilizing finance

In accordance with the Action Plan for 2020-2022 on Ensuring Effective Use of Water Resources (Annex 2), the reconstruction of 22 irrigation canals and the creation of 10 new reservoirs has begun. The 2021 Presidential Decree on additional activities aimed at improving the security of irrigation water for arable lands in a number of regions and meeting the residents needs for drinking water.

One point should be noted that although the management of irrigation and melioration systems in Azerbaijan is mainly based on the market economy approach, the costs of operation and maintenance are still provided by the state in modern times.

Following this process, the state of Azerbaijan envisages the gradual release of the state from the cost burden of management through the strengthening of WUAs and further expansion of joint management, increasing the obligations and responsibilities of farmers related to the management and maintenance of irrigation systems

In addition to construction of reservoirs and repairing of other water infrastructure there will be need to finance implementation of NWS and RBMPs in the future which requires billions of AZN (1 AZN =0.59EUR) in for each WS implementation periods.

Below is shown annual expenditure on environment protection where due place is located to water allocation.

Table 5. Public Expenditures in Environmental Protection, 2011–2020, million manats

	2000	2005	2010	2015	2019	2020	2021
Total	**18188,4**	**30905,7**	**260673,8**	**136208,3**	**387680,4**	**239764,5**	**141342,7**
including:							
expenditures for carrying out of activities for the protection of environment		21395,8	52817,3	32258,4	59222,8	49727,3	50589,6
expenditures for capital repair of fixed assets on protection of environment	3129,0	1860,8	4793,6	1605,0	11853,9	1920,1	1028,8
expenditures on maintenance of reserves, national parks, wild animals,	301,4	1026,0	3902,7	5949,8	6837,4	6206,0	6785,9

fishes and their reproduction							
expenditures for forestry	1181,4	3710,8	9153,0	11530,7	10793,0	11702,4	11609
capital investments for rational use of natural resources and protection of environment	1722,7	2912,3	190007,2	84864,4	309855,6	170208,7	71329,4
Expenditures per thsd.AZN of GDP[1)]	1,51	1,37	5,39	2,50	7,06	4,56	2,54

Source: *State Statistics Committee. Available at* www.stat.gov.az/source/environment/?lang=en.

Table 6. Current expenditures for carrying out of activities for environmental protection (thousand AZN)

	2000	**2005**	**2010**	**2015**	**2019**	**2020**	**2021**
Total	**11853,9**	**21395,8**	**52817,3**	**32258,4**	**59222,8**	**49727,3**	**50589,6**
including:							
protection of water resources and their rational use	10508,5	17899,3	39226,5	17276,2	31984,1	28998,1	20318,6
air protection	1040,5	2100,3	1049,6	2518,6	5710,2	5793,3	6096,5
protection from production and consumption pollutants	132,9	971,2	4054,2	7455,8	13627,4	11892,0	20937,1
land recultivation	172,0	425,0	8487,0	5007,8	7901,1	3043,9	3237,4

But it should be noted that annually about 450 mln AZN (1 AZN = 0.59 EUR) is allocated for state budget to Amelioration JSC 30-40 mln AZN (1 AZN = 0.59 EUR) to Azersu JSC, over 200 mln to Minstry of emergency and other investment from national budget and international donor supported activities relate here as well.

Therefore, it would be important on accepting of NWS it would be important to conduct budgetary assessment of its implementation for short, medium and long and terms, including for development and implementation of RBMPs, rehabilitation of existing and constructing of new water management infrastructure.

If should be important to consider an NBS approach as most optimal solution in this regards particularly when extending of water storage areas or solving of water salinity issues in Kura delta as it was sown in previous sections of this report.

5.6. Donor supported projects

The principal donors to Azerbaijan are Germany, Japan, Korea, United States of America, Turkey, the World Bank, the European Union, and others. Inversely, external support on environment experienced a slight increase, mainly due to the greater number of projects supported under the GEF in recent years. Between 2002 and 2011, 13 projects were approved in the GEF that had Azerbaijan as a beneficiary or one of the beneficiaries, a figure that compares with 28 in the period from 2012 to 2021. Of these 28, 16 with a GEF total grant of more than EUR 29 million were projects that had Azerbaijan as the exclusive beneficiary, while the remaining 12 were regional projects, mainly with neighbouring countries, in which Azerbaijan participated.

Azerbaijan received EUR 11,480,000 under STAR GEF-5 (2010–2014) and EUR 9,559,571 under STAR GEF-6 (2014-2018), of which around EUR 2.6 million remain to be used. The funds were used in different environmental projects dealing with land degradation, climate change and biodiversity conservation.

5.6.1. EU funded national projects

Azerbaijan has benefited from close cooperation with the European Union in the framework of the European Neighbourhood Policy and its eastern regional dimension, the Eastern Partnership.

In 2019, Azerbaijan joined the Eastern Europe Energy Efficiency and Environment Partnership (E5P), with further EU support in the energy sector. Cooperation on the environment and climate goals has been strengthened.

The framework for EU-Azerbaijan relations is embodied in the Partnership and Cooperation Agreement (PCA) in force since 1999. Since then, the EU has become the main investor in the non-oil sector in the country.2 In February 2017, negotiations were launched on a comprehensive new agreement between the EU and Azerbaijan, which is to replace the PCA. EU-Azerbaijan Partnership Priorities have been endorsed by both sides on 28 September 2018.

According to the EPR report over the 2011–2021 period, Azerbaijan received €558.95 million in aid, of which: €36.6 million were used to finance waste management and disposal projects; €78.02 million for water supply and sanitation; €3.57 for general environmental protection; €1,9 million for agricultural development and €1.25 million for projects concerning renewable energy production.

With the support from the EUWI+, a number of legal and regulatory package of draft documents was developed such as the “Action Plan for 2020–2022 to ensure the efficient use of water resources,” later approved by the 2020 Presidential Decree. Pilot river basin plans were implemented. Work was also undertaken in assessing capacities and needs, purchasing equipment and upgrading existing laboratories, supporting laboratories for accreditation, providing trainings and preparing Monitoring Development Plans.

5.6.2. EU funded regional (transboundary) projects

The EU-funded ENPI SEIS II East project was implemented in 2016–2020 by EEA, the Ministry of Ecology and Natural Resources and the State Statistical Committee. Its main objective was to continue to implement the principles and practices of SEIS in the country. As a result, the country produced

[2] https://ec.europa.eu/neighbourhood-enlargement/system/files/2021-12/09.12.2021-Azerbaijan_factograph.pdf

environmental reports and indicator-based assessments in line with EU and EEA methodologies. The introduction of ECE environmental indicators is progressing towards a final stage and certain indicators are used to report to the MEAs. Also, the capacity to manage and use environmental information has been improved. However, there is no evidence that this information is used to support decision-making. The results of the project according to its four main components are:

- Institutional framework: the roles and responsibilities within the Ministry of Ecology and Natural Resources regarding environment data collection, processing and reporting were revised and streamlined, organisational changes were elaborated and endorsed by the Ministry.
- Development of technical systems for environmental monitoring: the national environmental monitoring system was modernised with an enhanced data collection, processing and reporting.
- Capacity building and training: the capacity of the Ministry of Ecology and Natural Resources regarding environmental data collection, processing, analysis, reporting and communication was increased
- Practical implementation of the modernised systems by real case studies: environmental data collection, processing and analysis were tested in real cases and environmental information was communicated.

The Environmental Protection of International River Basins Project (ENPI-EPIRB) project was implemented from 2012 to 2015. The overall objective of the project was to improve water quality in the transboundary river basins of the wider Black Sea region, including Azerbaijan. From the environmental monitoring point of view, the project has contributed to increase capacity of WFD compliant monitoring. It also developed two guiding documents that are relevant to water monitoring: Guidelines for Groundwater Monitoring in the Pilot River Basins of Caucasus Countries (Armenia, Azerbaijan and Georgia) and Surface Waters Monitoring Programme in the Central Kura River basin (Azerbaijan).

The 2030 Agenda and the Paris Agreement are relevant focus areas within the Partnership, that has launched three flagship projects in which Azerbaijan has participated actively:

- The EU4Environment (2019–2022) aimed at helping the six Eastern Partner countries to preserve their natural capital and increase people's environmental well-being, by supporting environment-related action, demonstrating and unlocking opportunities for greener growth, and setting mechanisms to better manage environmental risks and impacts.
- The EU4Climate initiative (2018–2022) aimed at supporting, in the eastern European countries the development and implementation of climate policies, contributing to low emission and climate resilient development, as well as to commitments to the Paris Agreement on Climate Change.
- The EU Water Initiative Plus (EUWI+, 2016–2021), which pursues the advancement of eastern European countries legislation in the field of water management and improve the management of transboundary river basins. The Cooperation Framework implementation will build.

5.6.3. Projects with UN institutions

CLIMATE WATER PROJECTS

UNDP, UNEP and FAO are the most prominent agencies supporting the development of policies, programs and projects in the environmental field, including in terms of technical assistance, to the country.

UNECE provided technical and expertise to the legal review of draft legislation on Environmental Impact Assessment and to the national report under the Water Convention.

