# Azerbaijan
# General Water Security Assessment

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# Executive Summary

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|---|---|
| Water Security is more than coping with resource scarcity | **Water security is defined** as "The availability of an acceptable quantity and quality of water for health, livelihoods, ecosystems and production, coupled with an acceptable level of water-related risks to people, environments and economies" (Grey and Sadoff, 2007). Water security is critical to attaining development goals by delivering benefits for people, the economy, and the environment, and mitigating water risks amplified by climate change. |
| Water Security Diagnostic Initiative<br><br>Vision | Against this background, the World Bank's Water Global Practice initiated a **Water Security Diagnostic Initiative**[1] in 2017. The initiative seeks to make the best use of the World Bank's technical experience, instruments, and financial resources to produce studies that influence senior policymakers beyond line ministries.<br><br>The initiative contributes to attaining the World Bank's vision of achieving a "**Water-Secure World for All**" by sustaining water resources, delivering services, and building resilience. |
| Conceptual framework | The World Bank's conceptual **Water Security Diagnostic Framework (WSDF)** recognizes that not all water-related challenges are equally significant in their impacts on people, ecosystems, and economies. A consistent approach is important to identify the most severe risks and significant opportunities.<br><br>The concept determines water security **outcomes** from how water is managed and used. These are results of water **sector performance**, resource management, service delivery, and risk management. The performance, in turn, depends on water **sector architecture**, institutions and infrastructure and all areas are conditioned by water **endowment**. Therefore, the framework includes four main topical areas or dimensions: (i) water outcomes, (ii) water sector performance, (iii) water sector architecture, and (iv) water endowment. |
| One-Water Methodology | The **One-Water Methodology (O-WM)** aims to establish a consistent and systematic approach to diagnosing water security at country and regional levels without being overly prescriptive. It contributes to operationalizing the WSDF, identifying and benchmarking critical current and future challenges around water security in Europe and Central Asia (ECA) countries and proposing follow-up activities at the country level to improve water security. |
| Azerbaijan water security report | This report assesses Azerbaijan's current water security and future change drivers, aiming to spotlight issues for enhanced water security. It compiles knowledge, offering an overview of challenges, risks, and opportunities. The focus is on identifying key areas for immediate and future improvements in water security. |
| Diagnostic of Azerbaijan water security and proposed priority actions for enhancing water | The results of the diagnostic indicate that Azerbaijan could improve the management and protection of its water resources, further develop the institutional arrangements as well as the legal framework, and invest in the modernisation of the infrastructure. |

[1] https://www.worldbank.org/en/topic/water/publication/water-security-diagnostic-initiative

security in Azerbaijan

To do so, the following major challenges spanning over the different water security dimensions need to be addressed and prioritized:

- **Endowment** – Azerbaijan's most significant rivers are transboundary water bodies with considerable regional importance for agriculture and the energy sector. Azerbaijan experiences significant interannual and seasonal water variability due to its geographical location, climate, and hydrological characteristics. Irrigated agriculture stands as the largest water-consuming sector in Azerbaijan's accounting for a significant portion of the country's total water resource consumption, but inefficient irrigation practices are a major concern, especially in regions with high agricultural potential. Another serious pressure on the water bodies is pollution and needs to be addressed.

- **Architecture** – To strengthen the institutional arrangements in the water sector in Azerbaijan, it's important to enhance governance, coordination, and capacity-building. Water-related laws, regulations, and policies should be reviewed and updated to ensure they align with international best practices and promote sustainable water management. Infrastructure is partly outdated and often not well maintained. The country needs to strengthen operation and maintenance of infrastructural assets.

- **Performance** – Azerbaijan needs to continue with its investment in water supply and sanitation (WSS) infrastructure to improve safely managed WSS coverage further. The country shall modernize and expand wastewater treatment plants to meet growing urban demands and ensure effective treatment of sewage and industrial wastewater. Both flood and drought risks are significant and pose challenges to water resource management and disaster preparedness. To address these risks, Azerbaijan has been working and will further need to improve its water resource management, including the development of early warning systems for floods and droughts, infrastructure improvements, and sustainable water use practices.

- **Outcomes** – Azerbaijan has a good coverage of WSS services but needs to improve WSS infrastructure in rural areas, to ensure that rural communities have access to reliable and safe water supplies and appropriate sanitation services. Azerbaijan's water bodies face pressures due to growing water abstractions but also water pollution, requiring implementing effective water quality monitoring systems, improved wastewater treatment, and strengthening regulations and enforcement related to water pollution. The overall economic water productivity in Azerbaijan is well below its potential. Improving the institutional capacity and promoting the adoption of modern technologies (e.g., precision farming techniques, drip irrigation) could help leveraging the untapped economic potential.

# Abbreviations

| | |
|---|---|
| ANAS | Azerbaijan National Academy of Sciences |

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|---|---|
| AQUASTAT | FAO global information system on water resources and agricultural water management |
| AWM | Amelioration and Water Management OJSC |
| CMIP5 | Coupled Model Intercomparison Project - Phase 5 |
| ECA | Europe and Central Asia |
| EPI | Environmental Performance Index |
| EU | European Union |
| EUWI | EU Water Initiative |
| FAO | Food and Agriculture Organization of the United Nations |
| GDP | Gross domestic product |
| IBNET | International Benchmarking Network for Water and Sanitation Utilities |
| IPCC | Intergovernmental Panel on Climate Change |
| IWRM | Integrated Water Resources Management |
| JMP | Joint Monitoring Programme |
| MENR | Ministry of Ecology and Natural Resources |
| NPD | National Policy Dialogue |
| NWSAP | National Water Strategy Action Plan |
| OECD | Organization for Economic Cooperation and Development |
| O-WM | One-Water Methodology |
| RCP | Representative Concentration Pathways |
| SDG | Sustainable Development Goal |
| SOCAR | State Oil Company of the Republic of Azerbaijan |
| SSPs | Shared Socioeconomic Pathways |
| WASH | Water, Sanitation and Hygiene |
| WB | World Bank |
| WHO | World Health Organization |
| WRI | World Resources Institute |
| WSDF | Water Security Diagnostics Framework |
| WSS | Water supply and sanitation |

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# 1 Background and Project Introduction

## 1.1 Scope and Objectives of the Water Security Report of Azerbaijan

**This report provides a high-level assessment of Azerbaijan's water security status across different water security dimensions (endowment, sector architecture, performance and outcomes) with the aim of highlighting where efforts should be focused to increase the resilience of the water sector now and in the future.** The assessment focuses on identifying the key water security challenges, risks, and opportunities, following the *One-Water Methodology*. It responds to key questions such as: why does water security matter for Azerbaijan? What risks threaten its water security currently and in the light of future climate change? How is its performance constrained or enabled? What areas require special attention to overcome existing gaps and enhance water security in Azerbaijan? The findings in this report provide a high-level picture of Azerbaijan's water security but also offers a general set of recommendations for action, including water security areas where comprehensive analysis is required to identify leverage points, and sector investment plans.

This report is meant for policy and decision makers working in the space of water security for which water is a critical input, as well as non-state water institutions working on water security.

The report is organized as follows. The remainder of Chapter 1 provides a short overview of the Water Security Diagnostic Framework, the *One-Water Methodology*, and a general overview of key physical, and socio-institutional features of Azerbaijan. Chapter 2 provides a diagnosis of current water security status of Azerbaijan across its four main dimensions (endowment, sector architecture, performance and outcomes). Chapter 3 describes Azerbaijan's future trajectories imposed by global climate and socio-economic scenarios, and drivers related to ongoing and foreseen development plans. Chapter 4 elaborates a preliminary country narrative and related policy recommendations based on the main water security challenges, risks, and opportunities that Azerbaijan is and is likely to face in the near future.

## 1.2 The Water Security Diagnostic Framework

Water security is a complex, multi-dimensional and multi-sectoral concept. It concerns the building of a water secure future for the people, the economy, and the environment in the face of local and global challenges. Achieving water security is therefore the overarching goal of water management and includes leveraging productive aspects of water for human well-being, livelihoods, environment and socio-economic development, and the management of the destructive impacts of water such as floods, droughts, and pollution to protect societies, economies, and the environment. Water insecurity is typically driven by a combination of environmental, socio-economic, technological, and governance factors. The most water insecure countries combine challenging hydrological environments with weak institutions and chronic under-investment in water infrastructure. Even when water is abundant, and the hydrologic regime is benign, mismanagement (for example, poor pollution regulation) or inadequate infrastructure investments can lead to water insecurity.

Water security cannot be adequately assessed by any single integrative index. In addition, water security often intersects with other security concerns, including energy, food, climate change and overall national security. As an alternative to establishing a strict methodology for measuring water security, the Water Global Practice of The World Bank has developed a **Water Security Diagnostic Framework (WSDF)** (**Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.**Figure 1). The WSDF focuses on establishing a consistent and structured conceptual approach to diagnosing water security without being overly prescriptive. This approach is important to identify the most severe risks and significant opportunities, facilitate global comparisons, and benchmark countries. Moreover, it seeks to make explicit the relationship between a country's **water endowment** (given and subject to change due to climate change) and its linkage to **social, economic and environmental outcomes**. This is done by examining the role of **water sector architecture**, encompassing infrastructure and institutions, in

the **performance** of the water sector in managing **water resources**, delivering **water services**, and mitigating **water-related risks**.

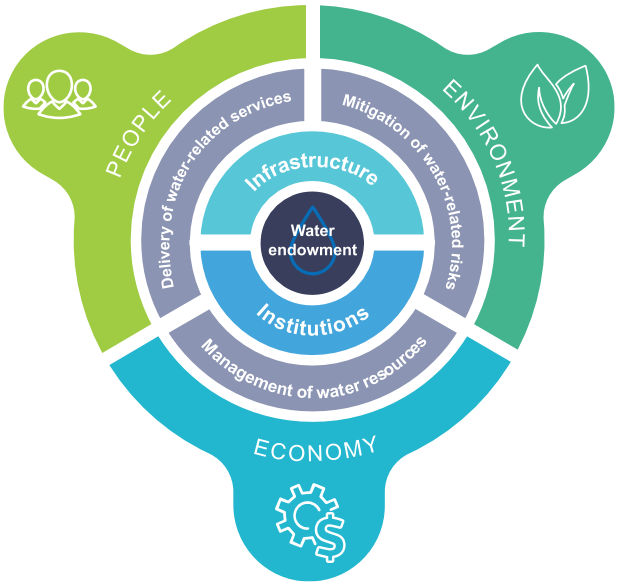



*Figure 1: The Water Security Diagnostic Framework (WSDF) and its different dimensions. Source: World Bank (2019)*

### 1.3 The One-Water Methodology

The **One-Water Methodology (O-WM)** has been developed to **operationalize the WSDF** using an innovative method which maximizes the use of available country data and stakeholder knowledge to establish a **rapid, consistent, and systematic diagnosis of the water sector** across the different dimensions as defined in the WSDF. Through an innovative set of qualitative and quantitative indicators structured in the form of a *performance* matrix, the O-WM allows countries to map where are they standing; but also provides the basis to **identify high-impact actions** to incrementally improve the performance of the water sector and put the country on the right track to water security. The O-WM promotes a dynamic learning cycle i.e. *learning by doing* that continuously strengthens the methodology and accelerates the systematic identification of new gaps and new opportunities.

The O-WM for country analysis and strategy comprises three phases and each phase includes several steps as shown in (Figure 2)**Error! Reference source not found.**

Phase A: Preparatory and Diagnosis Phase: This phase defines the current water security status of a country using a set of quantitative and qualitative indicators which help describing the different water security dimensions of the WSDF. Such indicator-based assessment is combined with desktop review and several stakeholder interactions, including scoping interviews and one workshop with key water-related actors. The main output of this phase is a detailed narrative of a country's water security status along the four water security dimensions of the WSDF, along with an identification of the main risks and opportunities of existing and future climate and socio-economic scenarios. The list of quantitative and qualitative indicators used to assess a country's water security is provided in Annex I.

Phase B: Action Planning and Decision Phase: Based on the diagnosis, this phase supports countries in the identification of pathways to enhance their water security through the identification and prioritization of actions through a participatory multi-criteria analysis. The main output of this phase is a roadmap that includes a set of priority actions that should ideally feed into a strategic action plan that builds on the momentum to accelerate policy reforms and investments to achieve a long-term water security vision.

Phase C: Learning phase and preparation for next cycle: Accumulation and analysis of experiences and lessons learned during the implementation of the O-WM and preparation for the next One-Water cycle.


*Figure 2: The 10-Steps-Process of the country One-Water-Methodology.*

In this report, only the Phase A of the **O-WM** is implemented to provide a preliminary assessment of water security in Azerbaijan. The country narrative serves as the basis to identify strategic areas of concern of the countries' water security, and where further efforts should be placed for action planning and implementation.

### 1.4 Setting the scene: Azerbaijan main physical, socio-economic and governance features

**Geography**. Azerbaijan is a country located at the crossroads of Eastern Europe and Western Asia. It is situated in the South Caucasus region and shares borders with Russia, Georgia, Armenia, Iran, and the Caspian Sea. Covering an area of approximately 86,600 square kilometres, Azerbaijan encompasses diverse physical features, including mountains, valleys, and coastal areas.

The country is characterized by three main geographical regions: the Greater Caucasus, the Lesser Caucasus, and the Caspian Sea coastal plain. The Greater Caucasus, in the north, consists of towering mountain ranges, including the country's highest peak, Mount Bazarduzu, which stands at 4,485 meters. The Lesser Caucasus, in the west and south, features lower mountain ranges and rolling hills. The Caspian Sea coastal plain, in the east, stretches along the country's shoreline, encompassing flatlands and fertile agricultural areas.

Azerbaijan is known for its rich biodiversity and natural beauty. The country is home to several national parks and nature reserves, preserving unique ecosystems and wildlife habitats. Notable natural landmarks include the Gobustan National Park, famous for its ancient rock carvings, and the Absheron Peninsula, known for its mud volcanoes and distinctive landscapes.

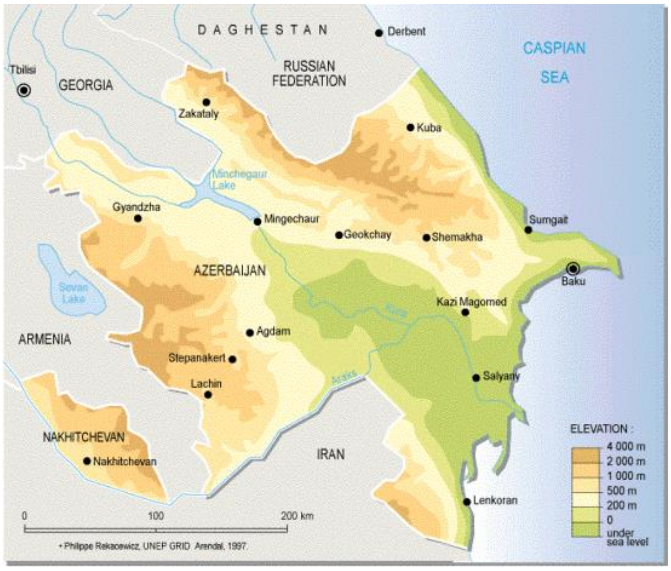



*Figure 3. Topographic map of Azerbaijan. Source: Philippe Rekacewicz, Emmanuelle Bournay, UNEP/GRID-Arendal*

**Climate.** Azerbaijan experiences diverse climatic conditions due to its geographical location and varying topography. The country's climate ranges from humid subtropical along the Caspian Sea coast to continental in the interior regions. The Caspian Sea coast has a mild, humid subtropical climate characterized by hot and humid summers and mild winters. Average temperatures in summer range from 25°C to 30°C, while winter temperatures average around 0°C to 5°C. The region receives a significant amount of precipitation throughout the year, with an annual average ranging from 250 mm to 1,000 mm. Inland regions, including the foothills of the Greater Caucasus and the central plains, have a more pronounced continental climate. Summers are hot and dry, with average temperatures ranging from 25°C to 35°C. Winters are colder, with temperatures often dropping below freezing, averaging around -5°C to 5°C. Precipitation in these areas is relatively lower, with an average annual rainfall ranging from 200 mm to 800 mm. The mountainous regions of Azerbaijan experience a highland climate, characterized by cooler temperatures and more significant variations throughout the year. Summers are milder and cooler, with average temperatures ranging from 15°C to 25°C. Winters are cold, with temperatures below freezing, averaging around -10°C to -5°C. These areas receive more precipitation, with annual rainfall ranging from 800 mm to 1,500 mm, and higher amounts in mountainous regions.

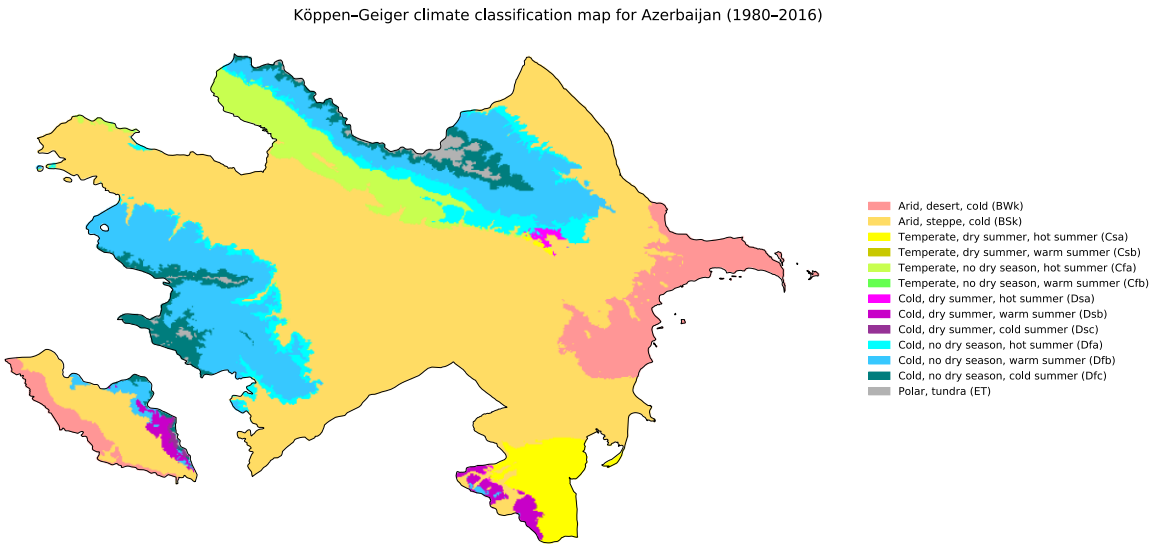



*Figure 4. Köppen-Geiger climate classification map of Azerbaijan 1980-2016: Fick and Hijmans (2017)*

**Administration.** Azerbaijan is a unitary semi-presidential republic, with the President serving as the head of state and the Prime Minister as the head of government. The country is divided into 66 administrative districts known as rayons, along with 11 cities of republican significance and one autonomous republic, Nakhchivan. The capital city, Baku, holds a special administrative status and is the political, economic, and cultural centre of the country. Each administrative district has its own executive authority, headed by an appointed governor, known as the Rayon Executive Power. These authorities are responsible for implementing national policies, managing regional budgets, and overseeing local governance. The cities of republican significance, including Baku, Ganja, and Sumgayit, have a higher level of autonomy and their own city executive powers.

**Population.** Azerbaijan is a diverse country with a population of approximately 10.2 million people. The demographic landscape of the country encompasses various ethnic groups, languages, and religious affiliations. The population density in Azerbaijan averages around 116 people per square kilometre, making it one of the more densely populated countries in the South Caucasus region. The population is relatively young, with a median age of approximately 31 years old. The country has a moderately high birth rate, balanced by a noticeable level of emigration, particularly in urban areas. Urbanization is prominent in Azerbaijan, with approximately 56% of the population residing in cities and towns, while the remaining population resides in rural areas. The capital city, Baku, is the most populous city in Azerbaijan, acting as a cultural, economic, and political hub. Other major cities include Ganja, Sumgait, and Lankaran, each contributing to the urbanization trend.

*Table 1. Population of the Republic of Azerbaijan as of January 1, 2022. Source: Bureau of National Statistics of the Republic of Azerbaijan2*

| Names of economic regions | Territory, thousand sq. Km | Population, thousand persons | | Population density 2022 (sq. km, person) |
|---|---|---|---|---|
| | | census 2009 | beginning 2022 | |
| Baku city | 2,14 | 2045,8 | 2303,1 | 1076 |
| Nakhchivan Autonomous Republic | 5,50 | 398,3 | 463,0 | 84 |
| Absheron-Khizi economic region | 3,73 | 514,0 | 579,9 | 155 |
| Daghlig Shirvan economic region | 6,13 | 281,6 | 326,8 | 53 |

[2] https://stat.gov.aze/en/

| Names of economic regions | Territory, thousand sq. Km | Population, thousand persons | | Population density 2022 (sq. km, person) |
|---|---|---|---|---|
| | | census 2009 | beginning 2022 | |
| Ganja-Dashkasan economic region | 5,27 | 560,0 | 612,1 | 116 |
| Karabakh economic region | 8,99 | 802,9 | 907,9 | 101 |
| Gazakh-Tovuz economic region | 7,03 | 612,6 | 690,6 | 98 |
| Guba-Khachmaz economic region | 6,96 | 488,7 | 561,8 | 81 |
| Lankaran-Astara economic region | 6,07 | 824,0 | 959,4 | 158 |
| Central Aran economic region | 6,69 | 656,6 | 743,2 | 111 |
| Mil-Mughan economic region | 5,67 | 444,7 | 526,4 | 93 |
| Shaki-Zagatala economic region | 8,84 | 566,0 | 632,9 | 72 |
| Eastern Zangazur economic region | 7,47 | 295,4 | 345,0 | 46 |
| Shirvan-Salyan economic region | 6,08 | 431,8 | 504,3 | 83 |
| **Republic of Azerbaijan** | **86,6** | **8922,4** | **10156,4** | **117** |

**Economy.** Azerbaijan has a developing economy driven by various sectors, including the industry, agriculture, and services. The country's vast reserves of oil and natural gas have played a significant role in shaping its economy.

