INITIAL NATIONAL ADAPTATION PLAN

AZERBAIJAN 2024

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LIST OF ABBREVIATION

ADB	Asian Development Bank
Azenerji	National Energy Production Company
BTR	Biennial Transparency Report
CCA	Climate Change Adaptation
CCVI	Climate Change Vulnerability Index
COP	Conference of the Parties
DPR	Direct Potable Reuse
EAP	Eastern Partnership
EbA	Ecosystem-based Adaptation
EIA	Environmental Impact Assessment
EWS	Early Warning System
EC	European Commission
EU	European Union
EUWI	European Union Water Initiative
GoA	Government of Azerbaijan
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GIZ	German Agency for International Cooperation
IFI	International Financing Institution
IP	Indigenous Peoples
IWRM	Integrated Water Resources Management
JICA	Japanese International Cooperation Agency
FNC AZ	Fourth national Communication of Azerbaijan
IPCC	Intergovernmental Panel on Climate Change
LDC	Least Developed Country
LEG	Least Developed Countries Expert Group
MoA	Ministry of Agriculture
MES	Ministry of Emergency Situations
MENR	Ministry of Ecology and Natural Resources
NAP	National Adaptation Plan
OECD	Organisation for Economic Co-operation and Development
OSCE	Organization for Security and Co-operation in Europe
SDG	Sustainable Development Goal
SDRM	The Strategic Development Road Maps
SWRA	State Water Resources Agency
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank
WUA	Water Users Association
WS	Water Strategy
WWTP	Wastewater Treatment Plan
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FOREWORD

Climate change is one of the most serious challenges facing our planet in the 21st century. It affects every nation, regardless of its development level, as demonstrated by the increasing frequency of anomalous natural phenomena globally.

Considering the urgency of this global phenomena, under the visionary leadership of the President of the Republic of Azerbaijan, Ilham Aliyev, we have undertaken numerous initiatives aimed at addressing climate change and achieving sustainable development. Azerbaijan has prioritized the integration of green technologies and sustainable practices across sectors, with these priorities detailed in the "Azerbaijan 2030: National Priorities for Socio-Economic Development", which serves as our guiding framework for sustainable future. This document outlines Azerbaijan's commitment to advancing climate resilience, environmental protection, and economic diversification through green practices and innovations.

The Republic of Azerbaijan has been proactive in joining global efforts to mitigate the adverse effects of climate change by ratifying the UN Framework Convention on Climate Change in 1995, the Kyoto Protocol in 2000, and the Paris Agreement in 2017. With a population of over 10 million, Azerbaijan contributes a mere 0.1% to global greenhouse gas emissions. Nevertheless, its unique physical and geographical attributes make it particularly vulnerable to the impacts of climate change, evidenced by the escalating occurrences of droughts, heat waves, floods, and other hazardous natural events.

Our water resources have diminished by approximately 15% in recent decades due to climate change, heightening the vulnerability of various sectors including water resources, agriculture, coastal regions and other. To combat these challenges, Azerbaijan has implemented a sophisticated early warning system to strengthen our resilience to these hazardous hydrometeorological phenomena.

Under our ambitious Nationally Determined Contributions (NDC), Azerbaijan is committed to reducing its greenhouse gas emissions by 35% by 2030, targeting key sectors such as energy, industry, agriculture, forestry and land use, and waste management.

These efforts are complemented by extensive reforestation initiatives aimed at restoring natural ecosystems and enhancing carbon sequestration, thereby directly supporting our NDC goals. By aligning our national priorities with the Paris Agreement and the Sustainable Development Goals, Azerbaijan is demonstrating a path toward a resilient, inclusive, and sustainable future for all.

The recent liberation of territories that had been occupied for almost three decades opens new avenues for mitigating and reducing the impacts of climate change. Initiatives for rehabilitating these territories include implementing "smart city" and "smart village" concepts and establishing a "green energy zone," all of which are integral to our broader mitigation strategies. Additionally, extensive reforestation and greening projects support economic diversification and contribute to significant reductions in greenhouse gas emissions.