The support provided by the UN institutions is consistent with the former UN-Azerbaijan Frameworks, the last of which ended in 2020. In 2021 a new cooperation agreement was approved: the UN-Azerbaijan Partnership Framework for 2021–2025. Protecting the Environment and Addressing Climate Change emerges as one of the four priorities and is operationalized through a set of expected results such as contributing to the establishment of a national green climate fund, a legal riparian water management agreement, and a national waste and wastewater management plan as well as providing technical assistance under the five ECE MEAs.

As part of its international commitments under this Convention, Azerbaijan ensures regular reporting of climate change related trends and developments in the form of national communications and biennial update reports. In this regard, the Government developed and submitted its Fourth National Communication in 2021where one of 3 main sectors impacted by Climate change has been identified to be water.

"*National Adaptation Plan (NAP) Support Project for adaptation planning and implementation in Azerbaijan (2021-2024)*" was approved, with UNDP as Delivery Partner. The Green Climate Fund project supports the Government of Azerbaijan in facilitating the development of the NAP and the improved climate change adaptation actions in Azerbaijan in three priority sectors identified by the Ministry of Ecology and Natural Resources (MENR) through stakeholder consultations: water, agriculture and coastal areas.

Urbanization and Climate Change Adaptation in the Caspian Sea Region Countries: Republic of Azerbaijan and Islamic Republic of Iran (2022)

Implementing Entity: United Nations Human Settlements Programme - UN-Habitat (lead); United Nations Environment Programme - UNEP (coleading implementing partner); International Organisation for Migration – IOM (implementing partner)

Executing Entities:

Government of Azerbaijan: Ministry of Ecology and Natural Resources (leading), State Committee on Urban Planning and Architecture (supporting).

Government of Islamic Republic of Iran: Director General for International Environmental and Sustainable Development Affairs of the Ministry of Foreign Affairs (co-leading), Ministry of Roads and Urban Development and (supporting), Department of Environment (supporting). Regional Component: Teheran Convention Interim Secretariat Amount of Financing Requested: 14 Million U.S Dollars Project Duration: 4 years.

Azerbaijan has submitted to the Green Climate Fund the third readiness proposal in May 2019, of over 30 mln USD proposal on "*Development of a strategy and action plan for up scaling climate services and multi-hazard early warning in Azerbaijan*" is under preparation, with UNEP as Delivery Partner. The third readiness proposal will assess climate services and multi-hazard early warning systems, the feasibility for up scaling them and the development of a strategy, action plan and financing strategy.

Strengthening and Country Programming support for Azerbaijan through FAO.2020-2022 (500.000 USD). Aims at private sector participation into climate investments specifically in the agriculture and LULUCF sectors for the implementation of INDC, following a gender balanced and participatory approach to all the proposed activities. The support for identification of Direct In relation to water FAO also implement in Azerbaijan Improved water governance: towards sustainable agricultural development project (2021-2023) 300.000 USD.

5.6.4. Awareness raising and capacity building

In the period 2018–2019 the "Environmental Education for Sustainable Development" project was implemented by the ministry in charge of education in cooperation with UNICEF. The Republican Child and Youth Development Centre organized workshops in regional Centers for 200 teaching staff who were familiarized with teaching technologies on the environment, the use of natural resources and biodiversity conservation.

In 2019, UNICEF continued to provide technical support to the Ministry of Education to increase knowledge of the 2030 Agenda for Sustainable Development and to encourage environmental thinking amongst 170 teachers and over 4,000 school students in 38 schools in Baku and Sumgait. A study of the existing Education Management Information System was initiated with the Ministry including a focus on the identification of capacities and gaps and suggestion of strategies for improvement of quality of data on water, sanitation and hygiene in schools. The study and its recommendations were shared with the Ministry of Education; however, no response or further action was taken by the Ministry due to COVID-19 related reprograming of financial resources.

UNICEF is providing support to the Government to advance preschool education, including developing an National Action Plan for preschool education, which was approved in 2016 and brought school readiness classes to all five-year-old children in Azerbaijan. Since 2016, more than 4,600 teachers from 61 regions have been trained to deliver the School Readiness Programme, which covered 95,000 five-year-old children in 2017, increasing attendance from 55 per cent in 2016 to 65 per cent in 2017. UNICEF also supported school-readiness through teacher training and the development of learning materials. The new preschool education curriculum has been developed built around global early learning development standards and the lesson learned from the successful school readiness pilot programmes supported by UNICEF.

5.7. Development of cooperation on transboundary and transit water bodies

It is important to implement existing cooperation agreements and sign the new treaties on transboundary cooperation. Azerbaijan's regional neighbors are not parties to the UNECE Convention on the protection and use of transboundary watercourses and international lakes.

Transboundary water pollution and shortage in period of irrigation has been increased in last period. This is also contributing to pollution of Caspian Sea and creates ecological problems for river delta ecosystem and its flora and fauna.

Cooperation with other watershed countries is important and can bring multipurpose benefits for the development of water resources, water quality, and water use.

The Caspian littoral countries have considered establishing common mechanisms and standards for environmental monitoring of the Caspian Sea to enable comparison of the results. Therefore, a working group was established to carry out these works. Besides this, the draft Protocol on Monitoring, Assessment and Information Exchange to the Tehran Convention was prepared for legalising the process (as of February 2022). Regarding transboundary biodiversity monitoring, the country has no regional cooperation in this field, hampering an efficient biodiversity protection. Moreover, transboundary monitoring of surface and groundwater seems to be insufficient.

According to EPR report there is need to strengthen regional cooperation for environmental monitoring and information, in particular regarding:

a) Speeding up of the negotiation for signature of the Protocol on Monitoring, Assessment and Information Exchange to the Tehran Convention;

b) The identification of key transboundary priority conservation areas to be regularly monitored;

c) The establishment and/or expansion of transboundary surface and groundwater monitoring networks.

In the last 15 years, Azerbaijan more than tripled foreign diplomatic representations, including permanent missions to international organisations. This external policy movement can also be observed bilateral agreements signed with other countries on environment-related issues. As from 2012, bilateral agreements have been signed with 1) Croatia on environment and nature protection (2013), 2) Bulgaria on cooperation on environmental protection (2014), 3), Islamic Republic of Iran on meteorology and related issues (2014), 4) Montenegro on cooperation on environmental protection (2015), 5) Qatar on cooperation on protection of endangered wildlife and its natural environment (2017), 6) Turkmenistan on cooperation on environmental protection and vii) France on Environment, Energy, Maritime and Climate.

Transboundary cooperation on shared water resources is critical for ensuring effective water resources management and for water security. In this regard, it is also worth noting the more recent agreements signed by Azerbaijan on transboundary water resources or with water-related relevant impacts such as the agreement with the Russian Federation on the Rational Use and Protection of the Water Resources of the Transboundary Samur River (2010) and with the Islamic Republic of Iran on the Construction of Hydroelectric Facilities (Ordubad-Marazad and Khudaferin-Gyz Galasy) for the Joint Use of Water Resources of the Araz River (2016).

It is also very important to point out that cooperation between Azerbaijan and Georgia has been taking place in regard to the Kura River, on the basis of regional and national working groups with regular meetings and specific mandates that are updated and endorsed by the two countries, with the support of GEF and UNDP. The two countries committed to cooperate towards transboundary IWRM, on the basis of the following five pillars:

1. Institutional strengthening and updating for sustainable IWRM,
2. Capacity building for professional water managers across multiple sectors,
3. Demonstrating applied solutions to improve water management in critical areas,
4. Increasing stakeholder awareness, education and empowerment,
5. Improving the use of science for governance.

The conditions seem to be met for moving towards the establishment of a legally binding agreement for the rational use and protection of the Kura River Basin between Azerbaijan and Georgia.

Georgia and Azerbaijan can play important role in application of transboundary level IWRM and basin approach according to EU WFD. Currently EU4Env. Water and Data project supports both countries towards transboundary water monitoring and also RBMP harmonization.

6. Practical reforms of the water management system in agriculture sector in Azerbaijan

6.1. Improvement of the institutional framework of the water sector based on the principles of integrated water resources management

Although the system of relevant legislation, water use tariffs, and penalties is currently applied in the water sector of Azerbaijan, the bodies that implement the system lack coordination.

The National Strategy proposes a clear separation of responsibilities for establishing, regulating, licensing, and supervising interagency coordination. From the administrative point of view, the issuance of water use permits should be separated from water use control while ensuring the independence of the water use permit process/6.21/.

While considering watersheds, local basin authorities shall combine coordinated management with unified rules and the development of organizations' functions and activities.

The aforementioned principles of improving institutional structure and capacity can be summarized as follows:

- establishment of watershed authorities and a watershed council to ensure integrated management of watershed resources;
- specifying the role (location) and responsibility of basin authorities at the national and regional levels;
- strengthening the organizational capacity of the water sector.

When government adopts the Water strategy the relevant enabling environment can be created to start application of IWRM in way described in the strategy in relation to water resources management through strengthened inter sectoral coordination, increased water use efficiency and river basin planning according to EU WFD.

6.2. Encouraging the efficient use of water and cost recovery

Drafting and approval of the country's annual water balance are aimed at assessing the availability and use of water resources at/by water facilities, planning the use and protection of water facilities, improving state water accounting, clarifying the mechanism and purpose of chargeable water consumption, enhancing water resources management efficiency, improving the financial position of entities providing services in this area, and ensuring a more flexible tariff/price regulation.