The share of the various sectors contributing to the gross domestic product (GDP) and its employment for 2021 is shown in Table 2.

The industry sector, encompassing oil and gas and manufacturing, plays a significant role in Azerbaijan's economy. It serves as a major contributor (48,43% of GDP), contributing substantially to government revenue and export earnings.

The oil and gas sector is a key component within this broader industrial framework. The country has made significant investments in oil and gas exploration and production, particularly in the Caspian Sea region. Azerbaijan is known for its major oil and gas fields, such as the Azeri-Chirag-Gunashli (ACG) field and the Shah Deniz gas field.

Manufacturing is another important sector, encompassing industries such as petrochemicals, machinery, textiles, and food processing. The country has been focusing on diversifying its manufacturing base and attracting foreign investments to promote industrial growth.

Agriculture plays a vital role in Azerbaijan's economy, employing a significant portion (34.19%) of the population and contributing to food security. The country has favourable conditions for agriculture, with fertile lands suitable for the cultivation of various crops, including grains, fruits, vegetables, and cotton. Livestock farming, including cattle, sheep, and poultry, is also prominent in rural areas.

The services sector, including tourism, finance, and telecommunications, has been growing in importance. Its contribution to the GDP is 37.63% and to employment covers half of the working force in Azerbaijan. Azerbaijan has been investing in infrastructure development and promoting tourism to showcase its cultural heritage, natural landscapes, and historical sites.

Azerbaijan faces economic diversification challenges and the need for sustainable development beyond the oil and gas sector. The government has implemented reforms to attract foreign investments, enhance business competitiveness, and support entrepreneurship and innovation.

*Table 2. Share of economic sectors in the gross domestic product (GDP), and its employment 2021 for Azerbaijan Source: World Bank*

| Sector | Contribution to GDP | Contribution to employment |
|---|---|---|
| Industry | 48.43% | 15.44% |
| Agriculture | 5.88% | 34.19% |
| Services | 37.63% | 50.37% |

**Agriculture.** Agriculture is an essential sector in Azerbaijan, providing employment opportunities and contributing to the country's food security. The favourable climate and diverse agricultural landscapes support the cultivation of a wide range of crops and livestock farming. Crop cultivation in Azerbaijan includes the production of grains such as wheat, barley, corn, and rice. Fruits such as apples, pears, cherries, and citrus fruits are also grown, along with vegetables such as tomatoes, cucumbers, and potatoes. The country has a long history of viticulture, with vineyards producing grapes for winemaking.

Livestock farming is significant in Azerbaijan, with a focus on cattle, sheep, goats, and poultry. The rearing of livestock provides meat, dairy products, and wool. Beekeeping is also practiced, contributing to honey production.

Azerbaijan has undertaken comprehensive agricultural reforms, demonstrating a commitment to enhancing productivity and bolstering the competitiveness of the agricultural sector. Notably, the country has made strategic investments in modern farming techniques and cutting-edge agricultural technologies to keep pace with global advancements in agriculture.

To support and empower farmers, the Azerbaijani government has implemented a multifaceted approach. Subsidies play a crucial role, providing financial assistance to farmers to mitigate potential economic challenges and incentivize sustainable agricultural practices. This support is instrumental in fostering economic stability within the agricultural community.

In addition to financial assistance, the government has prioritized knowledge transfer through training programs. These programs aim to equip farmers with the latest agricultural practices, innovative techniques, and sustainable methods. By enhancing the skill set of farmers, Azerbaijan seeks to ensure the adoption of modern and efficient farming practices throughout the sector.

Furthermore, a pivotal aspect of the government's strategy involves the development of agricultural infrastructure. This encompasses the creation and improvement of facilities such as irrigation systems, storage facilities, and transportation networks tailored to the specific needs of the agricultural sector. Robust infrastructure is vital for optimizing the entire value chain, from cultivation to distribution, and it contributes significantly to the sector's overall efficiency.

Through these concerted efforts, Azerbaijan strives not only to increase agricultural productivity but also to create a resilient and competitive agricultural sector capable of meeting domestic needs and participating effectively in the global market. The multifaceted approach, combining financial support, education, and infrastructure development, reflects a holistic strategy to propel the agricultural industry toward sustainable growth and prosperity.

**Energy.** Azerbaijan possesses abundant energy resources, including significant oil and natural gas reserves. The energy sector plays a crucial role in the country's economy and export earnings.

Oil and Gas: Azerbaijan is known for its substantial oil reserves and has been a significant player in the global oil market. The country has developed oil fields such as the Azeri-Chirag-Gunashli (ACG) field in the Caspian Sea, which contributes to its oil production. Azerbaijan has also made advancements in natural gas exploration and production, with the Shah Deniz gas field being a notable asset.

Renewable Energy: In recent years, Azerbaijan has been increasingly focusing on the development of renewable energy sources to diversify its energy mix and reduce reliance on fossil fuels. The country has significant potential for solar and wind energy, particularly in regions like Gobustan and Nakhchivan. Initiatives are underway to promote renewable energy projects and attract investments in the sector.

Azerbaijan has been investing in energy infrastructure, including pipelines and export routes, to ensure the efficient transportation and export of oil and gas resources. The government has also prioritized energy efficiency measures and sustainable development practices in the energy sector.

**Electricity.** Azerbaijan's electricity sector is evolving, driven by the growing demand for energy and efforts to diversify the country's energy sources. The generation, transmission, and distribution of electricity are overseen by the Ministry of Energy and the Azerbaijan Energy Regulatory Agency. Electricity generation in Azerbaijan comes from various sources, including fossil fuels, hydroelectric power, and renewable energy. Fossil fuel power plants, particularly natural gas-fired plants, play a significant role in electricity generation. Hydroelectric power stations, harnessing the energy of rivers, contribute to the country's renewable energy generation.

Azerbaijan has been exploring opportunities to expand its renewable energy capacity. Solar power projects, wind farms, and biomass energy initiatives are being developed to increase the share of renewable energy in the electricity mix. The government has implemented support mechanisms and incentives to attract investments in renewable energy projects.

The country's electricity grid is interconnected, allowing for the exchange of electricity with neighbouring countries. Azerbaijan is part of regional energy networks, enabling the import and export of electricity to ensure a stable supply and meet demand.

A Memorandum of Understanding (MoU) has been established between the Ministry of Investment of the United Arab Emirates and the Ministry of Energy of the Republic of Azerbaijan, fostering investment cooperation in electricity transmission projects. This initiative aims to bolster the development of the energy network, facilitating the exchange of technical knowledge and expertise.

The Framework Agreement on Strategic Collaboration outlines a comprehensive strategy to enhance Azerbaijan's renewable and clean energy capacities, paving the way for Green Energy Export Operations. The accompanying Calendar of Actions (roadmap) delineates a step-by-step plan for the construction of onshore solar and wind power plants, with a cumulative capacity of 1 GW. This roadmap outlines specific implementation measures for 2 solar and 1 wind energy projects slated for 2024-2027.

Moreover, a Strategic Partnership Agreement has been established between SOCAR and ADNOC, further solidifying collaboration in the energy sector. This multifaceted agreement extends to various areas, including rooftop solar projects, green hydrogen, green ammonia, synthetic methane, sustainable aviation fuel production, and the export of green energy. Notably, it encompasses ambitious targets, such as 2 GW solar and 2 GW wind onshore projects, as well as an impressive 6 GW offshore wind energy initiative.

The areas liberated from Armenian occupation in 2020 are identified as having significant potential for renewable energy development. The Government of Azerbaijan (GOA) has articulated plans to rehabilitate approximately 50 small Hydropower Stations (HPS) in these regions, contributing to a total generation capacity exceeding 300 megawatts (MW). It is noteworthy that around 20 HPSs are already operational, underscoring the initial progress in harnessing the region's hydropower potential.

**Water resources.** Azerbaijan's water resources exhibit significant diversity and face challenges related to unequal distribution. The country's surface water sources, totaling 27 km3, can decrease to 20-21 km3 in dry years. Approximately 70-72% of potable water sources are formed outside the country, including rivers, lakes, reservoirs, and glaciers.

Transboundary Significance: Azerbaijan's water resources are influenced by transboundary aspects, with 19.0-20.6 km3 originating from neighboring countries. Domestic sources contribute 9.5-10 km3, with key rivers like the Kura and Araz playing vital roles.

Pollution Concerns: The main arteries, Kur and Araz rivers, face pollution challenges upon entering the country, with chemical elements and compounds affecting water quality. At the border, the coagulation of oil products, phenols, copper, bismuth, titan, manganese, and other elements in water of these rivers, exceed permissible limits according to national standards. The Araz River, upon entry from Armenian territory, exhibits elevated pollution levels than the permissible levels, significantly affecting the overall quality of the water.

River Network Density: Azerbaijan's river network comprises 171 rivers longer than 25 km, with an average density of 0.39 km/km2. Lankaran exhibits the highest density (0.84 km/km2), while Jeyranchol and Absheron-Gobustan have the lowest (0.20 km/km2).

Water Composition: The natural mineral content of potable rivers' water ranges from 0.3-0.5 q/l. Hydrocarbonate and calcium ions prevail, except for Jeyranchol and Absheron-Gobustan rivers, which have a different chemical composition with higher mineral content.

Reservoirs: Azerbaijan has 140 reservoirs, including major ones like Mingachevir, Shamkir, Araz, and Sarsang, with a total capacity of 22 km3. Reservoirs help mitigate seasonal variations in river flow.

Lakes: Azerbaijan features 450 lakes with a total capacity of 394 km2, although 200 dry up in summer. The total water source of lakes is about 0.90 km3, with potable water accounting for 0.03-0.05 km3.

Glaciers: Glaciers, concentrated in the Greater Caucasus, cover approximately 6.6 km2 with a water source of 0.08 km3. Their areas have significantly diminished over the last 70 years, impacting river feed and regulation of water sources

Groundwater: Groundwater, totalling around 6.51 billion m3/year, is primarily found in foothills plains like Samur-Devechi and Shaki-Zagatala. Springs in mountainous regions contribute high-quality groundwater, with consumption ranging from 5-10 liters/second.

Per Capita Water Availability: Despite facing challenges, Azerbaijan surpasses many countries globally in per capita water availability, reflecting the significance of its water resources.

**Water management.** Azerbaijan's water management efforts aim to optimize water use, protect water resources, and ensure sustainable development. The country faces challenges related to water scarcity, transboundary water issues, and water pollution. The management of transboundary water resources is essential due to Azerbaijan's proximity to neighbouring countries and shared rivers. Cooperation and agreements with upstream and downstream countries play a vital role in addressing water-related challenges and maintaining the equitable use of water resources. Agriculture is a significant contributor to water stress. Water in agriculture poses a challenge in Azerbaijan as well, due to limited water resources, water loss and lack of efficient water use by farmers. The Government of Azerbaijan invests a lot into the development of its climate friendly agri-food systems. The main portion of our investment goes to digital and smart agriculture transformation. The major state support mechanisms also addressed the stimulation of our farmers for application modern irrigation technologies. In addition, prioritizing the replacement of soil channels with concrete channels, installing underground water pipes, and promoting drip and pivot irrigation are key components of Azerbaijan's efficient water governance policy.

Water management and allocation fall under the responsibility of the Ministry of Ecology and Natural Resources. The ministry oversees water resource management, develops water policies, and ensures sustainable water use. It collaborates with other government agencies and stakeholders to address water-related challenges and implement water conservation measures.

Azerbaijan, has made strategic investments in water infrastructure projects, including the construction of dams and reservoirs. These endeavours aim to regulate water flow, secure a reliable water supply

for irrigation, and address the challenges posed by floods and droughts. Concurrently, the government has dedicated efforts to enhance water resource monitoring capabilities and formulate comprehensive water management plans.

**Water and Sanitation.** Azerbaijan has made progress in improving access to clean water and sanitation, but challenges remain, particularly in rural areas and remote communities.

Access to drinking water has significantly improved, with approximately 95% of the population having access to improved water sources. The government has invested in infrastructure development, including the expansion of water supply networks and the renovation of water treatment facilities, mostly in secondary cities and yet to invest in the Greater Baku area which still observes up to 55% of losses with many residential areas not yet connected to piped water and centralised sanitation services.

Sanitation services have also improved, with a significant portion of the population having access to improved sanitation facilities. Efforts have been made to upgrade and modernize sewage systems, particularly in urban areas. However, in rural regions, access to improved sanitation facilities remains a challenge, and there is a need for further investments in infrastructure.

The government, in collaboration with international organizations, implements programs to promote hygiene practices, raise awareness about proper sanitation, and improve wastewater management. Community-level initiatives focus on educating the population about the importance of sanitation and encouraging behaviour change.

Addressing water and sanitation challenges requires continued investments, policy reforms, and community engagement. The government's commitment to sustainable water management, infrastructure development, and public health plays a crucial role in ensuring access to clean water and adequate sanitation for all Azerbaijanis.

# 2 Country Diagnosis

The country diagnosis of the water security situation of Azerbaijan is performed for the four dimensions of water security (endowment, architecture, performance, and outcomes) following the methodological approach provided in the O-WM. The overall assessment of each dimension is provided using radar charts that summarize the ranking of different indicators on a range band from 0 to 5 as defined in the O-WM[3]. A rating of 1 indicates Low performance (i.e., the country is at a very unfavourable status or performing poorly for a particular indicator), 2 rating is a Low-Medium (i.e., the country is underperforming although some progress has been made), 3 is Medium (i.e., the country is performing at an average level compared to other countries), 4 is Medium-High (i.e., the country is performing above average and showing good progress towards the desired outcome), and 5 is High (i.e., the country is at a high favourable status, outperforming and can be considered as best practice). The raw values of the indicators used to describe the different dimensions are described in Annex II.

## 2.1 Endowment

The water endowment of Azerbaijan, encompassing renewable and non-renewable sources, along with non-conventional water sources like reused wastewater, collectively determines the country's water availability and quality. In Figure 5, the assigned indicator values reflect a comprehensive assessment of these factors.

Azerbaijan's water availability and withdrawal are positioned at a Low-Medium level on the global scale. This ranking is substantiated by the indicator values: a Water Availability per capita score of 2 indicates a moderate availability of water resources. Additionally, the Water Withdrawal per capita score of 2 suggests that the country exhibits a higher ratio of water withdrawals compared to other nations, signifying an area of concern that may impact sustainable water use practices.

The assessment further reveals a distinctive characteristic in the form of Medium seasonal variability, as denoted by a Seasonal Variability score of 3. This underscores the fluctuations in water availability throughout the year, influencing the management and utilization of water resources.

Moreover, a Medium-High Interannual Variability score of 4 highlights the country's exposure to significant year-to-year variations in water availability. This variability poses challenges to long-term water resource planning and necessitates adaptive strategies to cope with changing conditions.

In terms of Drinking Water Quality, the assigned index score of 3 signifies a moderate level of quality. While the country maintains a certain standard, there is room for improvement in ensuring consistently high-quality drinking water for the population.

Lastly, the Dependency Ratio score of 1, showcasing a degree of self-sufficiency in meeting water needs.

Therefore, while Azerbaijan's overall water resource situation is at a medium level, specific areas, such as water withdrawals and variability, underscore the need for targeted interventions and improvements in sustainable water management.

[3] A score of 0 is equivalent to No Data

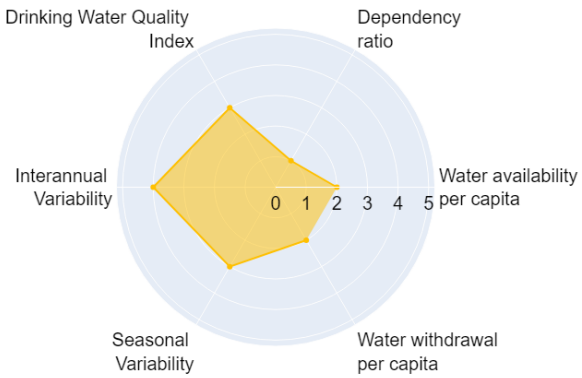



*Figure 5. Results of indicator assessment regarding the water endowment in the Republic of Azerbaijan*

### 2.1.1 Supply

#### *Water availability*

**Azerbaijan's water resources are relatively modest but still surpass the regional average for the South Caucasus.** With an average water availability of 3,485 m3 per capita per year (~29.5 km3 annually), the country's water endowment exceeds the typical regional average for South Caucasus nations (2,540 m3 per capita per year) (FAO, 2022).

The Kura River, the longest river in Azerbaijan with a total length of 1,515 km, covers 900 km within the country and receives a substantial annual inflow of 11.910 km³ from Georgia. The Aras River, which serves as a border between multiple countries, has an annual inflow of 6.724 km³, with additional contributions of 2.346 km³ from Armenian tributaries. The Samur River, originating in the Russian Federation, provides an annual discharge of 2.36 km³, considered available for Azerbaijan. These rivers play a crucial role in Azerbaijan's water resources, with the Kura River standing out as the largest contributor in terms of both length and annual inflow, followed by the Aras and Samur Rivers. Of the total available water resources, approximately 80% (~23.6 km3 annually) are surface waters, originating from sources such as rivers, springs, and lakes, while the remaining 20% comprises groundwater sources (~5.9 km3 annually).

**In Azerbaijan, there are noticeable variations in surface water availability across the country's diverse geography.** Regions with more abundant surface water resources are predominantly found in the northern and eastern parts, including the Greater Caucasus and the Caspian Sea basin. Conversely, areas in the southeastern and central regions, such as the Kur-Araz Lowland, tend to have lower surface water availability. It is interesting to note that despite the arid conditions in certain southern regions, they benefit from significant transboundary inflows, which significantly bolster their surface water resources. For instance, the rivers flowing into Azerbaijan from neighbouring countries, such as the Kura River from Georgia and the Araz River from Iran, greatly contribute to augmenting surface water availability in these regions, particularly in the Nakhchivan Autonomous Republic and the southern lowlands. This phenomenon is exemplified by the Kura and Araz river basins, which receive substantial transboundary inflows, thereby increasing their surface water availability and providing vital resources for agriculture and other uses.

**The Caspian Sea, the world's largest enclosed inland body of water, has experienced fluctuations in its water levels over time and is decreasing in recent years.** The water balance of the Caspian Sea is controlled by a number of different components such as inflow, the endorheic nature (no outflow) of the lake, water withdrawal for irrigation and land-use purposes, precipitation, and evaporation due natural and anthropogenic changes in climate.

Recent data indicates a concerning decline in the water levels of the Caspian Sea, underscoring the ecological challenges faced by this unique body of water. Over the last decade, the Caspian Sea has experienced a gradual reduction in water volume, highlighting the impact of climate change and human activities on its delicate equilibrium. Studies reveal that increased temperatures and altered precipitation patterns, attributed to climate change, contribute to heightened evaporation rates, exacerbating the decline in water levels.

Furthermore, the endorheic nature of the Caspian Sea, coupled with escalating demands for water withdrawal for agricultural purposes, intensifies the strain on this vital water source. Statistics show a marked increase in water extraction for irrigation and land-use, exacerbating the challenges posed by the diminishing water levels. (Koriche, et.al. (2021)) These trends underscore the urgency of adopting sustainable water management practices to mitigate the adverse effects on the Caspian Sea's ecosystem.

### *Dependency ratio*

**Azerbaijan's water resources are intricately connected to transboundary waters, which face increasing pressures due to various factors, including human activities in upstream regions.** Approximately 70% of Azerbaijan's surface water flows originate from neighbouring countries. The dependence on transboundary flows can vary across different river basins, with some regions relying more heavily on these shared water resources. Over time, both local and transboundary water flows in Azerbaijan have experienced fluctuations. The water resources of the Kura River and its main transboundary tributaries have decreased by 16.0–55.2%. This is because of the construction of new reservoirs and an increase in water withdrawals for irrigation, as well as the need to meet the requirements of other sectors of the economy in the countries located in the basin. The impact of climate change on the decrease in the river flow is approximately 5–15%.