Effective collaboration at local level is crucial to achieving our environmental goals. The State Commission on Climate Change plays a vital role in ensuring cohesive coordination among all national stakeholders involved in climate action, ensuring alignment and synergy across sectors for implementation of our international climate commitments.

This cohesive approach enables us to effectively implement our international climate commitments, translating global goals into actionable initiatives that resonate with our national priorities and drive impactful results.

Despite its long history in the oil and gas industry, Azerbaijan is setting ambitious targets to increase the share of the installed capacity of renewable energy to 33% by 2027 in the country's overall energy balance. The path to significant environmental impact reduction requires the unified efforts of all countries to secure a resilient and sustainable future. This underscores the critical importance of enhancing regional collaboration.

Incorporating adaptation to climate change into routine planning at all levels is essential. The UNFCCC's National Adaptation Plan (NAP) process supports adaptation planning in countries. The Intergovernmental Panel on Climate Change (IPCC) adopts a broad definition of adaptation, encompassing adjustments in natural or human systems in response to climatic stimuli, aimed at reducing harm or leveraging beneficial opportunities.

Drawing from extensive assessments of climate impacts across various sectors, Azerbaijan has identified targeted adaptation measures for crucial areas such as water, agriculture, ecosystems, and coastal regions. We are committed to developing our first NAP based on these identified measures, aligning with the steps outlined in the UNFCCC guidelines and the Paris Agreement's Global Goal on Adaptation.

The impacts of climate change are set to intensify, underscoring the importance of proactive measures aimed at reducing poverty, improving nutrition and education, managing the environment, and promoting sustainable livelihood opportunities. These efforts will not only reduce vulnerability to climate impacts but also enhance the overall resilience of our population to future climate changes.

Therefore, it is essential for Azerbaijan to integrate climate change and its impacts into the core of our economic policies, development initiatives, and international aid efforts as outlined in the guidelines mentioned above.

Azerbaijan is steadfast in its commitment to environmental protection and the mitigation of climate change, as evidenced by our privilege to host the 29th session of the Conference of the Parties (COP29) to the United Nations Framework Convention on Climate Change. This event is a testament to the global community's deep respect and trust in Azerbaijan's dedication to addressing critical global issues like climate change. Under the slogan "In Solidarity for a Green World", our country, exemplifying leadership in addressing global issues like climate change under the guidance of the President of the Republic of Azerbaijan, calls on all nations to strengthen solidarity for a greener, fairer, more inclusive, and sustainable world.