To help improve the country's public accounting of water consumption, it is important to approve the rules for water use charges. The adoption of the rules for water use charges is necessary to regulate relations between entities operating in the water sector, establishing the mechanism of mutual settlements, payments, and control to ensure the efficient use of water resources, clarifying the purpose of water use charges, water tariffs/price, improving the policy, etc.

The application of household tariffs to domestic and potable water supply services represents one of the means to save water. In general, the system should promote the water-saving practice through additional incentives.

In addition, improving water supply systems and especially raising public awareness can help reduce per capita water consumption. The current tariffs fail to reflect the cost/services of water consumption in Azerbaijan.

The country's legislation specifies preferential tariffs for irrigation water consumed by water user associations, municipalities, agriculture as well as for water supplied to winter pastures and rangelands, with tariffs for industrial, municipal, and other types of water consumption calculated against the actual costs incurred to extract water.

Azerbaijan's problems of primary irrigation include inefficient water use, failure of irrigation systems to meet the required standards as well as extremely low funding of the development, reconstruction, normal operation, and maintenance of these systems.

Appropriate economic instruments to address more efficient use of water include mobilizing sufficient funds to finance baseline water pricing, normal water quality, maintenance of water supply facilities envisaging the introduction of concessions (the objective of irrigation water policy is to gradually increase charges for water consumption by the agricultural sector and at least fully offset the cost of water supply), and providing cost-effective and targeted support for the reconstruction of irrigation systems.

The introduction of cleaner industrial production and technologies, water purification, and recycling will help to save money and reduce water pollution. Though very cost-effective, these measures require investment and international financing.

The greater application of economic instruments to facilitate the implementation of water policy. Indeed, the development of reform proposals includes one or more specific features of the economic instruments under consideration. This also is attracted national strategy and include improvement in the following areas:

- rate of tariffs, costs, and coefficients (usually raised through reforms);
- tariff structure and tariff setting process: it is a recurring process that may involve changes to sector development goals, investment, and operating programs;
- grounds used to determine service charges: a comparison of actual pollutant flows with the permissible level of pollutant discharges paid for by each user.

Rules on water abstraction from natural sources should be reformed based on preparation and application of new regulations to control all abstractions and make sure that abstraction fees system takes into account real water demand and ecosystem water needs as well.

The charges implemented are too low to provide incentives for efficiency use of water and need to be revised and reformed.

Negative impacts of inefficiency and uncontrolled water use creates serious water scarcity problems and discharge of polluted waters into water bodies creates environmental and human health problems, which cannot be solved by use of limited values of fees collected as payment for water use or as pollution charges. Therefore, reforms are needed to establish effective payment system of fees for water abstraction and wastewater discharge.

System of monitoring and control should be reformed and effectiveness of its application should be increased to make sure that all users are in compliance with users pay principles according to the amounts of water they receive.

In order to increase freshwater reserves, which are limited, and declining, efficient use of water will be ensured by creating new reservoirs, encouraging the use of alternative water sources, expanding water infrastructure and minimizing water losses.

Reduce water losses:

- Prevention of water losses in irrigation water supply systems;
- Strengthening the fight against illegal use of water.
- Increase water resources and using alternative water sources;
- Increase of surface water reserves due to creation of reservoirs;
- Artificial recharging of groundwaters;
- Cleaning and use of collector and drainage waters;
- Rainwater management and use;
- Purification and use of highly mineralized groundwater;
- Desalination and use of seawater;
- Wastewater treatment and use.

Enhancing irrigation water infrastructure:

- Development and implementation of the Master Plan for economic regions;
- Creation of waste and collector water treatment and reuse
- Creation of rainwater management systems;
- Development and implementation of the master plan for the basins;
- Creation of a new complex of reservoirs;
- Reconstruction and restoration of irrigation canals;
- Reconstruction and restoration of collectors;
- Expansion of irrigation and reclamation systems.

Promote rational water use:

- Promote the application of smart water systems;
- Promote the usage of modern irrigation technologies;
- Promote efficient and economical water use.
- Meeting water demand for irrigation and other sectors in line with international practice and local conditions

6.3. Enabling environment to practices application of integrated river basin management planning approach

Azerbaijan has no guidelines for developing River Basin Management Plans (RBMPs). However, there are several internationally used guidelines, such as the General Implementation Strategy (GIS) of Water

Framework Directive (WFD) and technical reports to assist countries in implementing the WFD. The Guidelines are intended to provide a general methodological approach. It is important, however, to adapt them to the local context to apply them to the development of RBMPs in Azerbaijan. Once adapted, they can help address the information support and other technical issues used in basin planning.

At present, RBMPs in Azerbaijan have only been developed at the project level for the midstream Kura, Ganjachay, and Ganikh river basins by support of different EU funded projects (EPIRB, Kura TACIS, EUWI+). Following the basic principles of the WFD methodology, these plans aim to improve the knowledge of relevant national and regional organizations and develop their capacity in water resources management.

To develop and commission RBMPs in Azerbaijan, it is necessary to define the boundaries of basin regions and develop and adopt mechanisms to apply the basin approach, taking into account the national legislative and institutional framework.

The concept of river basin district (subdistrict) can be associated with the economic and administrative districts of Azerbaijan. Within the accepted boundaries, economic districts can - separately or along with one or more districts - form a basin region.

This kind of support is already being provided by EU4Env. Water and Data project

To implement the basin approach stipulated by the Water Code of the Republic of Azerbaijan, it is necessary to develop a mechanism and then implement it throughout all districts with determined boundaries. This represents the main focus of the strategic development of the water sector in the coming years.

The draft Water strategy considers application of basin approach according to EU WFD. Therefore, when the strategy is adopted the relevant enabling environment can be created to start development of basin entities and implementation of existing and development of new RBMPs (according to identified basin districts).

7. Economically and environmentally sound options for practical reforms of the water pricing system in agriculture sector in Azerbaijan

7.1. Increasing the efficiency of functioning of WUAs

Prevention of water losses is possible primarily by eliminating infrastructure problems. It is known that prevention of water losses in Azerbaijan is one of the government's priorities. The "Water Commission" was established by the Decree of the President of the Republic of Azerbaijan dated April 15, 2020, and the Commission, which is represented by all relevant state institutions, is headed by the Deputy Prime Minister. One of the activities of that commission is solving infrastructure problems. The "Measure Plan for 2020-2022 on ensuring efficient use of water resources" was approved by another Decree of the head of the country. The implementation of the measures specified in that Action Plan will directly lead to efficient use of water, protection of water resources, prevention of losses, creation of additional reserve sources, education of consumers, etc. covers directions. As it can be seen, institutional reforms have been started in the direction of effective management of water resources and reduction of losses. Of course, the organization of irrigation in agriculture, which is the largest consumer group of water, should be the main subject of reform in order to ensure effective and efficient use of water.

In the current situation, distribution of water among farmers in the agricultural sector is carried out by WUAs, which have serious deficiencies in their activities. Therefore, it is necessary to improve the WUA instrument in the following way for effective organization and achievement of results.

1. Study and application of international experience on management and strengthening of WUAs (for example, Turkey's experience can be an example);
2. Reform of WUAs from representatives of local communities and farms by organizing objective elections;
3. Activities in the direction of taking complex measures to strengthen WUAs from an institutional point of view and turning them into technically and financially sustainable organizations - continuous training, support programs, implementation and control of WUAs, studying the positive experiences of countries, improving legislation and the powers of relevant bodies in this field improvement;
4. Preparation of an interactive map of the area covered by WUA. Formation of water demand according to cultivated areas and types of crops on that map;
5. Creation of an online platform (site) of each WUA;
6. Creating a database of farmers who are members and non-members of WUA, holding individual and collective meetings between those farmers and WUA, conducting a promotion policy for WUA membership;
7. Development of a state support mechanism for the purpose of strengthening the material and technical base of WUAs;
8. Drafting relevant normative legal acts for the purpose of regulating relations between the State Water Resources Agency (SWRA) and WUAs, as well as relations between WUAs and farmers, making proposals for changes to the existing legislation;
9. Developing and approving standard forms of relations between SWRA and WUAs, as well as contracts to be concluded between WUAs and farmers;

10. Regulation of supply (sale) of water to WUAs by SWRA through meters. WUAs will make results in the direction of calculating the actual losses by installing meters to the selected farmers while distributing the water they get through the meters among the farmers.;
11. Preparation of proposals on the effective organization of state control over WUA;
12. Preparation of water use plans according to planting plans and irrigation schedules according to the order of relevant institutions to apply to their territories of WUAs;
13. WUAs report not less than 2 times a year to a group established on public grounds consisting of representatives of relevant state institutions, local executive authorities, municipalities, non-governmental organizations, public associations and farmers' councils;
14. Placement of reports in a unified form, open to the public on the website of WUAs;
15. Over time, transferring the state's subsidy policy for water production to a subsidy policy for WUAs and creating opportunities for WUAs to benefit from the savings regime;
16. Determining the priority of irrigation and reclamation facilities to be brought to modern infrastructure through WUAs;
17. To promote the transition to modern irrigation systems through WUAs and to create incentives for farmers in this direction, to prepare proposals for differential tariff policy, etc.