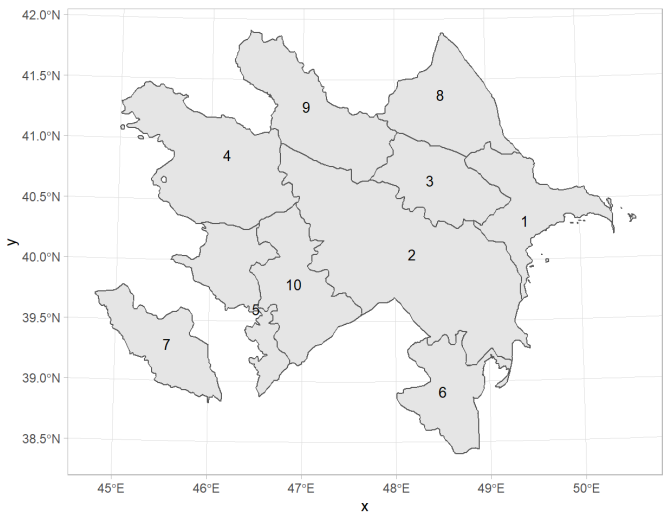
**Azerbaijan's most significant rivers are transboundary water bodies with considerable regional importance for agriculture and the energy sector.** One notable example is the Kura River, which originates in Turkey, flows through Georgia, and enters Azerbaijan before ultimately draining into the Caspian Sea. The Kura River serves as a vital lifeline, supporting agriculture, industry, and communities not only in Azerbaijan but also in Georgia. Nevertheless, variations in its flow can occur due to activities upstream, including dam construction, water diversion for irrigation, and hydropower generation in Turkey and Georgia. These actions have the potential to impact Azerbaijan's water availability, agricultural practices, and overall water security. Similarly, the Samur River, originating in Russia and flowing through the northern regions of Azerbaijan before reaching the Caspian Sea, is another critical transboundary water source. Activities upstream, particularly in Russia, can influence the flow and water quality of the Samur River, which is vital for agricultural irrigation and cover a considerable part of drinking water supply of Absheron Peninsula in Azerbaijan. The management and sustainable use of these shared water resources are of paramount importance to ensure the water security and development of Azerbaijan, emphasizing the need for collaborative efforts and regional agreements to address the challenges posed by transboundary waters.

### *Interannual and seasonal water variability*

**Azerbaijan experiences significant interannual and seasonal water variability due to its geographical location, climate, and hydrological characteristics.** Azerbaijan's interannual water variability is closely tied to variations in precipitation. Some years witness above-average rainfall, leading to increased river flow and groundwater recharge, while others may experience below-average rainfall, resulting in reduced water availability. Climate change has added complexity to interannual water variability. Irregular weather patterns, including prolonged droughts or extreme rainfall events, can disrupt the typical hydrological cycle and exacerbate water scarcity issues. In the mountainous regions of Azerbaijan, snowpack and glacial meltwater contribute significantly to river flow. Variations in snow accumulation and glacier melt rates from year to year impact the availability of freshwater resources downstream. Spring is a critical period for water resources in Azerbaijan, as melting snow

from the mountainous areas feeds into rivers and lakes. The timing and rate of snowmelt can vary significantly from year to year, affecting river flow and the availability of water for agriculture. Summers in Azerbaijan are generally hot and dry, leading to reduced river flow and increased evaporation rates from reservoirs and water bodies. This seasonal drought can strain water resources, particularly for irrigation and hydropower generation. The autumn season typically brings some relief from the summer drought, with increased rainfall replenishing rivers and groundwater. However, the timing and intensity of autumn rains can vary, impacting the overall water balance. Winter precipitation, including rain and snowfall, influences groundwater recharge and the filling of reservoirs. Variations in winter precipitation can affect water availability during the subsequent seasons.

At sub-national level, for the scope of this report, the country is divided into regions shown in Figure 6.




| Map. ID | Region Name |
|---|---|
| 1 | Absheron |
| 2 | Aran |
| 3 | Daglig-Shirvan |
| 4 | Ganja-Qazakh |
| 5 | Kalbajar-Lachin |
| 6 | Lankaran |
| 7 | Nakhchivan |
| 8 | Quba-Khachmaz |
| 9 | Shaki-Zaqatala |
| 10 | Yukhari-Karabakh |

*Figure 6. Azerbaijan Spatial divisions – Regions*

Further the seasonal variability of water availability at sub-national level is shown in Figure 7.

The spatial distribution of the coefficient of variation on the map can highlight areas with high seasonal variability in water availability. Regions with a higher coefficient of variance are likely to experience more pronounced changes in water availability between different seasons, such as having wetter periods followed by drier ones.

A higher coefficient of variation indicates greater relative variability in water availability across different regions. This means that some regions experience more significant fluctuations in water availability throughout the seasons compared to others.

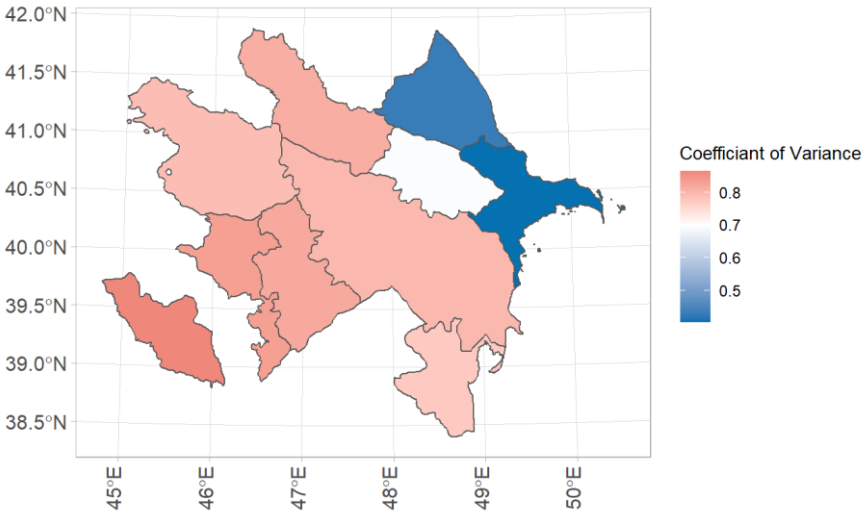



*Figure 7. Spatial variation of seasonal variability of water availability across regions in Azerbaijan. Source: Gassert et al. (2014).*

### *Water quality*

**The water quality in Azerbaijan can vary depending on the region and the source of the water.** The water quality in Azerbaijan is significantly impacted by various factors, particularly pollution from upstream sources and untreated water within the country. Transboundary rivers, such as the Kura and the Aras, receive pollutants from upstream countries, including heavy metals, exacerbating water quality issues. This pollution poses a significant challenge, particularly in surface water bodies, where contamination levels can be high. Urgent action is needed to address this issue, including improved monitoring, enforcement of regulations, and collaborative efforts with neighboring countries to mitigate transboundary pollution and ensure the protection of water resources for both present and future generations.

## 2.1.2 Demand

### *Water withdrawals per source of water*

**Azerbaijan's water withdrawal is substantial and exhibits significant disparities in its distribution across the country.** The current water withdrawals in Azerbaijan, totalling approximately 1,240 m3 per capita per year (~9.9 km3 annually; FAO, 2022), represent a substantial portion of the country's total water availability. This amounts to roughly 21% of the available water resources.

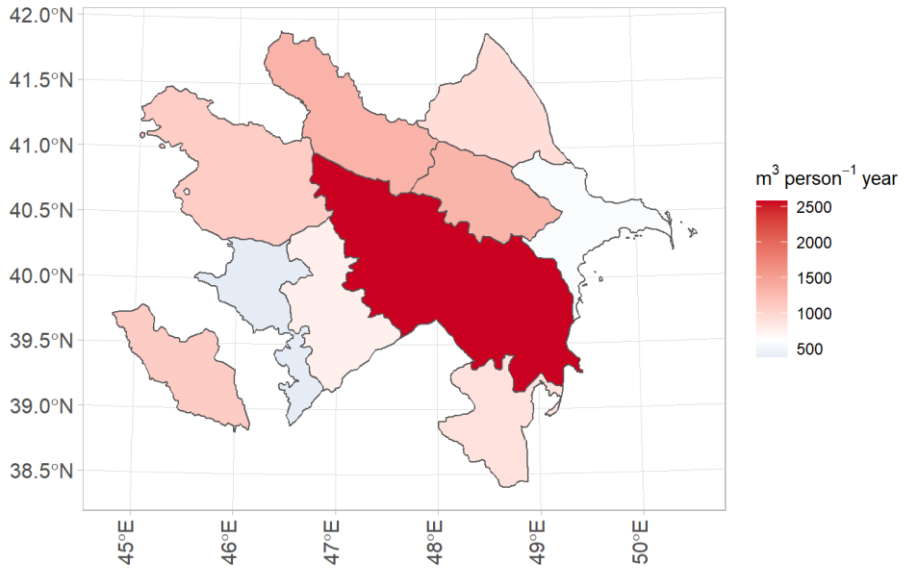



*Figure 8. Water withdrawal per capita in Azerbaijan across regions Source: Gassert et al., (2014).*

As can be seen the region of Aran has the highest water withdrawal per capita with 2500 m3/person per year. The high rates in this region, encompassing the lowlands around the Kura and Araks Rivers, are due to irrigation of the agricultural areas with moderate population density.

**Azerbaijan has several major aquifers that serve as significant sources of groundwater.** These aquifers are often found in sedimentary rock formations, such as sandstone and limestone, and can store substantial amounts of water. Some of Azerbaijan's groundwater sources are shared with neighbouring countries, such as Iran and Georgia. The management of these transboundary aquifers requires international cooperation to ensure equitable and sustainable use. Artesian wells are commonly used to access groundwater in Azerbaijan. These wells tap into pressurized aquifers, allowing water to flow to the surface without the need for pumping. Artesian wells are especially valuable for providing drinking water to rural communities. Groundwater sources in Azerbaijan play a crucial role in supplying water for both domestic and agricultural purposes. They are particularly important for irrigation in regions with limited surface water availability.

### *Sectoral water withdrawals*

**Water withdrawals in Azerbaijan are distributed across various sectors to meet the diverse needs of the country.** Agriculture is the largest consumer of water in Azerbaijan, accounting for a substantial portion of water withdrawals. Agricultural water withdrawal accounts for 92.3% (11.61 billion m3/year). Water is primarily used for irrigation to support the cultivation of crops, including fruits, vegetables, cotton, and grains. The areas equipped for irrigation by groundwater are 178,000 ha and the areas equipped for irrigation by surface water are 1,214,200 ha, covering 66.7% of the total arable lands (FAO, AQUASTAT database 2020). The agriculture sector is crucial for food production and rural livelihoods. The energy sector is the second largest water user (World Bank: Country Climate and Development Report). The industrial sector, including manufacturing and processing industries, also relies on significant water withdrawals. The industrial withdrawal comprises 4.51% (0.57 billion m3/year) Water is used for cooling processes, power generation, and various industrial operations. Industries such as petrochemicals, metallurgy, and food processing have notable water demands. Municipal and domestic water supply is essential for urban and rural communities. The municipal withdrawal constitutes 3.16% (0.40 billion m3/year) of the total water withdrawal. Water is withdrawn

for drinking, sanitation, and general household use. Municipal water supply systems are responsible for delivering safe and treated water to homes and businesses.

## 2.2 Architecture

The architecture of the water sector in Azerbaijan is assessed by looking at the institutional set up and regulatory framework and the availability and status of the infrastructure for key uses (water supply and sanitation and irrigation). Figure 14 displays the results of the indicators used for assessing the status of the water infrastructure. The institutional and regulatory framework will be assessed qualitatively but not benchmarked. As described in Section 2.1, the higher the score, the better is the country performing against the specific indicator.

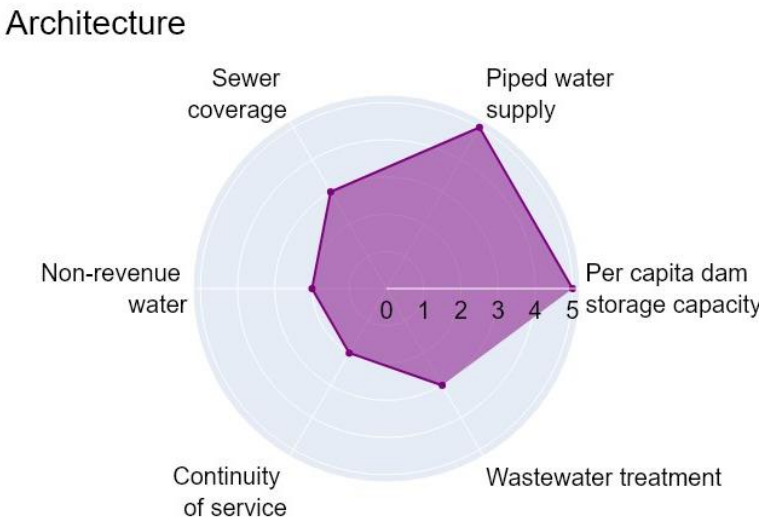



*Figure 9. Status of the water sector architecture in the Republic of Azerbaijan*

### 2.2.1 Regulatory framework and institutions

***Institutional arrangement, roles, and responsibilities***

**In 1997, Azerbaijan developed the Water Code as legal framework for the protection and use of water bodies and the framework established institutional roles and responsibilities.** Azerbaijan is willing to tackle challenges in the water sector, evidenced by its support of the UN Sustainable Development Goals (SDGs) and regional leadership. In the past decades, Azerbaijan invested with the support of International Finance Institutions in large scale WSS infrastructure projects, but on the other hand the management and the regulatory framework is underfunded (EUWI, 2021).

**At the national level, the institutional framework of the water sector, comprised by ministries, state agencies and companies, is under reform** to address the overlapping responsibilities and improve effective collaboration.

The following public organizations are involved in the water sector in Azerbaijan:

- Ministry of Ecology and Natural Resources
- Ministry of Emergency Situations
- State Agency for Water Resources
- Ministry of Finance
- Ministry of Economy
- Ministry of Health
- Amelioration and Water Management OJSC (AWM)

- Ministry of Agriculture of the Republic of Azerbaijan
- AZERENERJI OJSC
- AZERSU OJSC
- State Committee for Urban Planning and Architecture
- Tariff Council
- Municipalities / Local Government
- Water Commission
- NGOs – Azerbaijan Water Users Association (AWUA)

There are also NGOs which participate in the public hearing while initiating big size projects in the water sector, including construction of the reservoirs, dams and other hydraulic structures for irrigation, water supply and sanitation.

Three ministries are responsible for different agendas in the country's water sector, namely the Ministry of Ecology and Natural Resources (MENR), the Ministry of Emergency Situations (MES) and the Ministry of Agriculture. Currently, the country is undergoing institutional reform in the water sector. The establishment of the Azerbaijan State Water Resources Agency (ASWRA) is a step in the water sector reform process. However, the current structure and definition of specific roles and responsibilities in the water supply and wastewater sectors reflects the legacy of the past combined with newly created institutions that have not yet transformed or adapted their roles and responsibilities in the sector. The State Agency of Water Resources of Azerbaijan plays important role in managing the country's big size reservoirs and other hydraulic structures transferred to its balance and ensuring their sustainable use and development of the water resources. Its functions are essential for the safety of the hydraulic structures, sustainable water resources in the country and social well-being.

**The Ministry of Ecology and Natural Resources is responsible for the overall management of environmental and natural resources, including water resources, in Azerbaijan.** It formulates policies, regulations, and strategies related to water quality, conservation, and protection. Furthermore, it plays a crucial role in ensuring the sustainability and protection of water resources in Azerbaijan, and in promoting responsible and sustainable water use practices.

The **State Water Reserves Agency (SWRA)** operates under the Ministry of Ecology and Natural Resources. Its activities and responsibilities are related to water resource management, regulation and planning, infrastructure development, and data collection and research. The hydrology agency plays an important role in hydrological data management using information systems.

The State Agency of Water Resources of Azerbaijan plays important role in managing the country's big size reservoirs and other hydraulic structures transferred to its balance and ensuring their sustainable use and development of the water resources. Its functions are essential for the safety of the hydraulic structures, sustainable water resources in the country and social well-being.

**The Ministry of Emergency Situations** is responsible for disaster management and response, including flood and emergency management in the event of natural disasters, such as floods, while the **Ministry of Agriculture** plays a key role in ensuring the development and sustainability of the agricultural sector in Azerbaijan and in promoting the well-being of rural communities and the wider population.

Regarding to the participation in the water resource management, the Ministry through regional State Agricultural Development Centers supports Water User Associations and farmers for delivery of the irrigation water to the fields and their fair distribution among the users. The Ministry cooperates with the AWM to support working out irrigation plans, and define irrigation water demand at the beginning of each crop growing season and control to keep irrigation schedules during the vegetation period.

The State Agency for Water Resources of the Ministry of Emergency Situations of the Republic of Azerbaijan ensures reliable protection of the big size state-important water reservoirs in the balance, carries out regular control of the technical condition of water reservoirs in the country, monitors surface

and underground water resources, water bodies, hydro-technical installations, water supply systems and is an executive authority that implements the improvement of water resources management.

The Agency was established by the Decree of the President of the Republic of Azerbaijan No. 389 dated February 25, 2011 to improve the management of the country's water resources.

By the Decree No. 50s of the Cabinet of Ministers dated February 18, 2011, the main water intake facilities of the strategically important Shamkir, Yenikend, Mingachevir, Varvara cascade reservoirs, Jeyranbatan reservoir, Upper Karabakh, Upper Shirvan, Shamkir Mashin canals on the Kura River were transferred to the balance of the Ministry of Emergency Situations

**Azersu Joint Stock Company, also known as Azersu JSC, is the national water supply and sanitation company of Azerbaijan.** "Azersu" Open Joint Stock Company was established by the Presidential Order of the Republic of Azerbaijan dated June 11, 2004. "Azersu" OJSC organizes the collection, processing, transportation, storage and distribution of water from sources, provides consumers with drinking water in a centralized manner and sewerage services, implements collection, transportation, treatment and disposal of wastewater. The Joint Stock Company provides design, construction, operation and maintenance of drinking and wastewater systems. "Azersu" OJSC provides water supply and sewerage services to 1,813,531 subscribers across the country. 1,741,155 of them are population and 72,376 are non-population subscribers. 79,5 % of subscribers in the country, 82 % in Baku and 73,3% in the regions are provided with uninterrupted drinking water. The company has 21,000 km of water, 10,500 km of sewage and rainwater pipelines. At present, projects for the reconstruction of water supply and sewerage systems in cities and regions of the country are being implemented. As of October 01, 2023 the number of employees at "Azersu" OJSC is 13,900 people.

**Azerbaijan Melioration and Water Management Open Joint-Stock Company OJSC** is a state-owned joint- stock company in Azerbaijan that is responsible for managing and developing of the water and land resources used for the agriculture. The company is involved in a range of activities related to agricultural water and land management, including the construction of new irrigation systems. AWM generally responsible for the management of irrigation and drainage systems, including the improvement of existing infrastructure.

The primary responsibilities of AWM include:

- Developing and implementing strategies for the sustainable use of water resources in agriculture.
- Improving the efficiency of irrigation and drainage systems, to increase agricultural productivity and reduce water waste.
- Control soil salinity through existing collector- drainage system.
- Developing and implementing water management plans, to ensure that the country's agricultural water resources are used in a sustainable and equitable manner.
- Conducting research and development activities related to agricultural water management and control soil salinity and raising soil fertility, to improve the technology and practices used in the sector.
- Cooperating with other stakeholders, such as local authorities, international organizations, and private companies, to achieve common goals related to water management in Azerbaijan.

Overall, AWM plays a key role in ensuring the sustainable and efficient use of water resources in agriculture providing for irrigation, as well as land reclamation.

The AWM (national irrigation agency) is responsible for the design, operation, and management of irrigation systems, including reservoirs and other major water infrastructures such as long conveyance canals that connect the resource in reservoirs and irrigation schemes. The AWM plays a pivotal role in the performance of the irrigation sector as provider of bulk water to Water User Association in charge of operating irrigation schemes. As a state-owned open joint stock company, it is in the process of

being incorporated and supervised by the Azerbaijan Investment Holding (AIH). An assessment of its performance and capacity in delivering irrigation services will be a useful input for improving services.

Role of the State Agency for Water Resources and the Amelioration and Water Management OJSC with respect to the national water balance. The State Agency for Water Resources and the Amelioration and Water Management OJSC are the two most important institutions involved in the water balance in Azerbaijan. Their present task relates to the activity entitled "Informing country-wide sustainable water supply based on mapping of reservoirs and water accounting". They oversee the supply and demand for water in terms of prediction, evaluation, quantification in time and space, water release and use patterns for the dam managers, and water use for irrigation services. Amelioration and Water Management OJSC can influence the irrigation water consumption by improving irrigation efficiency, changing the irrigation schedules, types of crops grown, etc.

The main objective of the Water Resources Strategy in Azerbaijan is to enhance socio-economic benefits from efficient and sustainable water use in a situation of water security. This requires that the water resource, including when it is stored in reservoirs, meets the demand requirements, while considering the effects of climate change. One of the most strategic roles of the members of the Water Commission is to establish the bulk water allocation (annually or several times a year) through agencies responsible for supplying water. On the resource side, the entities managing dams are primarily the State Agency for Water Resources that operates the five largest reservoirs in the country (Mingachevir, Yenikend, Shamkir, Araz, and Sarsang) representing 80% of the total capacity, and also the Amelioration and Water Management OJSC that operates a significant number of the remaining 100+ smaller dams. The main sectors on the demand side are irrigation (responsibility of the Amelioration and Water Management OJSC), drinking water (responsibility of the Azersu OJSC), and energy - including hydropower (responsibility of Azerenergy OJSC). There are several multipurpose dams as well.

The **State Oil Company of the Republic of Azerbaijan (SOCAR)** is involved in the management and regulation of water resources in the context of the oil and gas industry, particularly in relation to environmental protection and water quality.

The **"Space Agency of the Azerbaijan Republic (Azercosmos)"** Public Legal Entity is since 2021 the legal successor of "Azercosmos" Open Joint-Stock Company. The Agency is a public legal entity that participates in the formation and implementation of the state policy in the field of space activities, performs regulation, monitoring in that field and functions of the national and public importance in launching into orbit, control and operation of satellites with telecommunications, Earth observation and other missions, participates in international space projects, cooperates with relevant international organizations and governmental bodies of foreign countries in the field of peaceful use of space.