Minister of Ecology and Natural Resources
of the Republic of Azerbaijan

Mukhtar Babayev

INITIAL NATIONAL ADAPTATION PLAN

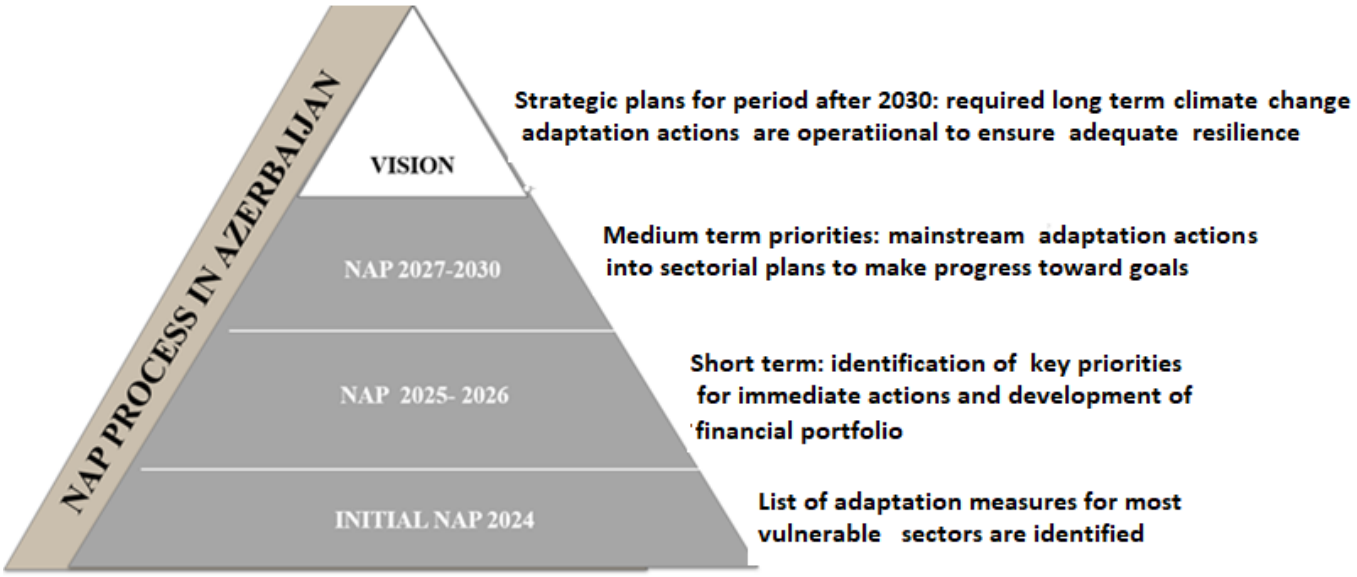
EXECUTIVE SUMMARY

AZERBAIJAN 2024

EXECUTIVE SUMMARY

The current climate changes and sectoral vulnerabilities, alongside climate change scenarios, necessitate development plans and programs to increase resilience and adapt to future climate change impacts. The process to formulate and implement National Adaptation Plans (NAPs) was established under the UNFCCC to facilitate adaptation efforts in least-developed countries and other developing countries.

Adaptation to the adverse impacts of climate change is thus a priority for Azerbaijan, and this Initial National Adaptation Plan helps the country reduce climate vulnerability and increase resilience to climate change. The plan sets out long-term adaptation, as well as short-term priority actions programmes to 2025-2026 and medium-term priority actions to 2027-2030.



The development process of the initial NAP is led by the Ministry of Ecology and Natural Resources (MENR) with contributions from relevant national organizations, the Adaptation Working Group, and various sectors under the decision of the National Climate Change Commission. This is framed within the "Socio-economic development strategy for 2022-2026 of the Republic of Azerbaijan" and other programs and strategies, with the assistance of the UNDP GCF NAP support project on adaptation planning and implementation in Azerbaijan.

The objectives of the NAP process are:

- ✓ To reduce vulnerability to the impacts of climate change, by building adaptive capacity and resilience.
- ✓ To facilitate the integration of climate change adaptation in a coherent manner into relevant new and existing policies, programmes and activities, in particular development planning processes and strategies, within all relevant sectors and at different levels, as appropriate.

The first chapter analyses the existing legal and institutional framework for conducting climate monitoring, collecting and analysing data, assessing climate change, and its impact on different sectors, and taking relevant actions.

Chapter 2 assess changes in climatic factors from 2001 to 2023 compared to the baseline period of 1970-2000. Analyses indicate an increase in air temperature across Azerbaijan and a decrease in precipitation in

the majority of the country. Over the last 23 years, the temperature anomaly across the country was 1.10°C. In 2023, the average temperature reached 14.60°C, which is 1.9 degrees higher than the norm for the years 1971-2000 (12.70°C). The highest average temperature in recent decades was 14.80°C in 2010.

In the last two decades, the multi-year average amount of precipitation was 464 mm, a decrease of 6.3% compared to the 1971-2000 norm (493 mm). Over the past 13 years, this decrease has reached 10%. Although a decrease in precipitation is observed in most parts of the country, an increase in local precipitation influenced by aerosols is also recorded in Baku. Over the past 13 years, the average amount of precipitation in the Absheron region increased by 32 mm, which is 14% above the 1971-2000 norm (229 mm).

Chapter 3 describes the results of climate risk mapping for elements such as hot days, droughts, heat waves, white winds, hail cases, floods, strong winds, etc. The climate change vulnerability index was calculated for regions of Azerbaijan based on indicators characterizing vulnerable areas such as water, agriculture, and Caspian Sea Coastal zones. The mapping identified the most vulnerable regions for different sectors.

According to current assessment, the areas, most vulnerable to climate change include:

- **Water sector:** Changing precipitation affects water resources and availability, reducing them by 15% over the last 23 years. The number of floods and mudflows has increased and intensified.