Expected results:

1. By improving the intra-household management of water resources, the system of controlling the efficient use of resources will be renewed and the trend of reducing losses will be formed in this direction;
2. Modern personnel potential for water management will be formed and the accounting system will begin to improve;
3. The operation of WUAs in on-farm irrigation systems will be improved and the water supply to farmers will be improved. After the completion of reconstruction and rehabilitation projects implemented in on-farm systems, their results will be sustainable and the efficiency of investments will increase;
4. A new context of improved and legal relations between WUA-state-farmer will begin to form;
5. After the formation of the proposed incentive tools for WUAs, it is predicted that the total irrigated area of the country will be transitioned to modern irrigation systems with a growth dynamics of at least 3% every year;
6. Interactive regulation of water resources by WUAs by bringing them to a manageable level will lead to the application of cropping plans suitable for the available water and insurance of productivity against risks;
7. As the initiatives for the development of the WUA institutional instrument are realized and their material and technical base is strengthened, the material and organizational issues falling on the state will gradually begin to ease. It is predicted that after the implementation of the new WUA concept, the expenses (subsidies), savings, etc. directed by the state to the production of water will be reduced. will start to decrease year by year (forecast 2% per year);
8. Savings from the efficient use of irrigation water in farms will also have a positive effect on the distribution of water between sectors. Thus, this saving will also serve to protect the environment by increasing the amount of water released into the ecological flow of rivers;

9. Reduction of water losses and protection of soil fertility will lead to an increase in plant productivity and an increase in the water use and farming culture of farmers in general.

7.2. Possible options in relation to reform in water pricing

As the national strategy encourages the greater application of economic instruments to facilitate the implementation of water policy therefore the development of reform proposals includes one or more specific features of the economic instruments under consideration, including the following:

- rate of tariffs, costs, and coefficients (usually raised through reforms);
- tariff structure and tariff setting process: it is a recurring process that may involve changes to sector development goals, investment, and operating programs;

There is need to conduct tariff reforms and develop differentiated irrigation water use system and based on established depending on local agromeliorative conditions, crop types irrigation water norms.

Although there is a common base for the WUAs activities in the country, they have not yet been able to become independent organizations that effectively implement the equitable distribution of irrigation water and the maintenance of irrigation infrastructure.

Also, though a number of projects on the recon structuring the WUAs have been implemented in the country, unfortunately, at this time, the main focus was not providing them with modern equipment, but rather on improving the existing infrastructure. In terms of the effective and efficient activities of WUAs, it is necessary to carry out monitoring and evaluations on them.

Currently, the country does not have an electronic monitoring system related to the use of irrigation water in the field of agriculture. Although some information is available on the volume of irrigation water from freshwater sources and main canals across the country, there are generally no statistics on the volume of irrigation water taken by WUAs and used by farmers. This in itself leads to the emergence of three major problems: the low level of productivity of plants as a result of non-compliance with irrigation norms of agricultural plants; Increase in the level of groundwater and soil salinization due to the supply of more water than necessary to the soil; Lack of effective control of irrigation water use across the country. Low level of collection of fees.

The establishment of an electronic monitoring system related to the use of irrigation water in the country can make an opportunity to increase the effectiveness of the general regulatory system for irrigation water, control the processes related to soil salinization, conduct practical analyzes of the activities of WUAs and farmers' expenditures on irrigation water, and make rational management and regulatory decisions.

Such ideas as formation of cooperative relations between farmers to be able to cover needed costs it is important to cultivate the same plant in the form of associations and establish a pivot system and introduce a uniform cropping system in individual regions to contribute to solving problems related to irrigation.

Measures to increase the role of farmers in the regulation and management of the irrigation system in the country are related. The use of WUAs in regulating the irrigation system is one of the most progressive methods applied by most countries of the world. Azerbaijan also followed this trend and ensured the formation of WUAs in the country. However, for the current period, the activity of WUAs in the country is not satisfactory. There are clear problems both in delivering water to farmers, ensuring continuity of

water supply, and collecting irrigation water fees. In order to solve the mentioned problems, the activity of WUAs should be improved, the transparency and efficiency of their activities should be increased.

It is important to apply "differentiated" irrigation water charges to fully satisfy the requirements for operation and maintenance in WUAs

Reducing water losses and optimizing the use of irrigation water by improving the operation of irrigation and melioration systems. This includes improvement of irrigation canals, replacement of earthen canals with concrete canals, as well as measures to expand the application of modern irrigation methods.

Restoration and increase of soil fertility by strengthening the works on the implementation of a complex of agrotechnical and ameliorative measures in irrigation areas. This includes the improvement of old drainage systems and the construction of new drainage systems, soil washing, expanding the use of rotational cropping systems, and etc. measures.

There is need to develop well designed strategy to reduce significantly irrigation water supply infrastructure e damages and to reduce the level of water losses (over 40%) in the water supply.

Awareness-raising campaigns partially support the implementation of the EPR Recommendation, which suggested to prepare awareness-raising campaigns for water users associations and end users to promote adequate planning of water utilization along the channels and sub-channels and culture of shared maintenance responsibilities.

7.3. Improvement of system of water subsidizing in Azerbaijan

It is important to prioritize the national consumption of water resources by sectors depending on their prospective development plans as well as to prepare a water management plans taking into account their interests and needs while introducing and implementing the regulation of water supply in different directions.

The major challenges that increase the tension in regulating water consumption according to Draft Water Strategy can be summarized as follows:

- Uneven distribution of water resources across areas;
- Forecasted further exacerbation of water scarcity as a result of climate change;
- Some rural residents' limited access to irrigation water due to lack of water supply systems in place;
- Uncontrolled use of water bodies;
- Reduction of flow of transboundary rivers;
- Higher flooding and increased silting of rivers;
- Water management deficiencies;
- Irrigation canals constructed in river channels and water losses occurring through on-farm irrigation networks;
- Flow losses due to anthropogenic impact on river channels.

Projections about the future water resources require a long-term vision regarding their protection from pollution. It is necessary to ensure the efficient use of existing water resources to provide future generations with sufficient water resources

Although the system of relevant legislation, water use tariffs, and penalties is currently applied in the water sector of Azerbaijan, the bodies that implement the system lack coordination.

The National Strategy proposes a clear separation of responsibilities for establishing, regulating, licensing, and supervising interagency coordination. From the administrative point of view, the issuance of water use permits should be separated from water use control while ensuring the independence of the water use permit process.

As is stated in Water Strategy it is necessary to draft and approve the country's annual water balance to assess the availability and use of water resources at/by water facilities, to plan the use and protection of water facilities, to improve state water accounting, to clarify the mechanism and purpose of chargeable water consumption, enhance water resources management efficiency, improve the financial position of entities providing services in this area, and ensuring a more flexible tariff/price regulation.

To help improve the country's public accounting of water consumption, it is important to approve the rules for water use charges. The adoption of the rules for water use charges is necessary to regulate relations between entities operating in the water sector, establishing the mechanism of mutual settlements, payments, and control to ensure the efficient use of water resources, clarifying the purpose of water use charges, water tariffs/price, improving the policy, etc.

Azerbaijan's problems of primary irrigation include inefficient water use, failure of irrigation systems to meet the required standards as well as extremely low funding of the development, reconstruction, normal operation, and maintenance of these systems.

Appropriate economic instruments to address more efficient use of water include mobilizing sufficient funds to finance baseline water pricing, normal water quality, maintenance of water supply facilities envisaging the introduction of concessions (the objective of irrigation water policy is to gradually increase charges for water consumption by the agricultural sector and at least fully offset the cost of water supply), and providing cost-effective and targeted support for the reconstruction of irrigation systems.

In order to effectively use land resources and irrigation water, it is important to support the formation of cooperative relations between farmers. Currently, most of the farmers in the country own 1-2 hectares of land. The share of these landowners in ensuring food security in the country is huge. However, the application of modern irrigation systems in these lands is problematic. Small-scale farms, for example, cannot provide sufficient financial means to implement a drip irrigation system, which can reduce the demand for irrigation water by 40-50%. Building a pivot system on small plots is also a complicated matter. For this, farmers must agree to cultivate the same plant in the form of associations and establish a pivot system. The creation of farmers' associations and the formation of cooperative relations can act as a very effective tool in solving this problem. In addition, the introduction of a uniform cropping system in individual regions can also contribute to solving problems related to irrigation.

Measures such as land consolidation and support for the formation of large farms also serve to solve the problems caused by the fragmentation of land plots. At present, certain works are being done in the country related to the consolidation of lands. In recent years, with state support large agricultural enterprises, in other words, agroholdings or agroparks, have been established in the country.

Above mentioned approach on irrigation sector water use reform can help to reduce government subsidies in result of increase of water use efficiency.