In addition to the **Azerbaijan National Academy of Sciences (ANAS)**, there are other universities e.g., Baku State University or Azerbaijan Technical University, research institutions, and non-governmental organizations (NGOs) in Azerbaijan that are actively involved in scientific research and activities related to water resources, water quality, hydrology, and environmental studies. These institutions contribute to the research, monitoring, and management of water-related issues in the country.

In Azerbaijan, **various institutions and entities operate at regional**, municipal, and local levels to manage water resources, provide water supply and sanitation services, and address water-related issues. Azerbaijan is divided into regions, and each region typically has its own **Regional Water Department** responsible for managing and regulating water resources and infrastructure within that region. **Regional Environmental Agencies** oversee environmental protection and water quality monitoring at the regional level.

**Local Governments**, including municipal and city administrations, play a role in regulating and monitoring water supply and sanitation services in their areas. At local level, environmental issues

including water quality and pollution control are addressed by **Local Environmental Departments**. Particularly in rural areas, Water User Associations exist to manage and allocate water resources at the community level. It is reported that the Water User Associations do not function as intended and expected results are not achieved, especially in terms of ensuring sustainability for infrastructure.

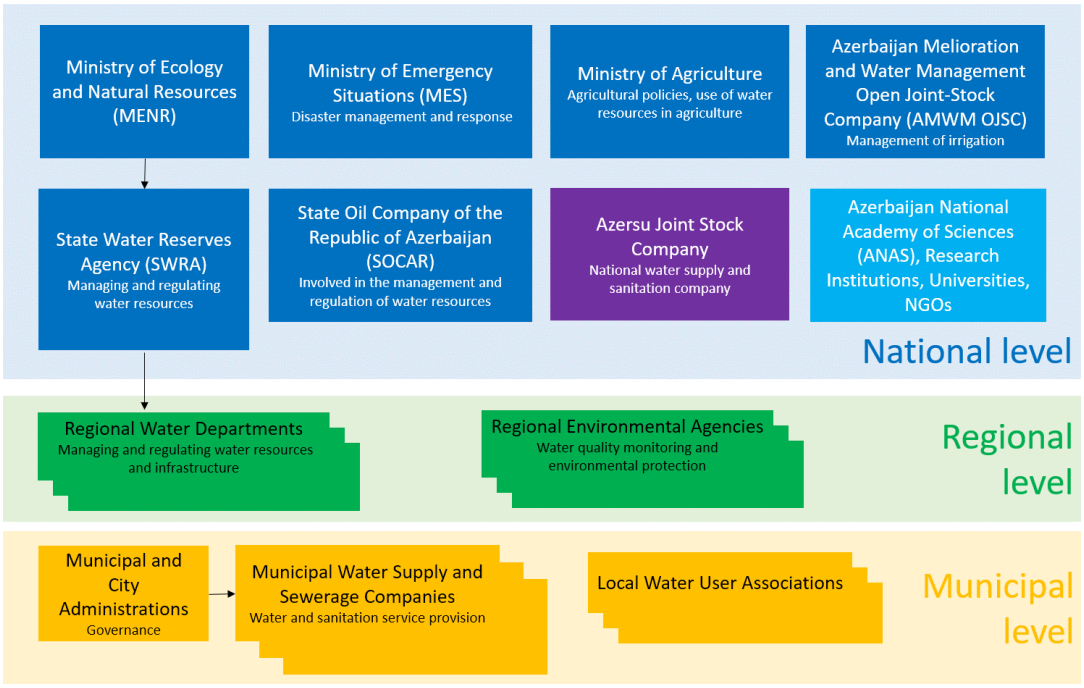



*Figure 10. Sector institutions at national, regional, and local level in Azerbaijan*

### *Legal framework and strategic planning*

**The Water Code of Azerbaijan, developed in 1997 and amended last time in December 2021, provides the legal basis for various aspects of water governance in the country.** It is the fundamental law that regulates water resources management, including water allocation, use, and protection. The Law consists of 4 Sections subdivided into 17 Chapters that contain 105 articles. Since 1997 the Water Code was amended several times by laws and is implemented by ministerial decrees.

Besides the Water Code, there are also the **Environmental Code** and the **Land Code** addressing certain water related aspects like environmental protection including provisions related to water quality, pollution control, and environmental impact assessments or agricultural water management.

**On strategy and policy level Azerbaijan developed several instruments.** The **State Program on Sustainable Socio-Economic Development** outlines the country's development priorities, including environmental and water-related objectives.

Azerbaijan has been working on the development of a **National Water Policy** that aims to provide a comprehensive framework for sustainable water resource management. The National Policy Dialogue (NPD) on water has supervised the national water policy reform process. A multi-stakeholder platform with cross-ministerial support, the NPD recognises the horizontal nature of water and its importance to the citizens and economy of Azerbaijan. It has also brought together donors and other international projects to share experiences and identify synergies to aid implementation and streamline progress (EUWI, 2021).

The implementation of the **National Water Strategy** and commitment to its comprehensive **National Water Strategy Action Plan (NWSAP)** is the next step. The NWSAP has significant cost implications in the short to medium term that Azerbaijan needs to prioritise. The National Water Strategy Project of Azerbaijan has been drafted and work is underway to develop an action plan for the Strategy based on the completion of specific milestones until 2030 in line with the SDGs. The Strategy focuses on key

challenges, such as improvements to legislation, institutional capacity, and the development of cooperation on transboundary waters in accordance with the principles of integrated water resources management.

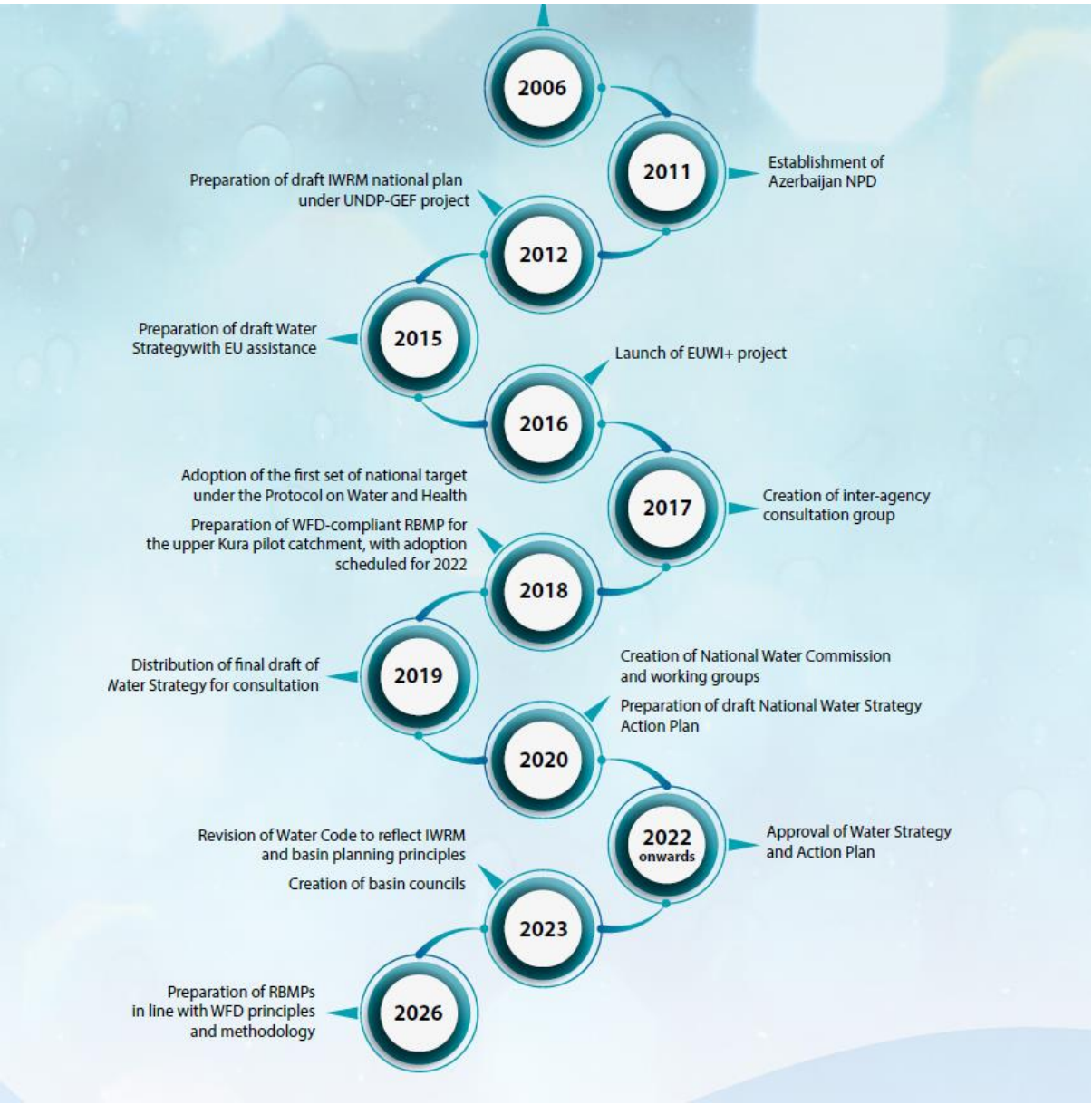



*Figure 11. Development Process of the National Water Strategy and Action Plan (source: EUWI, 2021)*

### 2.2.2 Infrastructure

#### *Water supply and sanitation*

**Water supply and sanitation infrastructure in Azerbaijan requires updating and expansion**. Potable water supply and sanitation services in Azerbaijan are centrally managed by Azersu JSC. The company is responsible for taking water from the sources, processing, transporting and distributing of water, and treatment of wastewater. According to the Organization for Economic Co-operation and Development (OECD, 2016), only about 36% of water networks are currently fully operational, while

approximately 64% are in need of rehabilitation or complete replacement. Many of these water networks were established 25-40 years ago and have already exceeded their intended lifespan.

The sanitation networks in urban areas span a total length of over 3,500 km, which is roughly a fifth of the size of the drinking water supply network. This disparity highlights the uneven development between sewage and water supply infrastructure in the country.

**Azerbaijan non-revenue waters are considered as average compared to the global range.** IBNET reports that Non-Revenue Water (%) at country level constant within 46,5%, between 2007-2009. Those data refers to only one Water Utility, the State Company Azersu. No information about Non-Revenue Water (%) for the recent years are available.

**The country invested around $4-5 billion into WSS infrastructure over the last two decades**. Particularly in urban centres across the entire country (50+ rayons except the Greater Baku area) significant investments have been made. The NRW in those areas is less than 10%. The major issues are in the Greater Baku area, which has an outdated distribution and sanitation networks, and where water losses are around 55%. The major issue countrywide is not really the matter of existing infrastructure (e.g abstraction, distribution and treatment infra is there along with individual household connections, metering and very high tariff collection ratio) but providing sustainability of these new infrastructural assets due to the lack of regulation from central government, absence of performance based relations between Azersu's HQ and rayon departments/operators, lack of revenue decentralisations and low capacity. as a result, many assets such as WWTPs, WTPs, SCADA systems, pumping stations, pressure reservoirs are quickly deteriorating and/or functioning not as designed due to multiple O&M issues (e.g. lack of material and spare parts, energy cuts due to Azersu's arrears, low staff capacity and turnover etc).

### *Reservoir Storage, Hydropower, and Irrigation*

**Reservoir Storage plays a major role in Azerbaijan's water management and energy strategies**. Azerbaijan maintains a substantial reservoir capacity of approximately 18.6 km3, with a dam storage capacity of around 1950 m3 per capita. These reservoirs serve multifaceted purposes including hydropower generation, irrigation, flood control, and water supply. The major reservoirs, spanning over 250 km2, as well as several medium-sized reservoirs ranging from 50-250 km2, contribute to complex water management systems designed to meet energy, transportation, and agricultural demands. The transportation of water in Azerbaijan involves an intricate network of canals, pipelines, and infrastructure designed to distribute water from reservoirs or other sources to various regions, cities, and agricultural areas. Reservoirs located across various regions of Azerbaijan serve diverse purposes; reservoirs in the western and southern regions are primarily used for agricultural irrigation, while those in central and northern areas cater to urban and industrial water needs. From the main river of the country, Kura River, water flows into extensive and complex irrigation distribution systems that are regulated from the large Mingachevir reservoir, which is located close to the Georgian border.

Reservoirs Storage need rational planning and improved management. While Azerbaijan has the largest volume of water storage in South Caucasus, amounting to about 21 billion cubic meters, the storage is imbalanced with 80% of the total capacity in five large reservoirs (Mingachevir, Yenikend, Shamkir, Araz, and Sarsang) and 20% of its capacity in 130 much smaller reservoirs. The Government of Azerbaijan is planning construction of additional dams along with a water resource masterplan as part of the recent national water strategy. Nevertheless, the dam managers face difficulties in predicting the inflow into the reservoirs and do not necessarily know the pattern of the downstream demand. In addition, the water losses are barely quantified due to lack of metering devices. Also, the inspections and monitoring for addressing dam safety issues do not follow the acceptable international standards.

**Hydropower is progressively gaining significance in Azerbaijan's energy portfolio, with an installed capacity of 1,150 MW in 2021.** The country has been witnessing an expansion in hydropower generation, accounting for approximately 12% of Azerbaijan's total electricity production

in 2020. The primary hydroelectric power plants are situated along major rivers such as the Kura and Araz, and they employ run-of-river and storage-based hydropower technologies. The year 2021 witnessed the addition of 180 MW of new hydropower capacity, including projects like the Dash Salahli and Girkan plants. Azerbaijan's Energy Strategy envisions further growth, aiming to develop an additional 1.5 GW of hydropower capacity by 2030, along with advancements in other renewable energy sources including wind and solar power.

The region of Karabakh and 7 rayons also contains 2 large dams and over 40 small hydropower stations. About half of the hydropower stations are functional, others are under construction or rehabilitation.

**Azerbaijan's irrigation infrastructure presents challenges in terms of coverage and condition.** According to recent data from AQUASTAT (2020), about 61,5% of the cultivated area (approximately 600,000 hectares) in Azerbaijan is equipped for irrigation. Key crops like cotton, fruits, and vegetables rely heavily on irrigation. Although the share of cultivated land under irrigation is very high, there is considerable room for improvement. Yet, inadequate maintenance and degradation of irrigation and drainage systems constrain agricultural productivity. Inefficient irrigation practices are a major concern, especially in regions with high agricultural potential. Irrigated agriculture stands as the largest water-consuming sector in Azerbaijan's agricultural domain, accounting for a significant portion of the country's total water resource consumption. Upgrading and modernizing the irrigation infrastructure is crucial to enhance water use efficiency and agricultural productivity.

*Table 3. Irrigated area within each province in Azerbaijan. Source: AQUASTAT, 2020* [4]

| District | Region | Area equipped for irrigation (ha) |
|---|---|---|
| | Absheron | 19 230 |
| | Aran | 691 840 |
| | Ganja-Gazakh | 188 992 |
| | Guba-Khachmaz | 136 524 |
| | Kelbejer-Lachin | 14 013 |
| | Lankaran | 34 368 |
| | Mountainous Shirvan | 54 766 |
| Babek | Nakhichevan | 19 300 |
| Julfa | Nakhichevan | 4 900 |
| Ordubad | Nakhichevan | 4 900 |
| Shahbuz | Nakhichevan | 2 600 |
| Sharur | Nakhichevan | 24 500 |
| | Sheki-Zagatala | 111 637 |
| | Upper Karabakh | 118 430 |
| **Azerbaijan total** | | **1 426 000**[5] |
| with groundwater | | 96 700 |
| with surface water | | 1 329 300 |

In conclusion, Azerbaijan's reservoir storage and hydropower capacity contribute significantly to its energy and water management strategies. Hydropower's growing role in the energy mix aligns with the country's goals of sustainable development and increased renewable energy generation. Despite the

[4] https://www.fao.org/aquastat/es/geospatial-information/global-maps-irrigated-areas/irrigation-by-country/country/AZE

[5] The value is slightly higher than in the latest AQUASTAT information used for the indicator.

challenges in irrigation infrastructure, addressing these issues will be pivotal in boosting agricultural output and conserving water resources for future generations.

## 2.3 Performance

The performance of the water sector in Azerbaijan is assessed under three categories: water resources management, management of water risk, and service delivery. The results of the indicator assessment for water sector performance are provided in Figure 12.

Azerbaijan had taken some measures to address water availability and water demand issues and to increase water use efficiency. These measures included efforts to improve water resource management, promote water efficiency, and invest in water infrastructure, both for potable water supply and irrigation. There is still a lot of room for improvement, especially in terms of irrigation.

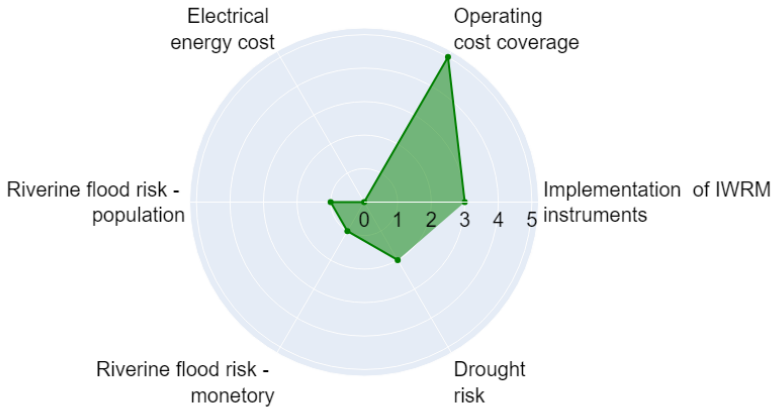



*Figure 12. Results of indicator assessment regarding Azerbaijan's water sector performance.*

### 2.3.1 Water Resources Management

#### *Strategic Planning*

**Azerbaijan is in the process of developing a comprehensive national strategy to guide the implementation of Integrated Water Resources Management (IWRM) principles**. The Water Code of Azerbaijan, established in 1997, lays the foundation for IWRM, but specific policies and plans based on these principles are still in progress. Aspects covered by the Water Code in relation to water resources management (WRM) encompass water allocation, distribution, conservation, water quality protection measures, establishment of water user rights and permits, infrastructure development for water supply and delivery, and enhanced stakeholder engagement. However, translating these legal requirements into actionable policies has yet to be fully achieved.

**To promote effective water resources management, the government of Azerbaijan approved the State Program for the Management of Water Resources for the period 2020-2030.** This program aims to attract investments that support water resources management. One major challenge is securing funding for the program, which has been partly achieved through state funds, financial support from development banks, and international donors. Recently, Azerbaijan introduced the WEAP (Water Evaluation and Planning) Model for integrated water resources planning.

#### *Operational Planning*

**The implementation of river basin planning is not widespread in Azerbaijan.** River Basin Management Plans that integrate IWRM principles are available for only a limited number of basins, often developed through international cooperation projects. Notable examples include the Gobustan-Chirag-Absheron Basin Plan, which was developed with support from international partners and aligns with IWRM principles. These plans provide a framework for addressing water-related challenges and opportunities within specific river basins.

**Azerbaijan has established Basin Councils for each of the country's river basins.** These councils serve as consultative and advisory bodies, involving government institutions from various levels and other relevant stakeholders. However, the level of engagement and effectiveness of these councils need improvement, as recognized in the State Program for Water Resources Management (2020-2030).

**Azerbaijan has instruments in place to support the IWRM approach.** The national monitoring network for water availability, coordinated by the Ministry of Ecology and Natural Resources, monitors hydrological and meteorological conditions. However, there is a need to expand and update this network to ensure comprehensive coverage. Water allocation measures are established in Azerbaijan. Water users are granted permits and allocations that are subject to revision every ten years. In response to water scarcity, the Basin Inspectorate has the authority to limit or suspend water intake from water bodies and prioritize water use for drinking water supply, industrial purposes, and irrigation. There are however challenges for the government as not enough information is available on all water resources. The situation is similar with the number of users and their water consumption. Monitoring and enforcement is inadequate due to the lack of adequate information systems and technical capacity in the government.

There is a lack of organizational structure and coordination of the monitoring and environmental data collection performed by various institutions. The Government of Azerbaijan is trying to expand the modern equipment for monitoring and measuring streamflow and meteorological parameters introduced through a recent UNDP Project on a pilot basis. The central water laboratory remains underfunded with equipment outdated and the effectiveness of regional laboratories for both ambient and regulatory monitoring is unclear. Also, the water information system for integrating data from various data producers needs to be strengthened along with supporting data digitalization and development of a national database and web services to facilitate data sharing. However, the Government of Azerbaijan is working on the electronic water system, that intends to centralize all information related to water into one system to facilitate inter-agency collaboration and improve water resources management.

**Azerbaijan should improve transboundary water cooperation with neighbouring countries.** The country has signed some agreements and treaties with neighbouring states to address various water-related issues such as water use, infrastructure projects, data exchange, flood management, and delineation of boundaries. Particularly, agreements with Iran and Russia are existing. Nevertheless, there is insufficient cooperation with Armenia and Georgia on transboundary water resource management, especially for Kura River and Araz river, the main rivers of the country. The Kura River, which originates in Turkey and flows through Georgia and Azerbaijan, is vital for both agricultural and industrial purposes. Cooperative efforts involving Georgia are essential for managing the Kura River's waters effectively. The management of the Araz River is crucial for both Azerbaijan and Armenia. However, due to geopolitical tensions, the water resource management between these countries has been challenging and often subject to disputes.