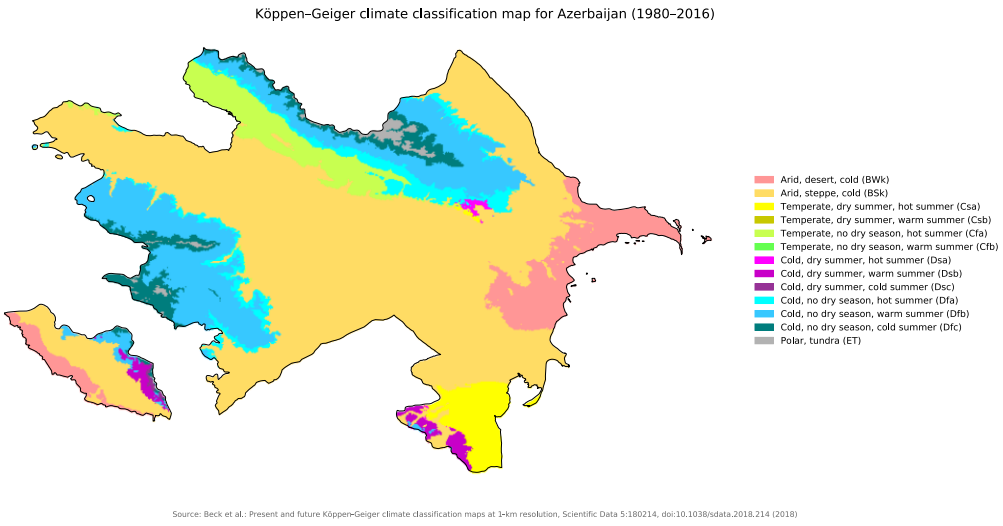
8. Proposals on a series of economically and environmentally sound options for practical reforms of the water pricing system in agriculture sector in Azerbaijan

8.1. Water Supply improvement through increasing of water use efficiency according to climate change scenarios

As Azerbaijan has varying topographic features throughout the country and the Greater Caucasus Range runs with the highest peak (Bazardyuzyu) located within this range at 4,466 meters and the Kura-Aras Lowland with the average elevation near the sea level covers much of central Azerbaijan and abuts the Caspian Sea. There are a number of canals between the Kura and Aras rivers, which allows for the irrigation of the lowland areas. According to World Bank the Gross Domestic Product (GDP) in Azerbaijan was worth 54.62 billion US dollars in 2021, according to official data from the World Bank. The GDP value of Azerbaijan represents 0.02 percent of the world economy.[3] GDP increases by an increase in oil production and a modest increase in domestic demand.[4] The global recession and decrease in fossil fuel demand due to the ongoing COVID-19 pandemic is likely to have a major impact on the oil and gas industry within Azerbaijan and the country's economy as a whole. Across all economic regions, the public sector has the highest percentage of hired work improvement ers (for both men and women) compared to other economic activities. However, most workers work outside of the public sector. The agriculture, forestry and fishing sectors have the largest number of employed persons with 1,777,700 individuals (36% of employed workers) working in this sector.

Nine out of the eleven identified Köppen climate zone classifications can be found in Azerbaijan, highlighting the significant variability in climate across the country.

Figure 3: Climate classification map of Azerbaijan. Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.



[3] World Bank. GDP per capita (current US$) – Azerbaijan.

[4] World Bank. The World Bank in Azerbaijan. Last Accessed 06 December 2020.

Under a high emissions scenario (RCP 8.5) Azerbaijan is expected to see an increase in monthly temperatures (over the observed norm 1986 – 2005) of 0.95 – 1.75 °C in 2020 – 2039, 1.72 – 3.07 °C in 2040 – 2059, 2.75 – 4.54 °C in 2060 – 2079, and 3.64 – 5.80 °C in 2080 – 2099.

Changes in precipitation are also expected in the future, with rainfall becoming more variable with extended drier seasons and increased heavier precipitation months. The months of June

– August, where there are already precipitation shortfalls, are likely to experience a particularly big decline. The results for the RCP4.5 for the minimum temperature show a slight increase in the minimum temperatures in the east side of the country (1 – 2 °C), and a higher increase in the west, and north, in the Greater and Lesser Caucasus areas, with values around 2 and 3 °C. The projections show an increase in the maximum temperature around the country, with a highest increase in the west, but with values over 3 °C in all cases. The mean daily precipitation does not show a significant variation.

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Water resources of Azerbaijan Republic together with transboundary water flow was assessed to be 30,5 billion m^3 by 80th of last centure, one third of which was formed in rivers located on territory of the country(Rustamov Gashgay 1986). Currently natural water resources are reduced in compared to 1990 by about 15% in result of climate change/6.5/.

Available on territory of Azerbaijan water resources are about 15- 20% less of their natural values because of upstream water withdrawals from transboundary rivers. In sum available water resources on Azerbaijan territory is less than natural values by 25-30% (Table 7)

Information about water resources and their use by sectors is provided in Table 7.

Table 7. Change of water resources of Azerbaijan.

Years	1990	2000	2010	2021
1. Natural water resources	30000	29000	28000	25500
2. Available on territory of Azerbaijan	25000	24000	23000	20500
3. Water abstraction from natural water resources on territory of Azerbaijan	16176	11110	11566	13743
3.1. Water consumption – total	12477	6588	7715	10526
3.1.1. Household water use	367	449	405	321
3.1.2. Water use for production	3282	2316	1742	2566
3.1.3. Water use in agriculture	8191	3819	5497	7575
3.2. Water losses during transportation*	4206	3053	3852	3217

According to the 4th National Communication on climatic change of Azerbaijan future scenarios predict further reduction of water resources at transboundary and local level. This will make the water supply even more difficult in the country if no water saving or other adaptation measures are applied.

Was used three scenarios for water use in Azerbaijan for the period between 2050-2070. These scenarios will help assess the degree of water supply efficiency depending on actions taken at national and transboundary levels in the future towards increasing water use efficiency.

While developing the scenarios the following factors will be taken into account that affect future water access:

- Forecasted future water withdrawals in upstream countries
- Future effects of climate change on water resources
- Future water losses in the agricultural and drinking water sectors
- Environmental flow demands in surface water bodies (e-flows)

- Increased demand for drinking and irrigation water in the future
- Impacts on water quality by the respective sectors

According to National Communications on climatic changes water resources of Azerbaijan Republic together with transboundary water flow was assessed to be 30,5 billion m^3 by 80th of last centure, one third of which was formed in rivers located on territory of the country (Rustamov Gashgay 1986).

Compared to norm(1961-1990) during last period air temperature on the territory of different regions of Azerbaijan increased by 0,4-1,3^o C.

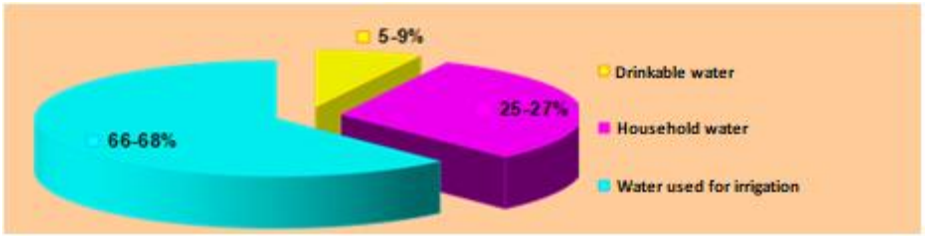
Change of water resources of main transboundary rivers and total water resources of the country (including water abstraction) is shown in Table 8.

Table 8. Long term water resources(discharges of rivers) of Azerbaijan Republic (m3/s)

№	River-Station	Flow	1961-1990	1991-2020	1991-2022
1	Kur-Girakkesaman	Natural	298	270	258
		Available on Azerbaijan territory	274	252	248
2	Araz- Gizilvang	Natural	193	170	166
		Available on Azerbaijan territory	145	115	110
3	Ganikh-Ayrichay	Natural	125	111	108
		Available on Azerbaijan territory	111	102	95
4	Azerbaijan Republic	Natural	963	867	850
		Available on Azerbaijan territory	781	678	660

Water resources of the country are widely used in different sectors (Figure4)

Figure 4. Water use by main sectors



According to statistical information water use in 2021 by sectors is swow in Table 3(www.stat.gov.az) .

Table 9. Water use by sectors.

	Water abstracted from natural sources	Water consumption	Periodically and consistently used water	Water lost during transportation	Waste water discharge	Of which wastewater
Total	**13742.8**	**10526.3**	**2794.9**	**3216.5**	**5237.1**	**439.5**
including:						
Agriculture, hunting and forestry	11965.5	7586.3	-	3121.4	3382.6	0.1
İndustry:	1757.4	2889.3	2765.5	91.4	1460.1	264.4
Mining industry	333.4	342.6	324.0	-	291.4	3.3
Processing industry	30.6	66.4	294.8	3.1	40.6	4.6
Production and distribution of electricity, gas and water	1393.4	2480.3	2146.7	88.3	1128.1	256.5
Transport, water consumption and communication	17.3	18.7	9.8	3.6	18.1	7.7
Other economic activities	2.6	32.0	19.6	0.1	376.3	167.3

According to climatic sceneries is expected reduction of flow of rivers in result of temperature increase and precipitation reduction. It is expected that in certain content upstream countries will increase water abstraction as well.

Today, the available water resources in Azerbaijan do not meet both the water needs of users and the flow required for the river ecosystem, and the average water shortage is 2,500 million m^3 per year(see table below). Climate scenarios show that this indicator will be even higher in the future if the necessary adaptation measures are not taken./Verdiyev R/

- Available water resources 21500 mln. m^3

- Water abstraction(in 21st century) 140000 mln. m3
- Environmental flow needs for river ecosystem 10000 mln. m^3

Future effects of climate change on water resources: Forecasts in the 4th National Communication Report will be used to take into account the impact of climate change on water resources. In that report according to the GFDL, HADGEM and MPI models the trend of changing of water resources for the following 2 climate scenarios are assessed:

- An optimistic (RCP4.5) scenario that reflects the level of response to climate change
- A Pessimistic (RCP 8.5) scenario, in which no action is taken

According to above models by **optimistic** scenario (RCP 4.5), the amount of water resources of Azerbaijan (together with transboundary water resources) will decrease by 05-10% in 2040 and by 10-15% in 2070 and by pessimistic scenario (RCP 8.5) by 10-15% in 2040 and by 15-25% in 2070 compared to current values(2020).According to RCP4.5 climate change sceneries it can be presumed that if all countries follow Paris agreement requirements then temperature increase may reach 2.0 ° C if not this figure can be around 4.0 ° C

As is shown in 4th NCCC precipitation change differently in basins of country rivers and no significant trend will be observed by end of century.

Taking this into account change of water resources by above 2 sceneries can be occuring according to Table 10.

Table 10. Change of water resources of Azerbaija Republic by climate chnage sceneries (m3/s)

Period	**1961-1990**	**1991-2020**	**Scenario**	**2021-2040**	**2041-2070**	**2071-2100**
Natural Flow	970	867	dT=2°C	802	759	715
			dT=4°C	759	672	585
Available on Azerbaijan Territory	781	678	dT=2°C	630	597	562
			dT=4°C	597	528	457

As one can see from above Table if no action againest climatic chnages are taken then by 2070 flow can be reduced in 2020-2070by 20-25%, and in 2071-2100by 30-35%.

Possible technical adaptation measures to solve this problem are losted below :

- Reconstruction of existing water facilities in order to reduce water loss;
- Improvement of water accounting and tariff system according to IWRM principles
- Use of rainwater and treated seawater and other alternative water sources;
- Use of recircled water;
- Regulation of flow and use it in times of water scarcity;
- Carrying out reforestation measures in flood-prone areas and planting of trees to protect water, also windbreak to conserve soil etc;

- Planting of less water consuming crop and tree types, rotation of crop production in agriculture
- Implementation of engineering-protective measures in basins and riverbeds;
- Construction of new reservoirs in the mountain river basin;
- Use of modern irrigation technologies and methods;

For this scenario water losses will be significantly reduced by implementation of identified priority measures.

Natural demand or e-flows refers to the amount of water that is stored in rivers for ecosystem needs. According to the methods we currently have, natural water demand to maintain rivers' ecological functions will be estimated based on existing in rivers water resources.

According to Rafig Verdiyev classification from available in river in given month abstraction of up to20% can still keep it in High hydrological status (corresponding to High ecological status in EU WFD ecological classification system), till 40% in Good, till 60% in average and till 80% -in poor status, over 80% abstraction leave river in bad hydrological status/21/.

But life shows that in reality countries often use over 80% of existing discharges by keeping it in Bad status or leading to drying of river.

One of good example can by shown water abstraction from Samur river by Russia and Azerbaijan or Azerbaijan and Iran from Araz. In this case each country abstracts about one third of water and leave one third in the river.

Therefore, taking into account this one can use that example in this study as well by considering ecological flow needs by about one third of natural flow values. For example, 10 cubic kilometers should be left in river for total average natural flow values of 30 cubic kilometers.

In this study as a more realistic scenario was considered: Upstream water use increases and this lead to reduction of available water resources by additional up to 10%. In the case of 4^0 increase of air temperature as a worse scenario the following table shows how more feasible measures can be taken to reduce the deficit by the efficient use of water resources to address the problem according to this scenario (Table 11).

Table 11. Adaptation measures aimed at efficient use of water resources

Water balance indicators	Amount of water, (mln. m^3)			
	Actual	2021-2040	2041-2070	2071-2100
Available water resources	21500	17000	15000	13000
Water to be taken from waterbodies to cover water demand	14000	14000	14000	14000
Environmental flow required in the river to keep ecosystems in current state	10000	10000	10000	10000
Amount to be taken from volume of water left in river as Environmental flow or from ground water sources	-2500	-7000	-9000	-11000
Adoption of the National Water Strategy aimed at improving water management on the principle of SEIIE and strengthening control over water use and reforming the tariff system	1000	1250	1250	1500
Reduction of water loss as a result of improving the water supply system	500	1500	2000	2500
Reuse of water in several areas (including use of contaminated water after purification)	500	1000	1250	1500
Use of rain and other alternative water sources(including treatment of sea waters)	1000	1250	1500	1750
Rational use of water in agriculture by applying modern irrigation methods and technologies and adapting the planting process (plant species, etc.) to climate change	1000	1250	1500	1750
Use of water resources of the liberated territories for water supply	500	1250	1500	1500
Reduction of water shortage as a result of measures	+2000	+500	0	-500

As it can be seen from the table implementation of above measures may be enough to solve water supply problem till 2070.

Accordingly, if we undertake planned above measures we may not have enough available water resources by 2070 to irrigate extra land area. Even in following after 2070 years there will be needed to take more deep measures or use water left in river as an environmental flow to cover water demand in period after 2070.

But use of amount of water left in the river as an environmental flow may degrade their ecosystem and even lead them to dry.

Further increase of irrigated land area without deeper adaptation measures may significantly increase this negative impact to river ecosystem.

8.2. Kura downstream water scarcity and salinization related water management problems and possible solutions

The Kura delta is downstream the Kura transboundary basin just before the Caspian Sea. This area has been modified through the years mainly because of: human works in the area, human activities in the upstream and downstream basin (abstractions, dredging, dams, etc.), variation of sea level.

This area has a high biodiversity potential and supports agriculture (breeding) and fishing.

The Kura River area of the Caspian Sea is an area of foraging, wintering, spawning migrations and reproduction of all species of the Caspian sturgeon family. In addition, the area is home to extensive wetlands with dense reed vegetation, a network of dams and a large island that is an important wintering and nesting site for some bird species and the area is especially important as a temporary resting place for a large number of birds during their flight. During the migration period, the number of waterbirds in one record reaches 75,000 individuals.

The issues are: salinity from Caspian Sea which impacts water supply upstream and irrigation (In such case, Azersu OJSC must provide water to the population by use of transport means, irrigation can increase soils salinity, etc.); low valorisation of biodiversity potential; unorganised land use and works; artificial hydraulic functioning; wetlands alteration.

Some years, high salinity has been analyzed about for 50 km upstream. These results indicate that the decrease of the Kura River discharge, observed for several decades, has reached a temporary critical point after which the River no longer presents a natural barrier for an intense Seawater intrusion. The decrease of the river discharge is certainly also based on large scale climate changes but largely on the excessive abstraction of water further upstream for different purposes (from EUWI+ report).

The main objective is to bring back a natural functioning to this area with benefits for communities and ecosystems through Nature based Solutions (NbS). It could be an example for NbS implementation in Azerbaijan and in the region, considering the importance of Kura delta.

The benefits for communities could be: reduction of salinity of tap water, access to drinking freshwater, floods mitigation, wise use of the area to avoid any conflicts, agriculture with high added values, landscape amenity, etc.

The indicators could concern: % of population with a safety drinking water supply all the time; area of wetlands restored; length of natural watercourses restored; trend of income for farmers and fishermen; evolution of biodiversity (species and number of birds, fish); reduction of flood damages; etc.

Baseline and targets will be defined during this first phase of the project with the local communities.

In Azerbaijan during the Soviet period taking into account limited values of flow in summer months (vegetation period) for irrigation and also in winter for hydropower production there were constructed large water reservoirs(total capacity is about 22 Bln cubic meters). In result of which in downstream of Kura, Araz and some other rivers because of reducing of floods and flow velocity many river banks silted and their capacity to allow to pass large amounts of flow became limited. In parallel banks of above rivers for use in agriculture have been changed and wetlands dried to as well

to populate people in those areas. In result during high flows many problems to infrastructure and human live was arisen, for example during flooding in Kura in 2010.

Of course now can be included on agenda restoration of riverbanks by use of NBSs to return it in natural conditions. But this can be done based on results of assessment of feasibility of it, to see if removing of infrastructure and settlements from areas to be flooded is indeed economically feasible

The other issue, where NBSs are needed to restore main Kura river channel located in south western direction in its delta at Caspian Sea coastal area, which is currently silted and not acting. As result only river channel in south eastern direction acts today and during low flow in river and strong winds the salty waters enter into Kura and moves along river up to 40km. This creates serious water supply problem for population who uses Kura waters as drinking water and for other purposes. In result because of lack of fresh waters people have to pay large amount of money to bring water in tracks for use. Many people can't afford this from economic point of view.