**Limited intersectoral cooperation exists within Azerbaijan's water resources management practice**, in particularly between key water-dependent sectors like energy and agriculture. The State Program for Water Resources Management (2020-2030) outlines efforts to enhance intersectoral cooperation, especially in the context of irrigation.

**In conclusion, Azerbaijan is advancing on the development and implementation of IWRM principles, guided by its national strategies and plans.** The country's efforts to improve water

resources policy framework and institutions in recent times demonstrate a commitment to sustainable water resources management.

### 2.3.2 Management of Water Risks

**Azerbaijan faces moderate flood and drought risks, with localized areas experiencing higher risks.** The country's vulnerability to flood and drought events highlights the importance of effective water risk management strategies to safeguard both human lives and economic activities.

#### *Flood Risk*

**Azerbaijan faces a moderate flood risk in terms of population affected and economic losses**. When compared within the Europe and Central Asia (ECA) region, Azerbaijan stands out with relatively high flood risks. According to data from the AQUEDUCT global dataset (Hofste et al., 2019), an average of 0.73% of the population in Azerbaijan is affected by floods annually, and flood-related losses over a 100-year return period are equivalent to 1.2% of GDP per year and average annual losses (AAL) from flooding in Azerbaijan are estimated at $252 million. This places Azerbaijan at a moderate level of flood risk in the ECA region... The most substantial damages are concentrated in various regions of Azerbaijan, underscoring the significance of flood risk. The assessment of average annual loss of life further emphasizes the importance of flood risk management in Azerbaijan.

**Flood risk in Azerbaijan is influenced by various factors, with spring snowmelt being a significant driver.** Transboundary flows from neighbouring countries can also contribute to flood risk. Around 65% of floods in Azerbaijan are triggered by spring snowmelt, with trends indicating an increase in intensity over the last few decades. Other factors such as potential dam failures and land use changes, such as deforestation or changes in cropping patterns, also play a role in shaping flood risks.

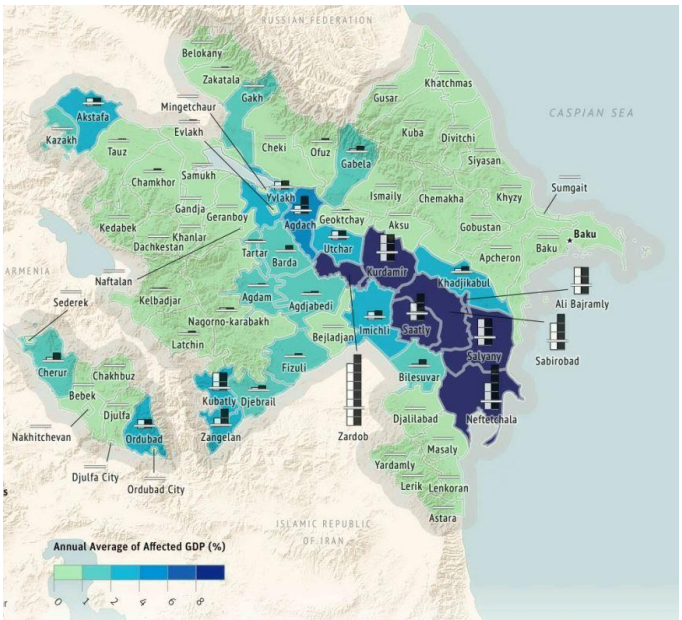



*Figure 13. Flood Risk as percentage of annual average of affected GDP in Azerbaijan. Source: World Bank*

#### *Drought Risk*

**Droughts represent a major threat to Azerbaijan's water security** The average drought risk in Azerbaijan is **''low – Medium''** but large areas of Azerbaijan face drought risks. Water levels in the Mingachevir dropped with much reduced water levels downstream in the Kura river's lower reaches.. This reduction in water levels was severe enough to cause a reversal of flow direction in the river and even seawater intrusion inland, reaching as far as 30 kilometers into the Kura River. The causes of

drought are complex and subject to a multiplicity of contributing factors – climatic, economic and unsustainable water use in the Kura and Araz river basins. Most treated potable water supplies to the Greater Baku area and rayons are sourced from the Kura and Araz rivers. The drought risk in Azerbaijan, when considering drought hazard, exposure, and vulnerability together, is generally classified as medium. The Western and South-Eastern regions of the country exhibit the highest drought hazard, with the Northern regions facing the most pronounced drought risk due to their high exposure. Azerbaijan's Northern regions are crucial for spring, rain-fed crops, including wheat, both for domestic consumption and export markets. Studies by Karatayev et al. (2022) suggest a correlation between wheat yield in these regions and the severity of summer droughts. This impact may be further exacerbated by the relatively low proportion of irrigated agriculture in Northern Azerbaijan.

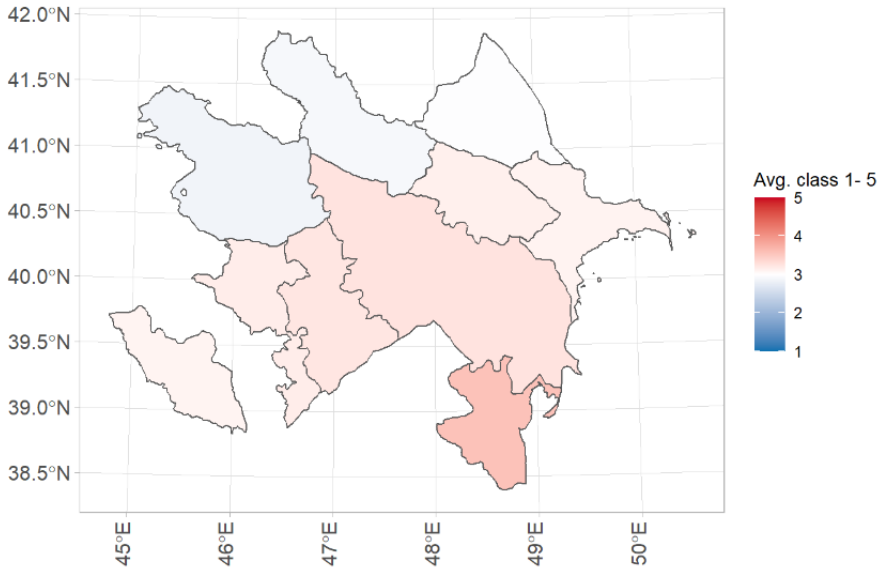



*Figure 14. Drought risk in Azerbaijan. Source: Hofste et al. (2019)*

### 2.3.3 Service delivery

**Azerbaijan´s access to drinking water and its reliability is good and but efforts are required to improve the coverage in the rural areas.** JMP (2022) reports that 92% of the urban population of Azerbaijan has access to safely managed drinking water and 8% has access to basic service. These figures are lower in the rural areas, where safely managed drinking water reaches 81% of the rural population and 13% has access to basic service. IBNET (2021) indicates that the continuity of the service reaches 16 h/d. The service is available but often interrupted.

**The level of connection to centralized sewer systems and wastewater treatment is lagging behind.** JMP (2022) reports that 63% of the urban population of Azerbaijan has access to safely managed drinking water, and 33% has access to basic service and 4% has access to limited service. No such kind if data are available for the rural areas, where the predominant facility type are improved latrines and to a lesser extend septic tanks. Likewise, only 46.5% of the total volume of wastewater at national collected is treated with at least primary treatment (EPI 2020).

**Water tariffs are very low and heavily subsidized by Government.** According to data from the International Benchmarking Network for Water and Sanitation Utilities (IBNET), operational costs are, on average, covered by the tariffs, with an operating cost coverage ratio of 1.68, rated as "high". But this information is not reliable, since not all water utilities are reporting to IBNET.

**Azerbaijan's water supply and sanitation infrastructure demand urgent attention and investments to improve the current situation.** Equitable and efficient service provision, coupled

with clear investment strategies, are crucial to addressing the disparities and challenges in the water sector. To ensure equitable service provision and to address the challenges in water supply and sanitation, a clear strategy is required. Investment priorities need to be defined to facilitate the necessary infrastructure upgrades. Additionally, strategies must be formulated to ensure the quality of service for all systems, whether managed by utilities or not.

The World Bank's Water and Sanitation Services (WSS) and Water Resource Management (WRM) teams are currently engaged in conducting analytical studies for the newly established Azerbaijan State Water Reserves Agency. Their focus lies on enhancing the effective utilization of water resources and improving irrigation practices. This includes in-depth examinations of financial sustainability aspects such as budgeting, subsidies, and tariffs to assist the government in laying out a comprehensive plan for the agency's future operations. The technical assistance provided by the World Bank, supported by the European Union, aims to address critical institutional gaps and facilitate informed decision-making processes. Through collaborative efforts with the government and relevant stakeholders, the teams are committed to sharing global experiences and insights to support the development of the new agency.

## 2.4 Outcomes

This section summarizes the analysis of the benefits derived from water and its use in Azerbaijan. Benefits are measures in terms of social, economic and environmental outcomes. As with other dimensions, the higher the score, the better is the country performing on that particular aspect or indicator. Figure 21 describes the indicator performance across the different outcomes.

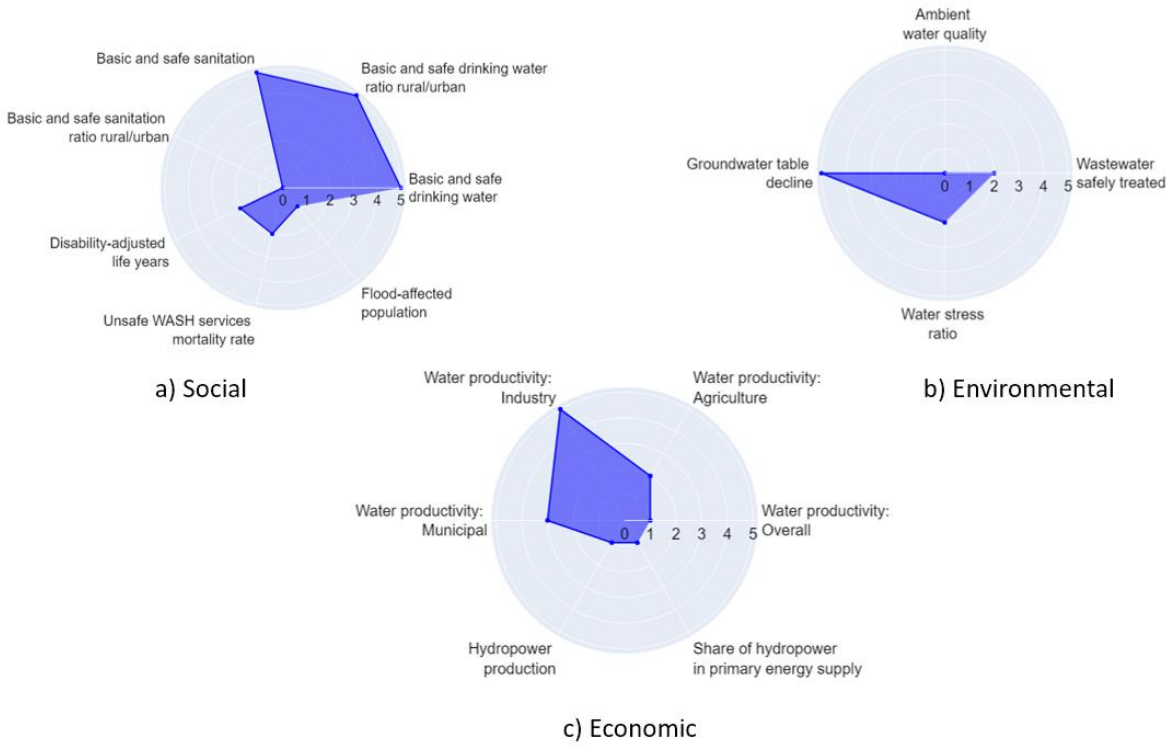



*Figure 15. Results of indicator assessment regarding Azerbaijan's water sector outcomes*

### 2.4.1 Social outcomes

#### *Supply of drinking water and sanitation services*

**Azerbaijan´s drinking water coverage is high but the safely managed proportion of access to potable water in rural areas need to be increased.** As of 2022, 92% of the urban population of Azerbaijan has access to safely managed drinking water and 8% has access to basic service. These

figures are lower in the rural areas, where safely managed drinking water reaches 81% of the rural population and 13% has access to basic service. IBNET (2021) indicates that the continuity of the service reaches 16 h/d. The service is available but often interrupted.

**As of 2022, 96.4% of the urban population in Azerbaijan had access to at least basic sanitation services.** According to JMP 63% of the population is connected to a safely managed sanitation service, while 33.4% of the population is connected to basic services. There is no JMP data available for rural areas of the country, but it can be assumed that the coverage of safely managed sanitation services is significantly lower than in urban areas.

#### *Health and safety*

**Azerbaijan performs significantly worse than neighbouring Armenia and Georgia in terms of health consequences of insufficient water supply and sanitation services.** The number of DALYs ("disability adjusted life years") due to unsafe water, sanitation and handwashing is with 248 DALYs/100,000 inhabitants, a value clearly above the middle range for the Caucasus Region as well as the ECA countries (medium ranges between 75-150 DALYs/100,000 inhabitants). The mortality rate attributable to unsafe WASH services is with 1.12 people/100,000 inhabitants, which as well significantly above the middle range of ECA countries (0.5-1 people/100,000 inhabitants).

### 2.4.2 Environmental outcomes

The results of the indicator assessments for environmental outcomes are provided in Figure 21.

#### *Water quality and ecological status*

**Azerbaijan has not reported information about the proportion of water bodies with good ambient water quality, but water quality and ecological status of Azerbaijan's water bodies is a main issue.** The main source of water supply in the country is the Kura River, but pollution is a major problem. All three countries of the river basin (Georgia, Armenia and Azerbaijan) contribute to the pollution due to lack of wastewater treatment facilities, mining, intense agriculture and industry. The concentration of heavy metals exceeds permitted concentrations.

#### *Water stress*

**Water stress is a significant concern in Azerbaijan, particularly in certain regions.** Azerbaijan currently faces a high level of water stress overall particularly in the eastern regions of the country. The water stress ratio of withdrawals to supply is according to the global dataset of AQUEDUCT (Hofste et al., 2019) at 56.4%. Water stress might increase in future due to climate change (see also chapter 3 Future Trajectories). Agriculture is a major consumer of water in Azerbaijan, accounting for a significant portion of water withdrawals. Irrigation practices in agriculture lead to increased water demand, particularly during the growing season. Inefficient irrigation practices are a major concern, especially in regions with high agricultural potential. Industrial activities, including energy production and manufacturing, also require significant water resources. and contribute to water stress, especially in areas with industrial zones.

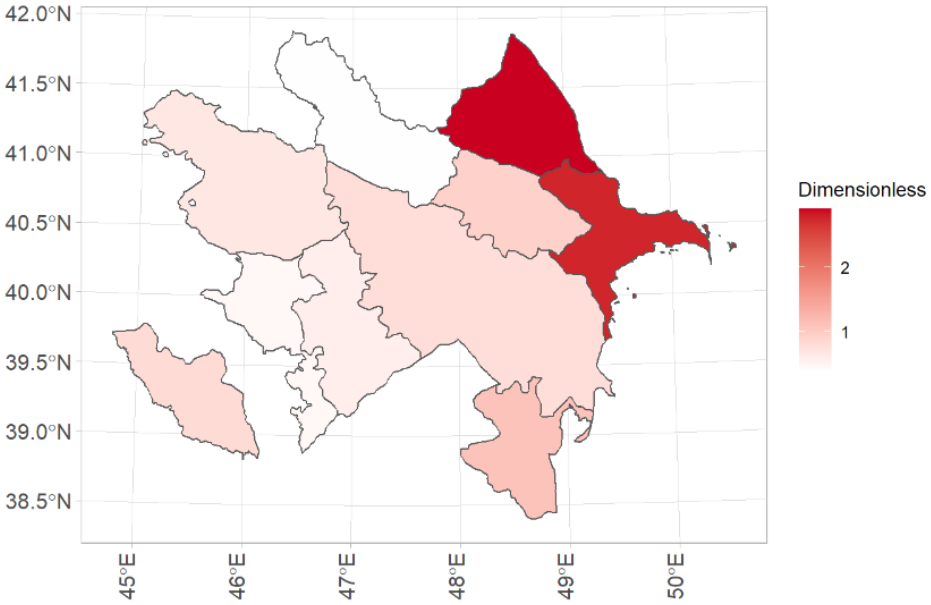



*Figure 16. Water stress ratio in Azerbaijan. Source: Hofste et al. (2019)*

### 2.4.3 Economic outcomes

**Azerbaijan is classified as an upper-middle income economy by the World Bank**. This classification is based on the country's gross national income (GNI) per capita. In comparison with the neighbouring countries in the Caucasus Region, Azerbaijan's GDP per capita is higher than in Georgia and Armenia due to its significant oil and gas reserves and energy exports.

According to the Baku Research Institute, the oil and gas sector, contributed 47,8% of the country's total GDP, with 52,7% of budget resources coming from oil revenues, and finally oil products accounting for 92,5% of total exports. While the oil sector employs only 39.400 people, agriculture, which provides 4,7% of GDP, employs 36,2% of the total population (1.809.000 people).

**The overall economic water productivity in Azerbaijan is low.** "Economic water productivity" measures the efficiency with which water is used in the economy at national level, and is shown in USD per m³ of water extracted. Azerbaijan's overall water productivity is about USD 3.7/m³, what is in the range of Armenia's water productivity, but only the half of Georgia's. It is also below other ECA countries and should find ways to further leverage its sufficient water resources. The country´s municipal water productivity is with USD 17.1/m³ very low, productivity of the industry sector is about USD 13.7/m³ and for agriculture well below USD 1/m³. The agricultural sector has very low water productivity due to the cultivation of water intensive crops that are not high value and due to high water losses in the irrigation systems. The countries agricultural water productivity is with USD 0.15/m³ the lowest in the region and only a fifths of Georgia's productivity (USD 0.77/m³). It is also below the ECA average of USD 2.6/m³.

**The agricultural sector in Azerbaijan is economically, politically and socially important.** Azerbaijan has designated agriculture as one of four priority sectors for diversifying its economy. In 2022, the agricultural sector contributed 5% to GDP, and around 36% to total employment. Agriculture is the most important economic activity in rural areas but characterized by extensive production and low productivity. The primary crops produced in Azerbaijan are agricultural cash crops such as grapes, cotton, tobacco, citrus fruits, and vegetables. As the government considers ways to improve Azerbaijan's irrigation systems and processes, there may be new export opportunities for companies specializing in water-efficient irrigation systems or water management solutions.

**Hydropower is progressively gaining significance in Azerbaijan's energy portfolio.** In 2020, hydropower contributed 1% of the total energy supply and 12% of the total electricity production. The share of hydropower in total electricity production in 2015 was with 6.6% half of the current share. Azerbaijan's Energy Strategy envisions further growth, aiming to develop an additional 1.5 GW of hydropower capacity by 2030. Azerbaijan has considerable hydropower potential, primarily due to its mountainous terrain and the presence of rivers and water resources. The country's rivers, including the Kura and its tributaries, offer opportunities for hydropower development. The government has been focusing on increasing the share of renewables, including hydropower, in its energy mix to reduce environmental impact.

### *Water-related risks and economic costs*

**Azerbaijan faces medium risk from riverine floods affecting in various regions a large number of inhabitants and causing significant economic losses.** When compared within the Europe and Central Asia (ECA) region, Azerbaijan stands out with relatively high flood risks. According to data from the AQUEDUCT global dataset (Hofste et al., 2019), the annual average population affected by flooding is about 220,000 which is about 2.2% of the total population. And the average annual affected GDP is about 2.2% of the annual GDP. However, most substantial damages are concentrated in various regions of Azerbaijan, underscoring the significance of flood risk.

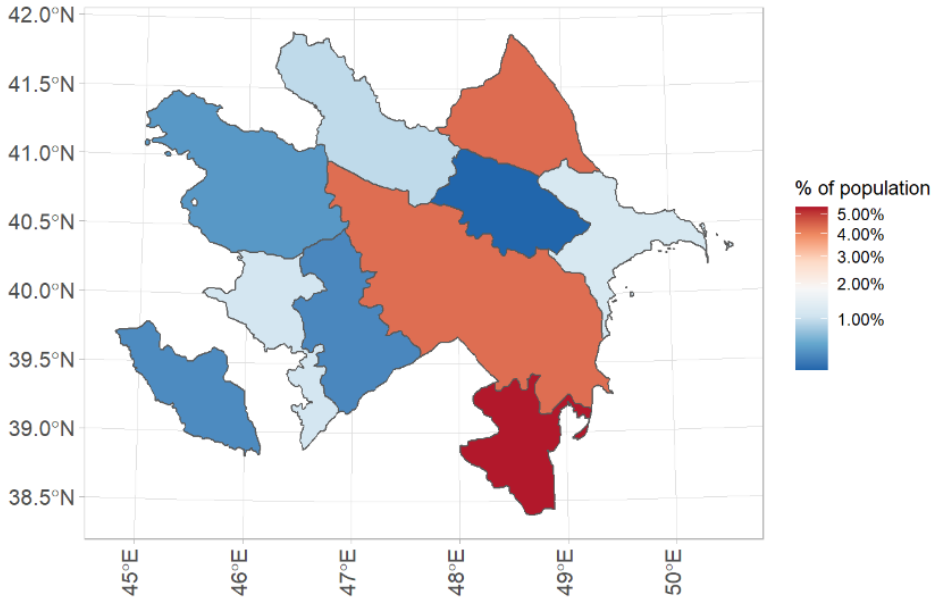



*Figure 17: Population affected by riverine flood risk in Azerbaijan. Source: Hofste et al. (2019)*

**Currently, Azerbaijan experiences an estimated 3.6% annual probability of severe meteorological drought, characterized by a standardized precipitation evaporation index (SPEI) of less than -2**. Drought risk is a concern in Azerbaijan, and the country has experienced periods of drought in various regions. As a downstream country, Azerbaijan is vulnerable to water resources upstream, which can impact its water availability and usage for agricultural, industrial, and domestic purposes. It is not only prone to damaging flood but also drought events, which climate change is making more severe[6]. Drought risk in Azerbaijan varies by region. The arid and semi-arid

6 https://climateknowledgeportal.worldbank.org

regions in the south, including parts of the Nakhchivan Autonomous Republic, are more susceptible to drought conditions due to their climate and limited water resources. Droughts can have a severe impact on agriculture, particularly in rural areas where agriculture is a significant livelihood. Crop yields have been affected, and farmers face challenges related to water availability for irrigation. Especially key agricultural regions, face high drought risks.