Therefore, several ways of solution can be considered in this regards. Among the can be below 3 options:

1. Full NBS by restoring of main Kura river channel in south western direction
2. Half NBS and half structural solution by construction of low height walls(just for purpose to raising the level of water corresponding to water discharges of 50 m^3/s to the level corresponding to 100 m^3/s and at the same time increasing flow velocity to stop back flow of water under pressure of Caspian waves) of several meters widths in 2-3 meter distance from each other(to allow sediments and fish to pass between them even in low flow period) and also in parallel to this restoring partly main Kura river channel .
3. Construction of walls to stop entering of Caspian Sea waters during south-eastern winds

Some plans are being implemented regarding this issue. One of them is the construction of a water dam in front of Kura, in which case, if the necessary conditions are not provided, certain ecological difficulties may arise (obstacle for the movement of fish, etc.)

As an alternative, it may be considered more acceptable to restore Mother Kura in a natural way. For this purpose, the international experts of the EU4 Environment Water and Data Project visited the river delta in Azerbaijan, where the issue of restoring the Mother Kura was considered, and we hope that the project will consider conducting any research on the possibility of this.

- Improvement of Water quality and quantity
- Rehabilitation of Ana Kuru can help to bring the quality of this water to drinking water level (salinity less than 1 g/l) and to overcome the difficulties that arise in women's use of the water for various purposes.
- Reducing the losses caused by water transportation and its use for irrigation and other purposes due to the fact that technologies and methods do not meet modern requirements can also ensure that there is enough water for use downstream of the Kura.
- As an alternative source of water, wastewater can be treated and used for technical purposes, and at the same time, through the application of rainwater harvesting technology, oil water can be widely used.
- It is true that the precipitation here is not so high (close to 250 mlm), but still, it is possible to consider the issue of taking that precipitation from the roof of the houses and using it as an alternative source of water.

Water management

- In order for the quality and quantity indicators of the Kura River to be at the appropriate level, it is important to have an international agreement and a functioning mechanism.
- Achieving the implementation of integrated water use among users and their coordinated activities based on the principle of priority use of water is the main condition.
- There is a need to work together with donor organizations to educate the population, especially women and youth, in the field of efficient use of water.

8.3. Pilot project on increasing the efficiency of functioning of WUAs

As is shown above increase of interagency coordination by the State Water Commission and activities of Commission to solve infrastructure and other problems within the "Measure Plan for 2020-2022 on ensuring efficient use of water resources" will directly lead to efficient use of water, protection of water resources, prevention of losses, creation of additional reserve sources, education of consumers, etc. As it can be seen, institutional reforms have been started in the direction of effective management of water resources and reduction of losses. Of course, the organization of irrigation in agriculture, which is the largest consumer group of water, should be the main subject of reform in order to ensure effective and efficient use of water.

In the current situation, distribution of water among farmers in the agricultural sector is carried out by WUAs, which have serious deficiencies in their activities. Therefore, it is necessary to improve the WUA instrument in the way proposed above for effective organization and achievement of results.

In order to implement mentioned WUAs capacity building activities in pilot area in June 2023 in Yevlakh raion will be organised seminar with reprerentatives of relevant stakeholders, including municipaities, fermers, 9 WUAs and etc. During the seminar the model concept on WUAs management improvement, crop production on the basis of water availabliity principle, application of modern irrigation ssystems and will be prepared proposal on a pilot project based on obtained during the training information about:

- Identification of content of training needs on management principles of WUAs
- Metering process support issues (scope – selected farmers in Yevlakh district)

- Establishing a system of informing of farmers about the efficient use of water and the decreasing risks of water resources (scope - farmers operating in Yevlakh district)
- Educational measures in the direction of maintaining the ecological balance of natural water sources (scope - farmers operating in Yevlakh district)
- Needed legislation improvement proposals development according to international experience related to the effective organization of the activities of WUAs (scope - country territory)

Prepared pilot proposal for improvement of performance of WUAs in selected pilot area will be submitted to government and donors for financial support.

As was mentioned above in pilot area implementation of the project can be good basis to achieve a below results, which in future can be extended to entire country territory:

- By improving the intra-household management of water resources, the system of controlling the efficient use of resources will be renewed and the trend of reducing losses will be formed in this direction;
- Modern personnel potential for water management will be formed and the accounting system will begin to improve;
- The operation of WUAs in on-farm irrigation systems will be improved and the water supply of farmers will be improved. After the completion of reconstruction and rehabilitation projects implemented in on-farm systems, their results will be sustainable and the efficiency of investments will increase;
- A new context of improved and legal relations between WUA-state-farmer will begin to form;
- After the formation of the proposed incentive tools for WUAs, it is predicted that the total irrigated area of the country will be transitioned to modern irrigation systems with a growth dynamics of at least 3% every year;
- Interactive regulation of water resources by WUAs by bringing them to a manageable level will lead to the application of cropping plans suitable for the available water and insurance of productivity against risks;
- As the initiatives for the development of the WUA institutional instrument are realized and their material and technical base is strengthened, the material and organizational issues falling on the state will gradually begin to ease. It is predicted that after the implementation of the new WUA concept, the expenses (subsidies), savings, etc. directed by the state to the production of water will be reduced. will start to decrease year by year (forecast 2% per year);
- Savings from the efficient use of irrigation water in farms will also have a positive effect on the distribution of water between sectors. Thus, this saving will also serve to protect the environment by increasing the amount of water released into the ecological flow of rivers;
- Reduction of water losses and protection of soil fertility will lead to an increase in plant productivity and an increase in the water use and farming culture of farmers in general.

8.4. Increasing the efficiency of water use by improving irrigation water tariffs and payments

Significant progress can be achieved within a few years by working together of the Government, Amelioration OJSC, WUAs and farmers to reduce water loss and increase the efficiency of water use by applying modern methods and technology.

For example, Amelioration OJSC, taking into account the cost of water it produces (all, including revenue), can sell water according to the tariff **Cmw**, which can be summarized either by regions or by the country.

Then the tariff for amount of water delivered to farmers by WUAs can be calculated as followings:

$$\mathbf{Tf = Cmw + Cwf}$$

It can be assessed for example to be 5 AZN cent per cubic meter if to accept that 500 million AZN is spent on water reclamation in the country in one year for 10 billion cubic meters of water used(abstracted) in total.

The state can subsidize to farmers certain α proportion of money spent by ameliora-tion OJSC(α*Cmw) and also β proportion of money spent by WUAs (β*Cwf).

Then in future work can be carried between the government and Amelioration OJSC to minimize α and with WUAs to reduce β trough implementation of water supply infrastructure rehabilitation and other water lost reduction activities. Same work can be carried between the government and farmers to increase water use efficiency by selection of crop types according to state agricultural development and climate change adaptation programs, application of modern irrigation technologies and methods and etc, In this case can also be set differentiated tariff based on agricultural irrigation norms of different crops given in annex.

8.5. Study on the possibility of use of the main collector-drainage network located in the Kura-Araz plain in the irrigation of agricultural crops

Research in this field were carried out by the scientists of Azerbaijan Hydrotechnics and Reclamation Scientific Production Union O.A. Zeynalova, M.Y. Iskanderov and C.P. Conducted by Aliyev.

On the basis of complex studies and many years of experience, irrigation and soil drainage norms have been established for the composition and quality indicators of collector drainage water used for irrigation of agricultural plants in different regions of Azerbaijan. These normative indicators can be applied in the Kura-Araz plain without harming the productivity of soils, the condition of water bodies, and the productivity and quality of agricultural plants.

According to the authors, the mineralization of the collector-drainage waters located in the Kura-Araz plain is between 1.0-20.0 g/1, and amount of water is about 4.670 bln. m3. The normalization of the quality of such irrigation water mainly consider the following indicators: pH, total degree of mineralization, chemical composition of water, proportion of valence cations, content of main nutrients (nitrogen, phosphorus and potassium), trace elements, amount of organic matter.

The possibility of using collector-drainage water for irrigation in the republic was studied by carrying out experiments on agricultural crops (cotton, cereals and alfalfa) and with different irrigation methods (surface and rainfall).

According to the degree of salinity of the collector-drainage water, the irrigation norm for irrigation of agricultural plants is given in a generalized way. Irrigation of soils with high mineral waters for a long time can be effective only on sandy and light soils with natural and artificial drainage and proper washing regime. Irrigation with highly mineralized water is very complicated and at the same time changes the physico-chemical and water-physical composition of the soil along with salinization..

Along with the large reserve of collector-drainage water, the mineral level of their water drops to a very low level during irrigation. Mainly during the vegetation period, the water of inter-farm collectors has low mineralization.

The conducted research and observations show that the mineralization of water in most collectors in the Karabakh Plain during the irrigation period does not rise above 3 g/l on average. This makes it possible to use collector-drainage water for irrigation in areas with a lack of water during the irrigation period.

Not all collectors operating in the Kura-Araz plain have low mineral content and high chemical composition. For example: the mineralization of the water of the main Shirvan collector undergoes slight changes throughout the year. Thus, the mineralization of water in the vegetation period is 5.5-9.0 g/1, and in periods without irrigation it is 11-16 g/1. This regularity is also observed in all main collectors.

The experience of many years in the field of irrigation of agricultural crops with drainage water in the conditions of Mugan, Shirvan, Mil-Karabakh plains gives grounds for coming to the conclusion that cotton, wheat and alfalfa can be grown with drainage water with a mineral content of up to 5 g/l in well-drained, saline soils. It should also be noted that when watering these plants with mineralized water, their productivity does not decrease, and even increases to a certain extent. The soils of Northern Mugan are considered to be medium and heavy clay soils due to their mechanical composition.