# 3 Future Trajectories

This section provides quantitative projections for several indicators representing selected water security dimensions described earlier. The following indicators with future projections include renewable water availability, total water demand, water stress, and flood risk.

## 3.1 Future climate and socioeconomic scenarios

**The Intergovernmental Panel on Climate Change (IPCC), a United Nations organization tasked with advancing knowledge on climate change, uses a collection of climate and socio-economic projections for modelling and research.** The climate/emission scenarios, the Representative Concentration Pathways (RCPs), are four projections of how concentrations of greenhouse gases in the atmosphere will change due to human activities. The four RCPs (i.e., RCP2.6, RCP4.5, RCP6.0, and RCP8.5) range from low future concentrations (RCP2.6) to high (RCP8.5). In this assessment, three RCPs are considered, and for simplification, these are referred to as low (RCP2.6), medium (RCP4.5) and high (RCP8.5) emission scenarios. For each RCP, we used the projections of five climate models: GFDL-ESM4, IPSL-CM6A-LR, MPI-ESM1-2-HR, MRI-ESM2-0, and UKESM1-0-LL6F6F[7]. Climate models provide projections of climate conditions (e.g., temperature, precipitation) under the various RCP scenarios.

**The socioeconomic scenarios, the** Shared Socioeconomic Pathways (SSPs)**, are five narratives of development, cooperation, and priorities.** For example, SSP1 is called the Sustainability Path and imagines a world acknowledging environmental boundaries, increasing equality and education, economic growth motivated by human well-being, and decreasing the use of resources and energy. SSP5 is called Fossil-Fueled Development. Each of the SSPs is associated with quantitative projections of population and GDP (Jones et al., 2016), which drive the changes in water demand. Population and GDP per capita projections are translated into water demands following the methodology of Wada et al. (2011).

## 3.2 Projections of some water security indicators

### 3.2.1 Water availability, water demand, and water stress

In this section, we provide future projections up to 2050 for some water security indicators, such as water availability and demand, under three climate and socio-economic scenario combinations to provide a range of possibilities. We refer to these combinations as Optimistic (combining SSP1 with RCP26), Middle (combining SSP3 with RCP70[8]), and Pessimistic (combining SSP5 with RCP85). The projections are the results of simulations conducted with the global hydrological models CWatM (Burek et al. 2020).

Figure 18 shows annual water availability in the historical period (1900-2020) and the future (2020-2050). Water availability annually experiences more extreme years, with examples of years that are wetter or drier than in the past. There is **no significant increasing or decreasing trend**, although extreme years may increase (Figure 18).

[7] The results of the climate models are taken from the ISIMIP project: https://www.isimip.org/
[8] Indicators related to flood risk use SSP2 with RCP45 for the Middle scenario.

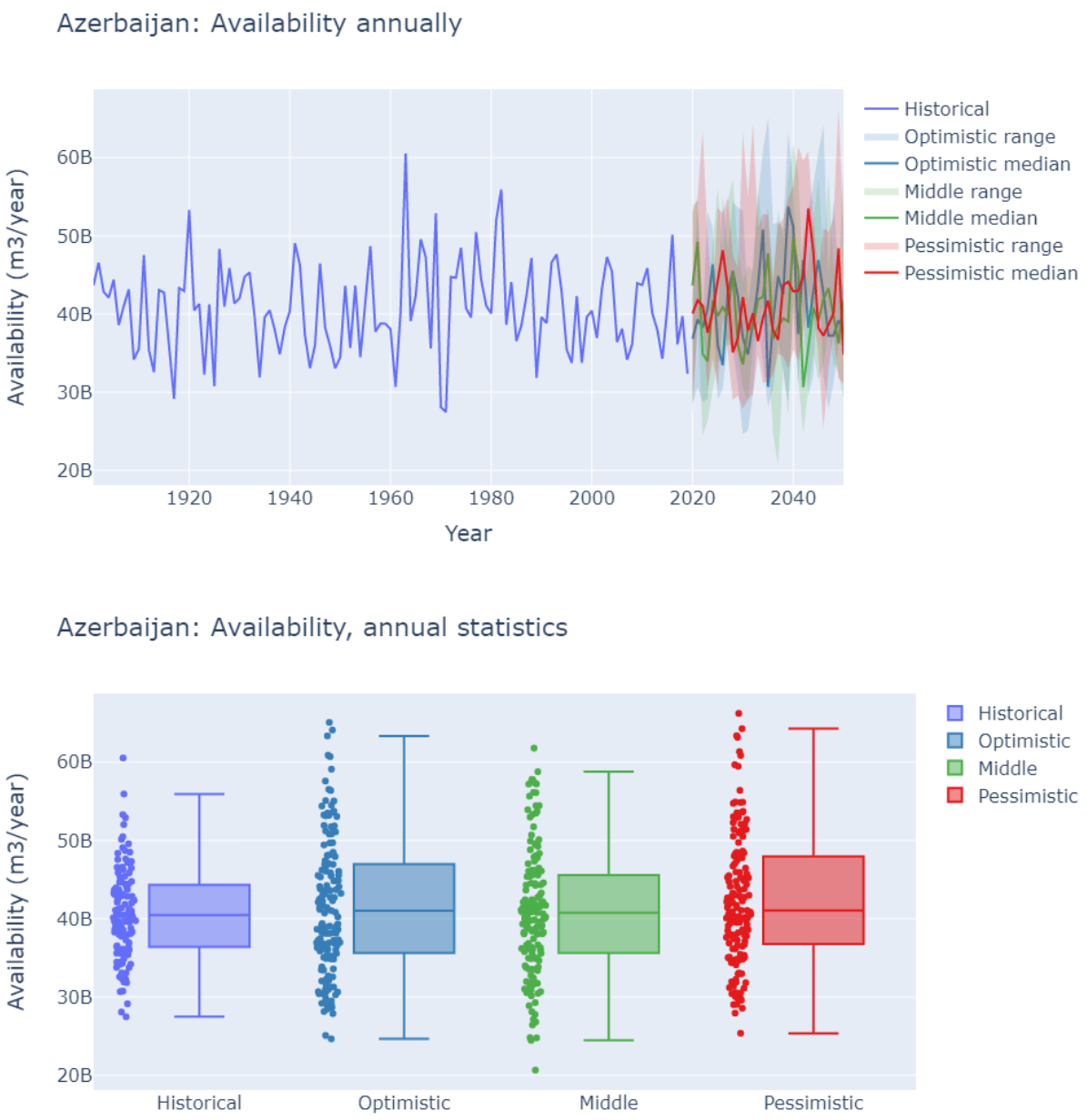



*Figure 18. Annual water availability for historical and three future scenarios.*

*Top) Line graphs show the median of the five models for each scenario and the entire range as a shadow, Bottom) Box-whisker plots showing the data variance through quartiles – quartiles divide the data into four relatively equal sizes.*

Figure 19 provides projections of total water demand by sector. These projections show that demands remain relatively constant with decreases in industrial demand. It is important to mention that water demand projections do not consider potential changes in irrigated areas. Irrigated areas were kept fixed at the 2000 level for future projections. As a result of the projected changes in water availability and demand, Azerbaijan is projected to experience **steady or somewhat increasing water stress**. Projections show levels of significant experiences of water stress, up to double as compared to more regular years (Figure 20)

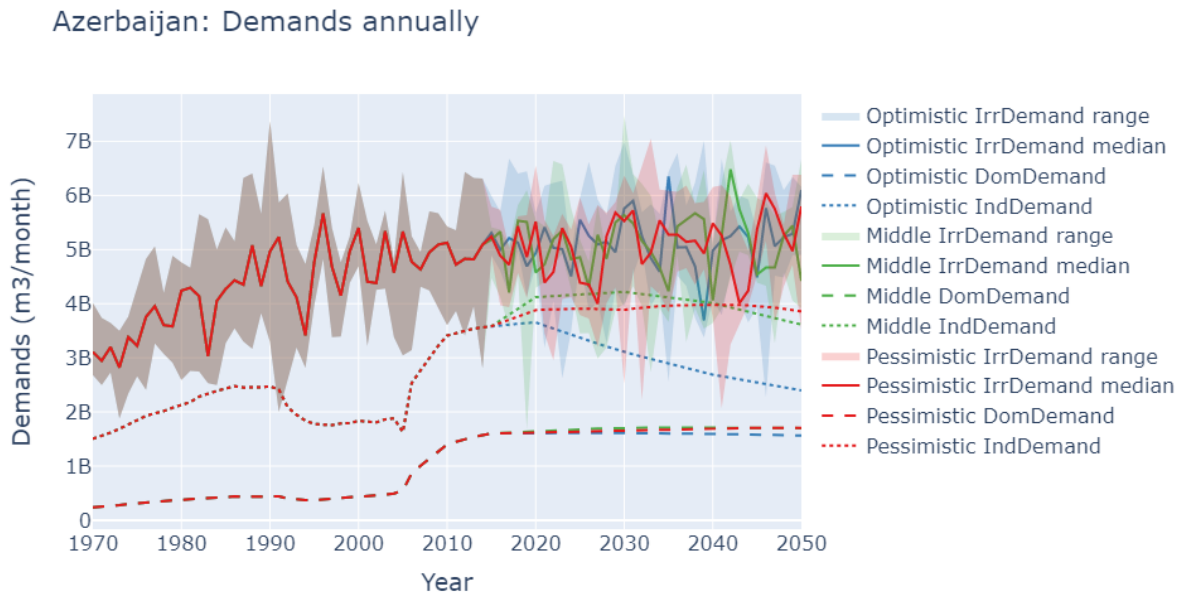



*Figure 19. Sectoral demands for historical and future scenarios. Source: Burek et al. (2020)*

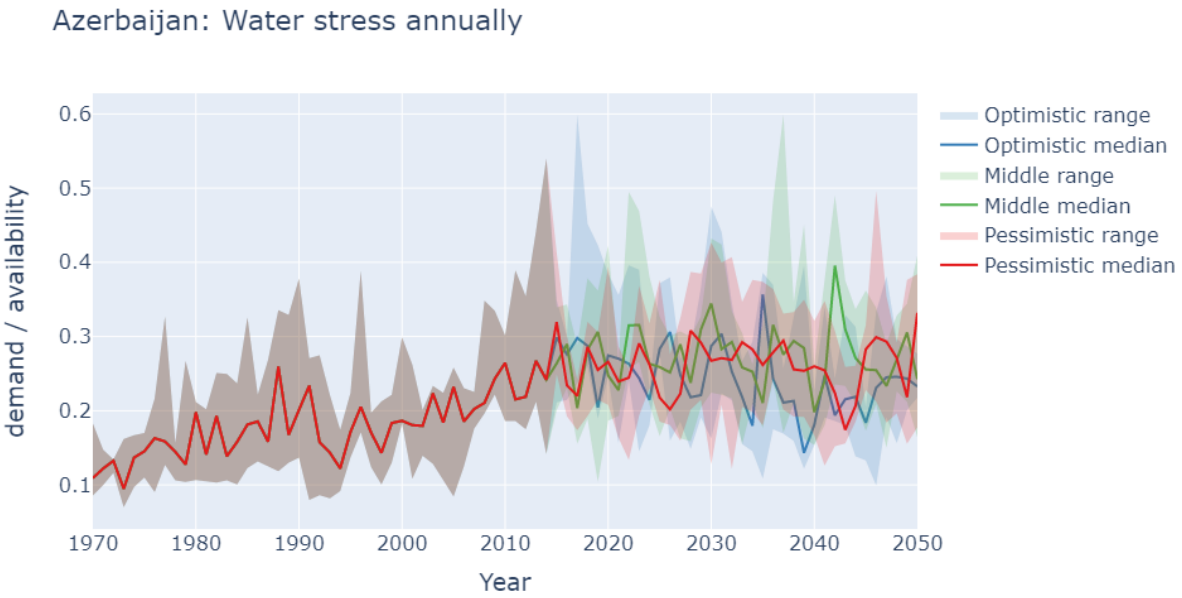



*Figure 20. Annual water stress for historical and future scenarios. Source: Burek et al. (2020)*

### 3.2.2 Flood risk

Flood risk due to climate change is expected to increase in some regions and decrease in others (Figure 21). The most significant increases are expected in Shaki-Zaqatala (~20% increase, ) and decreases in Ganja-Qazakh (~30% decrease) and Absheron (~20% decrease), in terms of GDP relative to the baseline. However, future flood risk cannot only be considered through the lens of climate change. Flood risk is also, for a large part, dependent on several other factors:

- The frequency and severity of the flood hazard. While the natural occurrence of floods is likely to increase, the actual occurrence also depends on the readiness of the flood defence system.
- The people/assets exposed in potentially affected areas. Here, the costs and benefits of further construction in at-risk areas must be carefully considered.
- The vulnerability of the people and assets when a flood occurs.

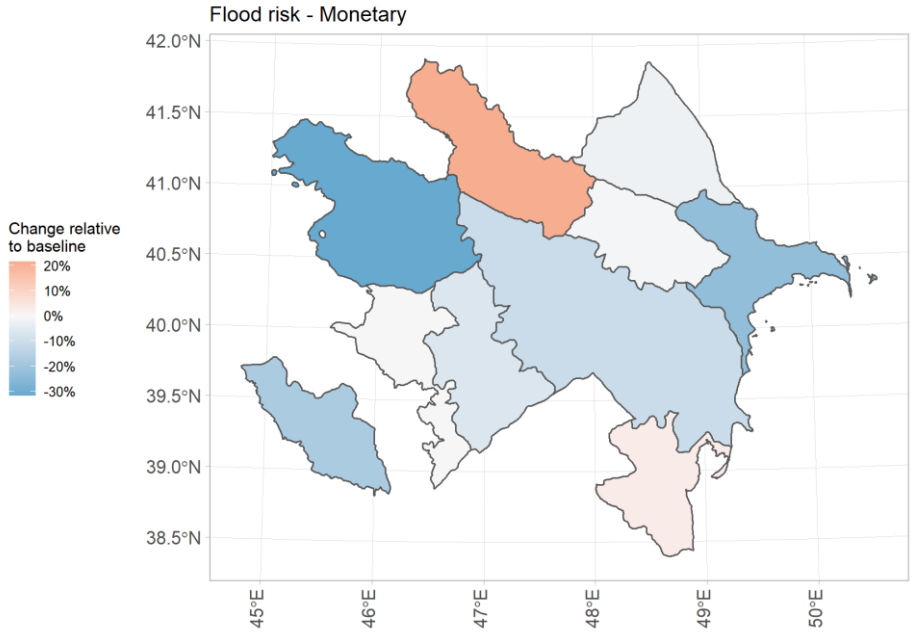



*Figure 21. Flood risk in terms of relative change to baseline GDP for the year 2050 based on the Pessimistic scenario. Source: Hofste et al. (2019)*

### 3.2.3 Drought risk

Like flood risk, drought risk is a complex combination of drought hazard, vulnerability and exposure, with much feedbacks between the components. Due to these complexities and uncertainties for future vulnerability and exposure, we limit the analysis to changes in drought hazards, mainly monthly precipitation (i.e., meteorological drought).

Based on a CMIP5 multi-model precipitation ensemble under RCP8.5 (see Figure 22), drought hazard during summer is expected to gradually increase over time. Overall precipitation decrease is expected, yet a two-month increase is projected during the 1940 –1950 period at end of the Autumn. By 2100, the combination of precipitation temperature anomalies (e.g., affecting evapo-transpiration) implies a large increase in drought hazard. The CMIP5 multi-model SPEI (Standardized Precipitation Evapotranspiration Index; see Figure 23) drought hazard index shows this increase, where the SPEI's negative values represent dryer conditions.

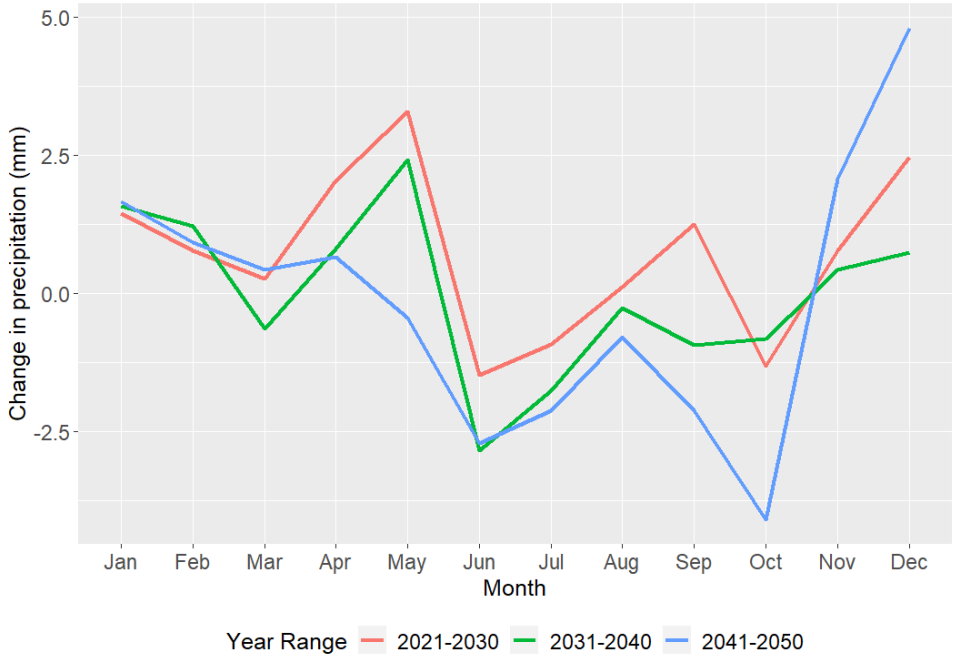



*Figure 22. CMIP5 ensemble projected change in monthly precipitation (mm) relative to the 1986–2005 baseline under RCP8.5. (Source: World Bank, 2023)*

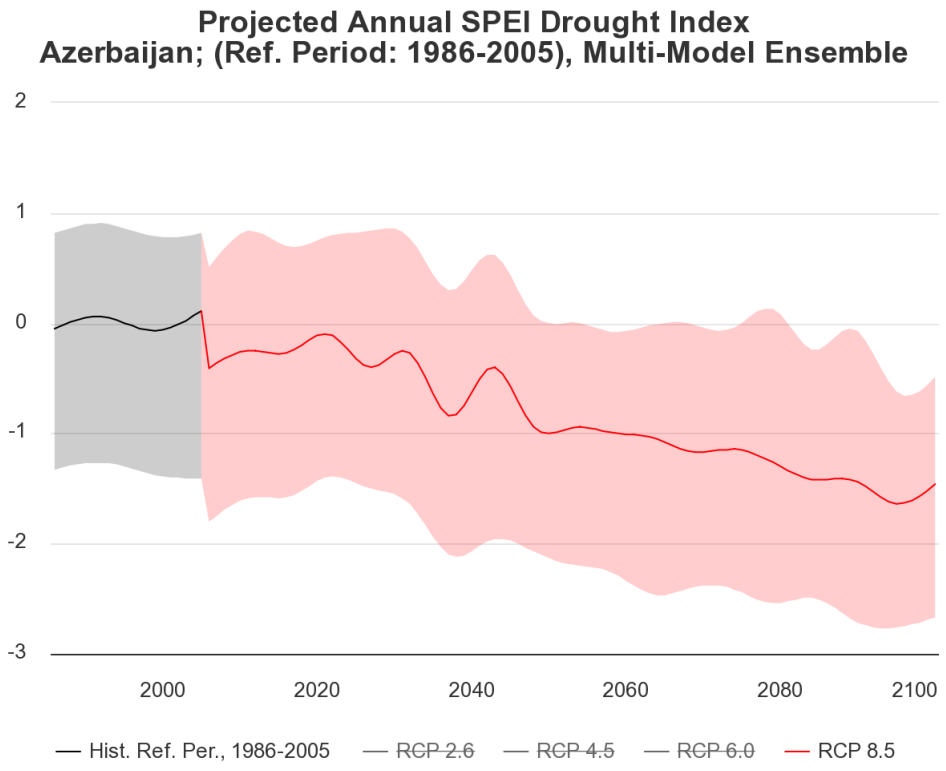



*Figure 23. CMIP5 ensemble historical (1986 –2005) and projected drought risk (based on the SPEI index) by 2100 under RCP8.5.*

*The line represents the median ensemble value, and the filled area represents the 10th and 90th percentiles. (Source: World Bank, 2023)*

# 4 Country Narrative and priority actions to increase water security

This section summarizes the main elements emerging from the water security diagnosis, by focusing on the strengths, risks and opportunities Azerbaijan is facing. This narrative is used as a basis for outlining several general recommendations that will help the country to become more water secure.

**Endowment**

Availability and demands

**Azerbaijan heavily relies on declining transboundary water from upstream countries for its socio-economic development.** Water sustains agriculture, energy and livelihoods in the country. However, around seventy percent of total surface water comes from upstream countries. This dependence poses significant challenges, particularly as the availability of transboundary water is declining. Additionally, while groundwater plays a crucial role in supporting various water uses, it is also facing a decline. As a result, the country is experiencing increasing pressure on its water resources, highlighting the urgent need for sustainable water management practices.

**Azerbaijan heavily relies on declining transboundary water from upstream countries for its socio-economic development. Water sustains agriculture, energy, and livelihoods in the country. However, around seventy percent of total surface water comes from upstream countries.**

**High seasonal water availability underscores the importance of water storage systems in Azerbaijan. ...**

**Azerbaijan had taken some measures to address water availability and water demand issues and to increase water use efficiency.** These measures included efforts to improve water resource management, promote water efficiency, and invest in water infrastructure. Irrigation systems are often outdated and with high levels of water losses. Further efforts are needed, particularly in regions facing water scarcity and water stress (e.g. Absheron and Quba-Khachmaz). It is essential to adopt a combination of strategies and actions.

Azerbaijan's most significant rivers are transboundary water bodies with considerable regional importance for agriculture and the water and energy sectors. One notable example is the Kura River, which originates in Turkey, flows through Georgia, and enters Azerbaijan before ultimately draining into the Caspian Sea. The Kura River serves as a vital lifeline, supporting agriculture, industry, and communities not only in Azerbaijan but also in Georgia.

**Priority actions**

1) Develop and implement a comprehensive IWRM framework that considers the sustainable use of surface water and groundwater, taking into account seasonal variations and potential water scarcity.
2) Cooperation with neighbouring countries needs to be strengthened and particularly with regards to water allocation, investment planning, monitoring, and information exchange.
3) Promote and incentivize the adoption of efficient irrigation practices among farmers, such as drip irrigation, to reduce water wastage in agriculture.
4) Research on the status and availability of groundwater and its recharge potential.
5) Improvement of Water Information Systems to support decision making on water resources management and planning.
6) Cooperation with neighboring countries to ensure water security for Azerbaijan's future.

## Architecture

Institutions

**To strengthen the institutional arrangements in the water sector in Azerbaijan, it's important to enhance governance, coordination, and capacity-building**. The institutional arrangement is complex, with ministries, state agencies and companies involved. Three ministries are responsible for different agendas in the country's water sector, namely the Ministry of Ecology and Natural Resources (MENR), the Ministry of Emergency Situations (MES) and the Ministry of Agriculture.

Azersu JSC is the national water supply and sanitation company of Azerbaijan. It operates throughout the country and is responsible for providing drinking water supply and wastewater treatment services to urban and rural areas in Azerbaijan. But municipalities and cities often have their own water and sanitation companies or utilities responsible for providing clean water and managing wastewater services within their jurisdictions.

Azerbaijan is undergoing a water reform towards adopting a IWRM approach and improve water security in the country. Currently, the country does not rely on a comprehensive water decision support system for IWRM. Water User Associations (WUAs) do not have sufficient capacities to monitor agricultural water use, since there is no metering in place.

**Priority actions**

1) Invest in capacity-building programs and training for government officials, water sector professionals, and local communities involved in water management.

2) Strengthen the state water agency responsible for overseeing water resource management, policy development, and regulation. This entity should have the authority to coordinate and implement water-related initiatives across various ministries and agencies.
3) Enhance transparency and accountability in water governance by regularly reporting on water resource status and management activities.
4) Strengthen the decision making on IWRM, establish an appropriate central decision support system and improve the cooperation between the different authorities.
5) Strengthen WUAs regarding the water use control.

Regulatory framework

**The Water Code of Azerbaijan, developed in 1997 and most recently amended in December 2021, provides the legal basis for various aspects of water governance in the country.** It is the fundamental law that regulates water resources management, including water allocation, use, and protection. Besides the Water Code, there are also the Environmental Code and the Land Code addressing certain water related aspects like environmental protection including provisions related to water quality, pollution control, and environmental impact assessments or agricultural water management. Azerbaijan has been working on the development of a National Water Policy that aims to provide a comprehensive framework for sustainable water resource management. Azerbaijan already developed the water resources strategy, with an action plan considering investments for the short term and long term. Furthermore, the country is currently developing an irrigation strategy plan. The National Policy Dialogue (NPD) on water has supervised the national water policy reform process. A multi-stakeholder platform with cross-ministerial support. It has also brought together donors and other international projects to share experiences and identify synergies to aid implementation and streamline progress.

**Priority actions**

1. Finalize the ongoing water sector reform, review and update water-related laws, regulations, and policies to ensure they align with international best practices and promote sustainable water management.
2. Develop a transparent and equitable system for allocating water rights, considering the needs of different water users, including agriculture, industry, and municipalities.
3. Implement a system for water permitting and licensing that encourages efficient water use and protects the environment.
4. Strengthen programs aimed at water protection to enhance the preservation of national water resources and mitigate pollution in groundwater, surface water, and other vital ecosystems. This includes implementing measures to monitor and regulate industrial discharges, agricultural runoff, and other potential sources of water contamination.

Infrastructure

**Dams play a pivotal role in sustaining water resources management and bolstering the economy by ensuring a reliable water storage capacity to mitigate seasonal and spatial water variability. Mingachevir Dam**, located in Azerbaijan, is the largest dam in the South Caucasus region. Completed in 1953, it serves as a vital component of water management, hydroelectric power generation, and irrigation for agricultural purposes in the surrounding areas. To optimize water resource utilization, it is imperative to spotlight the importance of modernizing and upgrading existing dams,

coupled with comprehensive watershed management programs. This strategic approach aims to enhance water productivity and efficiency, thereby fostering sustainable water management practices.

Water supply coverage by piped improved facilities (>90%) is adequate but existing infrastructure has often exceeded itsintended lifespan. Water supply and sanitation infrastructure in Azerbaijan requires updating and expansion. Potable water supply and sanitation services in the country are centrally managed by Azersu JSC. The company is responsible for taking water from the sources, processing, transporting and distributing of water, and purifying wastewater. According to the Organization for Economic Co-operation and Development (OECD, 2016), only about 36% of water networks are fully operational, while approximately 64% are in need of rehabilitation or complete replacement. Many of these water networks were established 25-40 years ago and have already exceeded their intended lifespan.

Water quality is also a serious issue and investments are needed for adequate water treatment to minimize drinking water related health risks.

**Priority actions**

1) Allocate resources for the construction of advanced water treatment plants and the expansion of distribution networks, prioritizing areas with inadequate infrastructure. Invest in smart technologies for leak detection, promote water conservation, and explore storage solutions to enhance water availability. Implement regular maintenance schedules for all water supply components to ensure long-term efficiency and sustainability.
2) Prioritize the expansion of potable water supply systems to reach underserved rural areas and peri-urban communities.
3) Strengthen water quality monitoring programs to regularly test water sources, treatment processes, and distribution networks for contaminants.
4) Monitor water losses and support the development of staff capacities to detect, manage and address NRW.
5) Modernization and upgradations of the existing dams - together with watershed management programs - to improve their water productivity and water efficiency.

**Investments in sanitation infrastructure are lagging what causes multiple social and economic costs.** In rural areas, there are limited access to improved sanitation facilities, such as flush toilets connected to a sewage system or improved pit latrines.. Sanitation infrastructure in rural areas of Azerbaijan has been a focus of development efforts to improve public health, sanitation practices, and overall living conditions. However, access to improved sanitation facilities still exist. Urban sanitation in Azerbaijan is generally better developed compared to rural areas. The Government of Azerbaijan, along with international organizations and donors, has undertaken efforts to enhance urban sanitation infrastructure. The sanitation networks in urban areas span a total length of over 3,500 km, which is roughly a fifth of the size of the drinking water supply network. This disparity highlights the uneven development between sewage and water supply infrastructure in the country.

**Priority actions**

1) Invest in the upgrade and expansion of sewerage systems, especially in urban and peri-urban areas. Ensure that sewage networks cover a larger portion of the population, including underserved communities.
2) Promote the use of safe and improved on-site sanitation solutions, such as improved pit latrines and septic tanks, in areas where centralized sewerage systems are not available.
3) Modernize and expand wastewater treatment plants to meet growing urban demands and ensure effective treatment of sewage and industrial wastewater.
4) Engage communities in sanitation and hygiene promotion initiatives to raise awareness about the importance of safe sanitation practices, waste disposal, and hygiene.

**Irrigation plays a significant role in agriculture in Azerbaijan, where it is essential for enhancing crop yields, ensuring food security, and supporting the livelihoods of rural communities, but the irrigation methods are quite often inefficient.** But Azerbaijan's irrigation infrastructure faces challenges in terms of coverage and condition. Key crops like cotton, fruits, and vegetables rely heavily on irrigation. Yet, inadequate maintenance and degradation of irrigation and drainage systems constrain water delivery and thus agricultural productivity. Inefficient irrigation practices are a major concern, especially in regions with high agricultural potential. Irrigated agriculture stands as the largest water-consuming sector in Azerbaijan's agricultural domain, accounting for a significant portion of the country's total water resource consumption. Upgrading and modernizing the irrigation infrastructure is crucial to enhancing water use efficiency and agricultural productivity.

**Priority actions**

1) Invest in the modernization and rehabilitation of irrigation infrastructure, including canals, pipelines, and distribution networks. Ensure proper operation and maintenance to reduce water losses and improve water distribution efficiency.
2) Develop climate-resilient irrigation strategies that consider the changing climate patterns and potential shifts in precipitation. Implement adaptive measures to cope with increased drought risks and water scarcity.
3) Provide training and technical support to farmers on modern irrigation techniques, water-efficient farming practices, and sustainable soil management.
4) Encourage the use of efficient water allocation methods, including water rights and permits, to ensure fair distribution and prevent over-extraction of groundwater and surface water.

### Performance

Water resources management

**Azerbaijan is in the process of developing a comprehensive national strategy to guide the implementation of Integrated Water Resources Management (IWRM) principles**. But implementation of IWRM in Azerbaijan faces several challenges, despite its importance for sustainable and equitable water use. These challenges stem from various factors, including governance issues, environmental concerns, and resource constraints. The implementation of river basin planning is not widespread in Azerbaijan. River Basin Management Plans that integrate IWRM principles are available for only a limited number of basins, often developed through international cooperation projects. Water scarcity is a pressing issue in many regions of Azerbaijan, exacerbated by increased competition for limited water resources between sectors, particularly agriculture, industry, and municipalities. Climate change has led to shifts in precipitation patterns, increased temperatures, and altered hydrological cycles. These changes pose challenges for water resource management, affecting water availability and quality. Ensuring water quality and addressing pollution from industrial, agricultural, and domestic sources is crucial for IWRM. Contaminated water sources can have adverse effects on human health and ecosystems. Reliable data on water resources, including groundwater and surface water, are essential for informed decision-making. Data gaps and limitations in monitoring systems impede IWRM efforts.

**Priority actions**

1) Allocate more resources to support the hydrological, agrometeorological, climate and meteorological monitoring.
2) Invest in improved data collection, monitoring, and analysis of water resources. Establish a comprehensive and up-to-date database that includes information on surface water, groundwater, water quality, and climatic trends.

3) Enhance collaboration with neighbouring countries sharing transboundary water resources to develop and implement joint management strategies and agreements. Engage in dialogue and dispute resolution mechanisms to ensure equitable sharing of water resources.
4) Strengthen and streamline the institutional framework for water management, including establishing clear roles and responsibilities among relevant government agencies. Promote inter-agency coordination to ensure a unified approach to water governance.
5) Centralize all information related to water into one system to facilitate inter-agency collaboration and improve water resources management.

Risk management

**In Azerbaijan, both flood and drought risks are significant and pose challenges to water resource management and disaster preparedness.** The country's geography and climate, characterized by mountainous terrain and varying precipitation patterns, make Azerbaijan prone to flash floods, especially in the spring and autumn. Many rivers, including the Kura and Aras, flow through Azerbaijan, and they can overflow their banks during heavy rainfall or snowmelt, causing riverine floods. Climate change may lead to more frequent and severe rainfall events, increasing the risk of floods in some regions. Transboundary rivers shared with neighbouring countries can lead to complex flood management issues and require international cooperation.

Azerbaijan faces recurring periods of drought, which can lead to water scarcity for agriculture, industry, and domestic use. Changing precipitation patterns and rising temperatures associated with climate change may exacerbate drought conditions in the future.

To address these risks, Azerbaijan has been working to improve its water resource management, including the development of early warning systems for floods and droughts, infrastructure improvements, and sustainable water use practices. Additionally, regional cooperation with neighbouring countries on transboundary water issues is essential to mitigate the impacts of floods and droughts effectively.

**Priority actions**

1) Enhance and expand early warning systems for floods, including the installation of weather monitoring stations, river gauges, and rainfall prediction models.
2) Upgrade and maintain flood protection infrastructure, such as levees, embankments, and flood barriers, to reduce the impact of riverine and flash floods.
3) Encourage community-based flood risk management initiatives, involving local residents in disaster preparedness and response efforts.
4) Establish comprehensive drought monitoring systems that integrate meteorological, hydrological, and agricultural data to detect early signs of drought conditions.
5) Promote sustainable agricultural practices that enhance drought resilience, such as crop diversification, soil conservation, and water-efficient irrigation techniques.
6) Implement integrated water resource management (IWRM) principles and water demand programs to optimize water allocation and usage during periods of drought.

**Outcomes**

Social

**Azerbaijan´s drinking water coverage is high but the safely managed proportion of access to potable water in rural areas need to be increased.** As of 2022, 92% of the urban population of Azerbaijan has access to safely managed drinking water and 8% has access to basic service. These figures are lower in the rural areas, where safely managed drinking water reaches 81% of the rural population and 13% has access to basic service.

**96.4% of the urban population in Azerbaijan has access to at least basic sanitation services.** According to JMP, 63% of the population is connected to a safely managed sanitation service, while 33.4% of the population is connected to basic services. There is no JMP data available for rural areas of the country, but it can be assumed that the coverage of safely managed sanitation services is significantly lower than in urban areas.

**Priority actions**

1) Improve WSS infrastructure in rural areas, to ensure that rural communities have access to reliable and safe water supplies and appropriate sanitation services.
2) Promote safely managed on-site sanitation solutions and adequate faecal sludge management.
3) Enhancing financing mechanisms: There is a need to enhance financing mechanisms for water supply and sanitation projects in rural areas. This could involve the establishment of dedicated funding sources, such as a rural water and sanitation fund, to support investment in rural infrastructure.

Environment

**Water quality and ecological status of Azerbaijan's water bodies needs to be improved.** Azerbaijan faces several challenges related to water pollution and poor water quality, which can have significant implications for human health, ecosystems, and overall water resource management. The main source of water supply in the country is the Kura River, but pollution is a major problem. All three countries of the river basin (Georgia, Armenia and Azerbaijan) contribute to the pollution The concentration of heavy metals exceeds permitted concentrations. Heavy industrial activity, particularly in urban and industrial areas, release pollutants into water bodies. The use of fertilizers, pesticides, and herbicides in agriculture lead to runoff that carries agricultural chemicals into rivers and lakes. In some areas, there is a lack of effective wastewater treatment facilities, resulting in the direct discharge of untreated or partially treated sewage into water bodies.

**Priority actions**

1) Enforce and enhance environmental regulations and standards to control industrial discharges, agricultural runoff, and municipal wastewater effluents.
2) Upgrade and expand wastewater treatment plants in urban and industrial areas to ensure effective removal of contaminants before discharge into water bodies. Promote the construction of decentralized wastewater treatment facilities in smaller communities and rural areas to improve water quality and protect local ecosystems.
3) Establish and strengthen water quality monitoring networks to regularly assess water quality parameters, including chemical, biological, and physical indicators. Develop a centralized database for water quality data, accessible to relevant authorities and the public, to track pollution sources and trends.
4) Enhance transboundary collaboration to improve water quality and reduce water pollution from upstream countries

Economic

**The overall economic water productivity in Azerbaijan is low.** Water is a valuable resource in Azerbaijan, where water scarcity is a significant concern. Efficient water use is essential for sustaining agriculture, ensuring food security, and supporting economic development. Azerbaijan's overall water productivity is about USD 3.7/m³, what is in the range of Armenia's water productivity, but only the half of Georgia's. Agriculture is a major consumer of water in Azerbaijan, accounting for a significant portion of total water withdrawals. But agricultural water productivity is very low and below USD 1/m³. Water scarcity, competing water demands, and inefficient irrigation practices pose challenges to water productivity. The country´s municipal water productivity with USD 17.1/m³ and the productivity of the industry sector with USD 13.7/m³ is also lower than the average of the ECA region.

**Priority actions**

1) Promote the adoption of modern technologies such as precision farming techniques. This could involve training programs for farmers, as well as subsidies or other incentives to encourage the adoption of new technologies like drip irrigation.
2) Support research and development to identify new technologies and practices that can help to improve water productivity. Facilitate the implementation of those innovations in the agricultural industry.
3) Implement a transparent and fair pricing system for water that reflects its true economic and environmental value, including the costs of sourcing, treatment, and infrastructure maintenance.
4) Evaluate the introduction of appropriate high-value crops and encourage their adoption by farmers to increase agricultural water productivity

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# 6 Annexes I: List of indicators used in the O-WM

Please note that the general country assessment of water security performed in Azerbaijan is based only on the core indicators listed below in the table. The supporting indicators requires stakeholder engagement which is beyond the scope of this report.

| WATER SECTOR OUTCOMES | | | |
|---|---|---|---|
| Social | | | |
| 1. Basic and safely managed drinking water coverage | CORE | QUANTITATIVE | |
| 2. Basic and safely managed drinking water coverage urban/rural | CORE | QUANTITATIVE | |
| 3. Basic and safely managed sanitation coverage | CORE | QUANTITATIVE | |
| 4. Basic and safely managed sanitation coverage urban/rural | CORE | QUANTITATIVE | |
| 5. Number of DALYs (disability-adjusted life years) due to unsafe water, sanitation, and handwashing | CORE | QUANTITATIVE | |
| 6. Mortality rate attributable to unsafe water, sanitation, and hygiene (unsafe WASH services) | CORE | QUANTITATIVE | |
| 7. Number of people affected by floods | CORE | QUANTITATIVE | |
| 8. Exposure of people to flood risks | CORE | QUALITATIVE | SUBNATIONAL |
| 9. Exposure of people to drought risks | CORE | QUALITATIVE | SUBNATIONAL |
| 10. Exposure of people to water stress | CORE | QUALITATIVE | SUBNATIONAL |
| 11. Affordability of WASH services | SUPPORTING | QUANTITATIVE | |
| 12. Deaths from floods | SUPPORTING | QUANTITATIVE | |
| 13. Non-availability of flush toilets | SUPPORTING | QUANTITATIVE | |
| 14. Number of diarrheal DALYs from inadequate water, sanitation, and hygiene | SUPPORTING | QUANTITATIVE | |
| 15. Percentage of deaths caused by diarrhea in children under 5 years of age | SUPPORTING | QUANTITATIVE | |
| Environmental | | | |
| 16. Share of wastewater safely treated | CORE | QUANTITATIVE | |
| 17. Proportion of water bodies with good ambient water quality (%) | CORE | QUANTITATIVE | |
| 18. Wetland loss | CORE | QUANTITATIVE | |
| 19. Groundwater decline | CORE | QUANTITATIVE | SUBNATIONAL |
| 20. Water stress ratio | CORE | QUANTITATIVE | SUBNATIONAL |
| 21. Share of surface water bodies (rivers) with good ecological status (EU | SUPPORTING | QUANTITATIVE | |