Based on many years of experience, the following indicators are used for the efficiency of irrigation, collector-drainage and underground water use in some regions of the Kura-Araz plain.

It is possible to irrigate agricultural crops with mineralized water on the Mughan plain only in intensively drained soil. In non-saline chloride-sulfate conditions, cotton can be irrigated with mineralized water (5 g/1). If there is a shortage of water, then water with a mineral content of 7 g/1 can be used. Taking this into account, it is important to carry out 3.0-4.0 thousand m3/ha water for washing soil every year in order to clean the field from residual salts after the end of the vegetation period.

Many years of experience in irrigation of agricultural plants with drainage water in the conditions of Mugan, Shirvan, Mil-Karabakh plains gave the authors the reason to come to the conclusion that in well-drained, salt-free soils, collector-drainage with mineral content up to 3-5-7 g/l cotton, wheat and alfalfa plants can be irrigated with water (adding fresh water if necessary).

It is noted that underground water was used for washing and irrigation in the former state farm No. 4 of Beylagan district. For this study, cotton fields were irrigated by drawing water from vertical drainage. Samples of groundwater were takenand analyzed, from the results it was found that soils become moderately saline when irrigated with groundwater. Therefore, such water should be used to irrigate agricultural crops and after irrigation, 2000-3000 m3/ha should be applied to the soil, chemical meliorants should be used, and salinization of the soil should be prevented.

This work can also play an important role for further pilot project development in relation to use of different collector and drainage water use in agriculture or other purposes.

8.6. Pilot discussions to address the existing water management issues on IWRM and NBS basis

A. Pilot testing of improvement of irrigation water use system in Yevlakh region

A meeting with the participation of about 25 Water Users Association (WUA) representatives and farmers in the Yevlakh State Agrarian Development Center was organized to discuss issues related to water use and ways of improving of its efficiency. It was organized by the Director of the organization Mr. Rustamov Abaseli.

During the meeting briefly, Mr. Rustamov informed participants about the existing problems in Yevlakh region regarding the use of water in irrigation and other irrigation water use issues.

Then in his presentation, Mr Rafig Verdiyev and Firudin Taghiyev informed participants about the existing status of water resources in the country and expected their changes under climatic changes. It was noted that in addition to the reduction of water resources under climate change and also the impact of inefficient use of water resources and huge water losses in water infrastructure lead to serious water supply problems in Azerbaijan.

Results of discussions are described in Annex 7

B. NBS for Hajigabul lake

The meeting was conducted in MENR on 05 July 2023 by the participation of representatives of Water Resources, Division, Environmental Policy Division, Hydromet and Environmental Expertise and Geodesy and Cartography Agencies of MENR to discuss ways of rehabilitation o dried in recent years by the impact of climatic changes Hajigabul lake.

During the meeting, it was noted that as under the climate change impact evaporation has increased and lake level has dropped down and mainly it dried and only a small proportion of water left in the lake has high salinity. It was also noted that now the main canal feeding the lake from Kura River isn't operational and no fresh water enters into lake. This happened because now no water discharges of the Kura River currently is used by papulation of the areas surrounding Kura as it is the only source of water for use by households and other purposes.

It was noted that currently waters in Shirvan collector fed by irrigated areas below Upper Shirvan canal have lesser salinity than Hajigabul lake and it can be used to feed the lake as a first step to restore the lake.

Trip was organized the next day to Hajigabul Lake. During the discussions with local branches of MENR, Amelioration JSC, and Executive power of the Hajigabul raion it was agreed to propose to consider the possibility of constructing of canal from Shirvan collector to the area located in the middle of the lake near Shirvan city.

It was decided to check the possibility of donor support for conducting of assessment of different options to deliver Shirvan collector's water to the lake and propose a more feasible option.

Then the proposed option can be submitted to donors or the government for implementation in coming years.

Results of study is also described in Annex 7

C. National level Legal-regulatory Framework improvement to adapt to Climatic Changes

On August 19th the National Workshop was conducted by MENR, UNDP and REC Caucasus regarding the improvement of legal-regulatory framework to adapt to climatic changes. Different legislations and regulatory documents related to climate and climatic changes and also to related sectors have been discussed during the workshop and proposals made to amend existing and adopt new legal-regulatory framework

Among others Rfaig Verdiyev also made a presentation about the current situation with water management and expressed the importance of the development of a mechanism for application of EU Directives and IWRM principles, taking into account climatic changes. He proposed some options for increasing of efficiency of irrigation water use and described possible water efficiency increase measures to adapt to the impact of future climatic changes according to RCP 4/4 and RCP8.5 sceneries.

Then Head of division of Ministry of Agriculture Mr. Firudin Tagiyev regarding the application of a new approach in irrigation water use told that reduction of water resources leads to serious water supply shortages and therefore it is important to take relevant efficient water use measures in the condition of climatic changes and rapid agricultural development in the country.

Main proposals and discussion results are given in Annex 7

9. Conclusion

In conclusion in order to increase water management efficiency below reforms in water sectors is needed:

- For projections about the future water resources there will be needed to develop a long-term vision regarding their protection from pollution.
- It is necessary to develop well elaborated action plan for WS implementation to ensure the efficient use of existing water resources to provide future generations with sufficient water resources
- Although the system of relevant legislation, water use tariffs, and penalties is currently applied in the water sector of Azerbaijan, there is need to develop a mechanism of coordination among water sector actors.
- The National Strategy proposes a clear separation of responsibilities for establishing, regulating, licensing, and supervising interagency coordination. From the administrative point of view, the issuance of water use permits should be separated from water use control while ensuring the independence of the water use permit process.
- As is stated in Water Strategy it is necessary to draft and approve the country's annual water balance to assess the availability and use of water resources at/by water facilities, to plan the use and protection of water facilities, to improve state water accounting, to clarify the mechanism and purpose of chargeable water consumption, enhance water resources management efficiency, improve the financial position of entities providing services in this area, and ensuring a more flexible tariff/price regulation.
- To help improve the country's public accounting of water consumption, it is important to approve the rules for water use charges. The adoption of the rules for water use charges is necessary to regulate relations between entities operating in the water sector, establishing the mechanism of mutual settlements, payments, and control to ensure the efficient use of water resources, clarifying the purpose of water use charges, water tariffs/price, improving the policy, etc.
- The application of household tariffs to domestic and potable water supply services represents one of the means to save water. In general, the system should promote the water-saving practice through additional incentives.
- In addition, improving water supply systems and especially raising public awareness can help reduce per capita water consumption. The current tariffs fail to reflect the cost/services of water consumption in Azerbaijan.
- For use of drinking water fees can be applied in differentiated way, for example for 5 cub.m per month per person population can pay normal tariff and for each extra 5 cubic meters double tariff and for extra tripled tariff. Similar approach currently is applied in Azerbaijan for use of electricity in households.
- The introduction of cleaner industrial production and technologies, water purification, and recycling will help to save money and reduce water pollution. Though very cost-effective, these measures require investment and international financing.

- Azerbaijan's problems of primary irrigation include inefficient water use, failure of irrigation systems to meet the required standards as well as extremely low funding of the development, reconstruction, normal operation, and maintenance of these systems.
- Appropriate economic instruments to address more efficient use of water include mobilizing sufficient funds to finance baseline water pricing, normal water quality, maintenance of water supply facilities envisaging the introduction of concessions (the objective of irrigation water policy is to gradually increase charges for water consumption by the agricultural sector and at least fully offset the cost of water supply), and providing cost-effective and targeted support for the reconstruction of irrigation systems.
- In order to effectively use land resources and irrigation water, it is important to support the formation of cooperative relations between farmers. Currently, most of the farmers in the country own 1-2 hectares of land. The share of these landowners in ensuring food security in the country is huge. However, the application of modern irrigation systems in these lands is problematic. Small-scale farms, for example, cannot provide sufficient financial means to implement a drip irrigation system, which can reduce the demand for irrigation water by 40-50%. Building a pivot system on small plots is also a complicated matter. For this, farmers must agree to cultivate the same plant in the form of associations and establish a pivot system. The creation of farmers' associations and the formation of cooperative relations can act as a very effective tool in solving this problem. In addition, the introduction of a uniform cropping system in individual regions can also contribute to solving problems related to irrigation.
- Measures such as land consolidation and support for the formation of large farms also serve to solve the problems caused by the fragmentation of land plots. At present, certain works are being done in the country related to the consolidation of lands. In recent years, with state support large agricultural enterprises, in other words, agro holdings or agroparks, have been established in the country.
- Above mentioned approach to irrigation and drinking water sector water use reform can help to reduce government subsidies in the result of increase of water use efficiency
- Implementation of a series of above mentioned pilot projects can be supported by government and donor institutions to see the effectiveness of different proposed water use efficiency increase options in certain areas where the relevant condition exists in relation to soil conditions, current and future climatic trends, water availability, economically and environmentally feasibility and others.
- All the above proposals have been discussed in conducted field meetings and at national workshops. In the results of discussions, decisions have been taken to include the main findings of the study to decision makers to include in future action plans(Annex 7)

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