| | | | |
|---|---|---|---|
| WFD) | | | |
| 22. Share of surface water bodies (lakes) with good ecological status (EU WFD) | SUPPORTING | QUANTITATIVE | |
| 23. Share of groundwater bodies with good chemical status (WFD) | SUPPORTING | QUANTITATIVE | |
| 24. Share of groundwater bodies with good quantitative status (WFD) | SUPPORTING | QUANTITATIVE | |
| 25. Terrestrial and marine protected areas | SUPPORTING | QUANTITATIVE | |
| Economic | | | |
| 26. Water use efficiency per sector | CORE | QUANTITATIVE | |
| 27. Economic water productivity | CORE | QUALITATIVE | SUBNATIONAL |
| 28. Agricultural gross value generated by irrigated agriculture | CORE | QUANTITATIVE | SUBNATIONAL |
| 29. Electricity production from hydroelectric sources | CORE | QUANTITATIVE | |
| 30. Share of hydropower in total primary energy supply | CORE | QUANTITATIVE | |
| 31. Tourism share of GDP | SUPPORTING | QUANTITATIVE | |
| 32. Water productivity of irrigation | SUPPORTING | QUANTITATIVE | |
| 33. Water productivity of industry | SUPPORTING | QUANTITATIVE | |
| **WATER SECTOR PERFORMANCE** | | | |
| Management of water resources | | | |
| 34. Degree of implementation of water resources management instruments | CORE | QUALITATIVE | |
| 35. Availability and adequacy of national water resources management instruments | SUPPORTING | QUALITATIVE | |
| 36. Availability and adequacy of basin management instruments | SUPPORTING | QUALITATIVE | |
| 37. Availability and adequacy of aquifer management instruments | SUPPORTING | QUALITATIVE | |
| 38. Availability and adequacy of national management instruments to ensure efficient and sustainable water use | SUPPORTING | QUALITATIVE | |
| 39. Availability and adequacy of water quality management instruments | SUPPORTING | QUALITATIVE | |
| 40. Data collection and sharing within countries and across borders | SUPPORTING | QUALITATIVE | |
| Delivery of Water Services | | | |
| 41. Operating cost coverage | CORE | QUANTITATIVE | |
| 42. Electrical energy costs as percentage of operational costs | CORE | QUANTITATIVE | |
| 43. Level of water and sanitation strategic planning and strategic investment | SUPPORTING | QUALITATIVE | |

| | | | |
|---|---|---|---|
| planning | | | |
| 44. Maturity of water and sanitation performance monitoring framework | SUPPORTING | QUALITATIVE | |
| 45. Quality of rural water and sanitation infrastructure operation and maintenance system | SUPPORTING | QUALITATIVE | |
| 46. Quality of asset management | SUPPORTING | QUALITATIVE | |
| 47. Quality of irrigation infrastructure, investments, and operation and maintenance system | SUPPORTING | QUALITATIVE | |
| **Mitigation of risk** | | | |
| 48. Riverine flood risk – population affected | CORE | QUANTITATIVE | SUBNATIONAL |
| 49. Riverine flood risk – monetary | CORE | QUANTITATIVE | SUBNATIONAL |
| 50. Drought risk | CORE | QUANTITATIVE | SUBNATIONAL |
| 51. Management instruments to deal with droughts | SUPPORTING | QUALITATIVE | |
| 52. Management instruments to deal with floods | SUPPORTING | QUALITATIVE | |
| **WATER SECTOR ARCHITECTURE** | | | |
| Institutions | | | |
| 53. Fragile State Index (FSI) | CORE | QUANTITATIVE | |
| 54. Degree of IWRM implementation | CORE | QUANTITATIVE | |
| 55. Level of legal and policy framework maturity | SUPPORTING | QUALITATIVE | |
| 56. Level of operationalization of international treaties | SUPPORTING | QUALITATIVE | |
| 57. Variety of government institutions registered in FAO database | SUPPORTING | QUALITATIVE | |
| Infrastructure | | | |
| 58. Per capita dam storage capacity | CORE | QUANTITATIVE | SUBNATIONAL |
| 59. Total water supply coverage by piped improved facilities | CORE | QUANTITATIVE | |
| 60. Total sanitation coverage by sewer facilities | CORE | QUANTITATIVE | |
| 61. Non-revenue water | CORE | QUANTITATIVE | |
| 62. Continuity of service | CORE | QUANTITATIVE | |
| 63. Wastewater treatment | CORE | QUANTITATIVE | |
| 64. Share of cultivated land under irrigation | CORE | QUANTITATIVE | SUBNATIONAL |
| 65. Share of irrigated land with flood irrigation | CORE | QUANTITATIVE | |
| 66. Share of irrigated land with sprinkler irrigation | CORE | QUANTITATIVE | |

| | | | |
|---|---|---|---|
| 67. Share of irrigated land with drip irrigation | CORE | QUANTITATIVE | |
| 68. Level of adequacy of water supply infrastructure | SUPPORTING | QUALITATIVE | |
| 69. Adequacy of water and sanitation design standards and guidelines and approval process | SUPPORTING | QUALITATIVE | |
| 70. Level of adequacy of irrigation infrastructure | SUPPORTING | QUALITATIVE | |
| 71. Irrigation infrastructure financing | SUPPORTING | QUALITATIVE | |
| 72. Level of adequacy reservoir/hydropower infrastructure | SUPPORTING | QUALITATIVE | |
| **WATER SECTOR ENDOWMENT** | | | |
| Supply | | | |
| 73. Total renewable water resources per capita | CORE | QUANTITATIVE | SUBNATIONAL |
| 74. Share of surface water to total water availability | CORE | QUANTITATIVE | SUBNATIONAL |
| 75. Share of groundwater to total water availability | CORE | QUANTITATIVE | SUBNATIONAL |
| 76. Share of non-conventional water resources to total availability | CORE | QUANTITATIVE | SUBNATIONAL |
| 77. Transboundary dependency ratio | CORE | QUANTITATIVE | |
| 78. Water quality index | CORE | QUANTITATIVE | |
| 79. Inter-annual variability | CORE | QUANTITATIVE | SUBNATIONAL |
| 80. Seasonal variability | CORE | QUANTITATIVE | SUBNATIONAL |
| Demand | | | |
| 81. Water withdrawal per capita | CORE | QUANTITATIVE | SUBNATIONAL |
| 82. Share of surface water to total withdrawals | CORE | QUANTITATIVE | SUBNATIONAL |
| 83. Share of groundwater to total withdrawal | CORE | QUANTITATIVE | SUBNATIONAL |
| 84. Share of agriculture water use to total water withdrawals | CORE | QUANTITATIVE | SUBNATIONAL |
| 85. Share of industrial water use to total water withdrawals | CORE | QUANTITATIVE | SUBNATIONAL |
| 86. Share of municipal water use to total water withdrawals | CORE | QUANTITATIVE | SUBNATIONAL |

# 7 Annex II: Results of Core indicator assessment

*) topic/issue reference to Annex 3 of the ToR and the Toolkit

| Ind. Number | Dimension | Sub-dimension *) | Indicator | Unit | Data Source | VALUE | RANGE BAND | RANGE BAND DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| 1 | Outcomes | Social | Basic and safely managed drinking water coverage (%) | % population | UNICEF/WHO Joint Monitoring Programme (JMP) https://washdata.org/data | 96 | HIGH | 96 (98 is the regional average WHO region Europe) - 100 |
| 2 | Outcomes | Social | Basic and safely managed drinking water coverage (%) rural/urban | Ratio rural-urban (rural/urban x 100): 0-100 | UNICEF/WHO Joint Monitoring Programme (JMP) https://washdata.org/data | 91 | HIGH | 91-100 (and 100+): Very small to no gap in service provision remaining. |
| 3 | Outcomes | Social | Basic and safely managed sanitation coverage (%) | % population | UNICEF/WHO Joint Monitoring Programme (JMP) https://washdata.org/data | 96.4 | HIGH | 96 (97 is the regional average WHO region Europe) - 100 |
| 4 | Outcomes | Social | Basic and safely managed sanitation coverage (%) rural/urban | Ratio rural-urban (rural/urban x 100): 0-100 | UNICEF/WHO Joint Monitoring Programme (JMP) https://washdata.org/data | | No Value | No Value |
| 5 | Outcomes | Social | Number of DALYs (disability-adjusted life years) due to unsafe water, sanitation and handwashing | DALYs/100.000 inhabitants | Global Health Database Exchange http://ghdx.healthdata.org/ | 248 | LOW-MEDIUM | 150-300 |
| 6 | Outcomes | Social | Mortality rate attributable to unsafe water, sanitation, and hygiene (unsafe WASH services) | People affected annually per 100.000 inhabitants | SDG 3.9.2 monitoring | 1.12 | LOW-MEDIUM | 1-2 |
| 7 | Outcomes | Social | Number of people affected by floods/a/100k | People affected annually per | EM-DAT, the International Disaster Database (https://public.emdat.be/) | 433 | LOW | 200+: Population heavily affected by flooding, deficits |

| Ind. Number | Dimension | Sub-dimension *) | Indicator | Unit | Data Source | VALUE | RANGE BAND | RANGE BAND DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| | | | inhabitants 1980-2021 | 100.000 inhabitants | | | | inadequate flood risk management on all scales (lack of warning system, weak planning, little or no infrastructure) and high exposure |
| 10 | Outcomes | Social | People living in areas under water stress | % population | | 20 | MEDIUM-HIGH | 20-40 |
| 16 | Outcomes | Environmental | Share of wastewater safely treated (%) | % | SDG Indicator 6.3.1 https://www.sdg6data.org/indicator/6.3.1 | 57 | LOW-MEDIUM | 51-65%: Low amounts of wastewater are being safely treated, although some control measures and policies work; health of people and aquatic ecosystems in large parts still at risk. |
| 17 | Outcomes | Environmental | Proportion of bodies of water with good ambient water quality (%) | % | SDG Indicator 6.3.2 https://sdg6data.org/indicator/6.3.2 | | No Value | No Value |
| 18 | Outcomes | Environmental | Wetland loss | Score 0-100 | Environmental Performance Index/Yale University https://epi.yale.edu/epi-results/2020/component/wtl | 100 | HIGH | 91-100: Wetland losses are reduced to almost zero; as land-use planning measures/protection policies seem to work effectively, need to start on |

| Ind. Number | Dimension | Sub-dimension *) | Indicator | Unit | Data Source | VALUE | RANGE BAND | RANGE BAND DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | restoration measures/policies. |
| 19 | Outcomes | Environmental | Groundwater table decline (cm/yr.) | cm/yr. | WRI AQUEDUCT Water risk atlas: https://www.wri.org/aqueduct | 0.340290742 | HIGH | Very slow or no decline: 0-1 (<0 cm/y) |
| 20 | Outcomes | Environmental | Water stress ratio | % | WRI AQUEDUCT Water risk atlas: https://www.wri.org/aqueduct | 56.4 | LOW-MEDIUM | 20-10%: Low water stress |
| 26 | Outcomes | Economic | Economic water productivity: Overall | USD/m3 | FAOSTAT (SDG 6.4.1 indicator) http://www.fao.org/sustainable-development-goals/indicators/641/en/ | 3.66 | LOW | 0-10: Very low water use efficiency, due to high agricultural production, high losses and/or low productivity. |
| 26a | Outcomes | Economic | Economic water productivity: Agriculture | USD/m3 | | 0.15 | LOW-MEDIUM | 0.1-0.2: Low water use efficiency; agricultural sector important user of water, losses/low productivity common. |
| 26b | Outcomes | Economic | Economic water productivity: Industry | USD/m3 | | 50.3 | HIGH | 47+: Excellent water use efficiency; good infrastructure/very little losses of water, highly industrialized and/or service-oriented economy. |
| 26c | Outcomes | Economic | Economic water productivity: Municipal | USD/m3 | | 46.6 | MEDIUM | 31-47: Water use efficiency increasing; improved productivity and less losses, in sections of the |

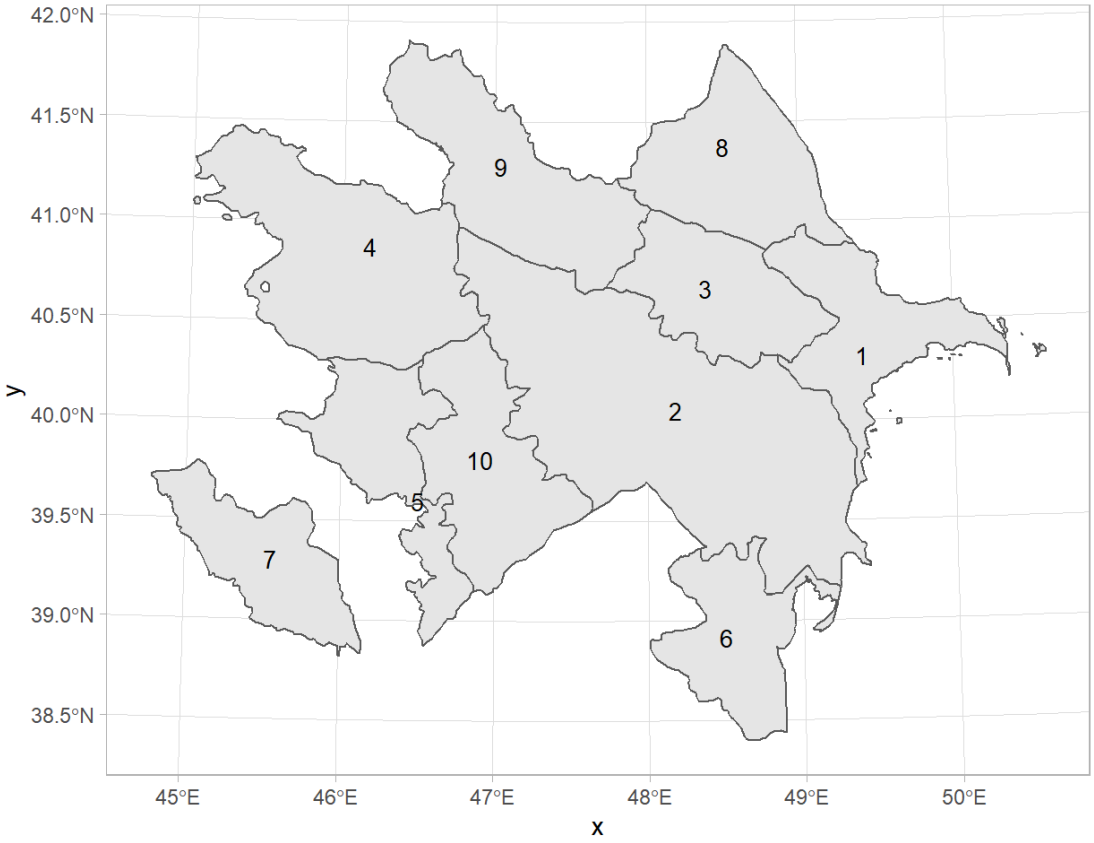
| Ind. Number | Dimension | Sub-dimension *) | Indicator | Unit | Data Source | VALUE | RANGE BAND | RANGE BAND DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | economy still low productivity. |
| 28 | Outcomes | Economic | Agricultural gross value generated by irrigated agriculture | % | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html | 72 | MEDIUM-HIGH | 50-90% |
| 29 | Outcomes | Economic | Electricity production from hydroelectric sources | % | World Bank https://data.worldbank.org/indicator/EG.ELC.HYRO.ZS | 6.6 | LOW | 0-10% |
| 30 | Outcomes | Economic | Share of hydropower in total primary energy supply | 0 to 100 | IRENA database https://www.irena.org/Statistics/Statistical-Profiles | 0.6 | LOW | <1% |
| 34 | Performance | Management of Water Resources | Degree of implementation of water resources management instruments | 0 to 100 | National: SDG 6.5.1 monitoring | 54 | MEDIUM | Some management instruments implemented on a more long-term basis, with adequate geographic and stakeholder coverage. |
| 41 | Performance | Delivery of Water Services | Operating cost coverage (ratio) | ratio | International Benchmarking Network for Water and Sanitation Utilities (IBNET) www.ib-net.org | 1.68 | HIGH | Clearly above 1: Utilities are able to save for major capital maintenance and extensions |
| 42 | Performance | Delivery of Water Services | Electrical energy costs as percentage of operational costs | % | International Benchmarking Network for Water and Sanitation Utilities (IBNET) www.ib-net.org | | No Value | No Value |
| 48 | Performance | Mitigation of Risks | Riverine flood risk - population affected | % population per year | WRI Aqueduct Water Risk Atlas: https://www.wri.org/publication/aqueduct-30. | 2.233575592 | LOW | 2+ |

| Ind. Number | Dimension | Sub-dimension *) | Indicator | Unit | Data Source | VALUE | RANGE BAND | RANGE BAND DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| #NV | Performance | Mitigation of Risks | Riverine flood risk - monitoring | % GDP per year | WRI Aqueduct Water Risk Atlas: https://www.wri.org/publication/aqueduct-30. | 2.224463356 | LOW | 1-1,5 |
| 50 | Performance | Mitigation of Risks | Drought Risk | Rating between 1 and 5 | WRI Aqueduct Water Risk Atlas: https://www.wri.org/publication/aqueduct-30. | 3.611180643 | LOW-MEDIUM | 2 |
| 53 | Architecture | Institutions and governance | Fragile State Index (FSI) | Index between 0 and 120 | Accessible online database https://fragilestatesindex.org/country-data/ | 75.1 | LOW-MEDIUM | Warning 71-90 |
| 54 | Architecture | Institutions and governance | Degree of IWRM implementation | Degree between 0 and 100 | Accessible online database http://iwrmdataportal.unepdhi.org/country database | 57 | MEDIUM | Medium high 51-70 |
| 58 | Architecture | Infrastructure | Per capita dam storage capacity | m3/person | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html Subnational: GRanD database | 2188.1 | HIGH | >1500 |
| 59 | Architecture | Infrastructure | Total water supply coverage by piped improved facilities (%) | Percentage [%] | Joint Monitoring Programme for Water Supply and Sanitation (JMP) (WHO/UNICEF) https://washdata.org/data | 90.99185 | HIGH | 90-100% |
| 60 | Architecture | Infrastructure | Total sanitation coverage by sewer facilities (%) | Percentage [%] | Joint Monitoring Programme for Water Supply and Sanitation (JMP) (WHO/UNICEF) https://washdata.org/data | 58.07709 | MEDIUM | 40-60% |
| 61 | Architecture | Infrastructure | Non-revenue water (%) | Percentage [%] | International Benchmarking Network for Water and Sanitation Utilities (IBNET) www.ib-net.org | 46.55 | LOW-MEDIUM | 40-60%<br><br>Lower end since globally, non-revenue water accounts for 25 to 50 % |
| 62 | Architecture | Infrastructure | Continuity of service | h/day | International Benchmarking Network for Water and Sanitation Utilities (IBNET) www.ib-net.org | 16 | LOW-MEDIUM | 16-20 service is available but often interrupted |

| Ind. Number | Dimension | Sub-dimension *) | Indicator | Unit | Data Source | VALUE | RANGE BAND | RANGE BAND DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| 63 | Architecture | Infrastructure | Wastewater treatment | Score between 0 and 100 | Accessible online database https://epi.yale.edu/epi-results/2020/component/wwt | 46.5 | MEDIUM | 21-50 medium connection and treatment rate |
| 64 | Architecture | Infrastructure | Share of cultivated land under irrigation | % | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html | 61.8 | Informative | Informative |
| 65 | Architecture | Infrastructure | Share of irrigated land with flood irrigation | % | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html | 57.3 | Informative | Informative |
| 66 | Architecture | Infrastructure | Share of irrigated land with sprinkler irrigation | % | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html | 42.5 | Informative | Informative |
| 67 | Architecture | Infrastructure | Share of irrigated land with drip irrigation | % | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html | 0.01 | Informative | Informative |
| 73 | Endowment | Supply | Total Renewable Water Resources per capita | m3/year/person | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html | 3485.087 | LOW-MEDIUM | 1000-5000: low to moderate water scarce |
| 74 | Endowment | Supply | Share of surface water to total water availability | % | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html | 87 | Informative | Informative |
| 75 | Endowment | Supply | Share of groundwater to total water availability | % | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html | 13 | Informative | Informative |
| 77 | Endowment | Supply | Share of non-conventional water resources to total availability | % | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html | | Informative | Informative |
| 76 | Endowment | Supply | Transboundary Dependence Ratio (Water Independence) | % | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html | 76.59697188 | LOW | 100-75%: Very high or complete dependence on upstream countries |
| 78 | Endowment | Supply | Drinking Water Quality Index | 0 | https://epi.yale.edu/epi-results/2020/component/uwd | 46.4 | MEDIUM | 40-60 |

| Ind. Number | Dimension | Sub-dimension *) | Indicator | Unit | Data Source | VALUE | RANGE BAND | RANGE BAND DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| 79 | Endowment | Supply | Interannual Variability | coefficient of variation | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html Subnational: WRI Aqueduct Risk Atlas | 0.41 | MEDIUM-HIGH | 0.5-0.25 |
| 80 | Endowment | Supply | Seasonal Variability | coefficient of variation | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html Subnational: WRI Aqueduct Risk Atlas | 0.74 | MEDIUM | 1.00-0.66 Medium |
| 81 | Endowment | Demand | Water Withdrawal per capita | m3/year/person | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html | 1222.871 | LOW-MEDIUM | 2000-750 |
| 82 | Endowment | Demand | Share of Surface water to total water withdrawal | % | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html | 94 | Informative | Informative |
| 83 | Endowment | Demand | Share of groundwater to total water withdrawal | % | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html | 6 | Informative | Informative |
| 84 | Endowment | Demand | Share of Agriculture water use to total water withdrawal | % | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html | 92.35637 | LOW | 100-80% |
| 85 | Endowment | Demand | Share of Industrial water use to total water withdrawal | % | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html | 4.347826 | LOW | <8%, Low-income countries |
| 86 | Endowment | Demand | Share of Municipal water use to total water withdrawal | % | FAO AQUASTAT http://www.fao.org/aquastat/statistics/query/index.html | 3.2958 | LOW | 0-10% |

# 8 Annex III: Spatial divisions - Regions




| Map. ID | Region Name |
|---|---|
| 1 | Absheron |
| 2 | Aran |
| 3 | Daglig-Shirvan |
| 4 | Ganja-Qazakh |
| 5 | Kalbajar-Lachin |
| 6 | Lankaran |
| 7 | Nakhchivan |
| 8 | Quba-Khachmaz |
| 9 | Shaki-Zaqatala |
| 10 | Yukhari-Karabakh |