- **Agriculture**: Climate change negatively impacts crop yields due to changes in temperature, precipitation, droughts, hydrological systems (including irrigation), soil quality, erosion, and extreme events.

- **Health:** The main impacts result from heatwaves and an increase of extreme weather events.

- **Climate related hazards and disasters**: Increasing incidences of floods, droughts, hail, strong winds, and other extreme events have negative socio-economic impacts, including on infrastructure, production sectors, and people's livelihoods and health, especially for vulnerable groups and communities.

- **Coastal and Mountain ecosystems:** Changes in climate impact natural systems in the country, observable along coastal zones and estuaries as well as in river basins and various mountain ecosystems. The level of the Caspian Sea has dropped by more than 2 meters in the last 20 years, with further declines expected.

Climate change also leads to increased floods and mudflows in the Greater Caucasus Mountain areas, resulting in damage to communities and infrastructure, and soil erosion. Droughts in mountain areas negatively impact water supply due to the drying of springs and reduced river flow, seriously damaging forests and pastures, destroying grass cover, increasing soil erosion. Climate change impacts ecosystem services that benefit local communities and tourists in high mountain areas through impacts on food and feed, water availability, natural hazards regulation, spirituality and cultural identity, aesthetics, and recreation. Climate change impacts on infrastructure and accessibility also affect ecosystem services. The diversity and magnitude of climate change impacts highlight the need to consider ecosystem services in high mountain areas and to increase the adaptation options for local communities and tourists.

Chapter 6 describes developed climate change scenarios to assess future climate change and its impacts on different sectors. Three different global climate models were employed and analysed in this research. The seasonal variations of the model outputs and their ability to simulate the climate conditions in Azerbaijan

were assessed. The circulation models developed for Azerbaijan were established based on different emission scenarios, **for the first time with a 9 km resolution** with support from the Directorate of Climate Change of the Ministry of Environment, Urbanization and Climate Change of the Republic of Türkiye and the National Hydrometeorological Service of MENR of the Republic of Azerbaijan in line with the recommendations of the Intergovernmental Panel on Climate Change (IPCC). Among the three models, the RegCM4 model, generated by the MPI-ESM-MR (Max Planck Earth System Model), was found to best represent the prevailing climate system in Azerbaijan. The MR model for the reporting period is an integrated Earth system model comprising atmosphere, surface, and ocean submodules developed by the Max Planck Institute in Germany.

To reduce vulnerabilities prepared initial NAP document aims to:

- Inform the planning, coordination, and implementation of adaptation actions needed at all levels of government and across society and ecosystems.
- Provide guidance on integrating adaptation considerations into policies, programs, and activities.
- Increase resilience to future climate change impacts

For the above vulnerable sectors and ecosystems, measures of adaptation have been developed as the main implementable actions within the Initial NAP process. To formulate and implement the NAP in full compliance with UNFCCC guidelines and also GGA requirements, the main NAP actions are identified.

During 2025-2026, the Initial NAP will transition to a full-scale NAP by establishing the necessary legal and institutional framework, along with capacity building to integrate adaptation measures into sectoral development strategies and plans. A financial portfolio and funding sources will also be developed and identified to support the comprehensive implementation of the NAP from 2027 to 2030 and beyond.

By implementing relevant actions during the initial three years of the NAP (2027-2030), a necessary enabling environment will be created to support full-scale NAP implementation across sectors. This will align with international regulations to enhance future climate resilience of ecosystems.

The preliminary measures in this document are based on proposals from various sectoral institutions and, following a cost-benefit assessment, can be implemented to support the Government and sectors in achieving planned actions within different development plans and the Nationally Determined Contribution (NDC).

This Initial NAP document was prepared in alignment with the requirements of the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC). It outlines priority programs to address identified climate risks and vulnerabilities, including actions focused on reducing sectoral vulnerabilities, capacity building, coordination and oversight, monitoring, and review.

A core principle of Azerbaijan's NAP process is mainstreaming climate change adaptation into relevant sector plans and policies. Efforts to incorporate adaptation have already begun in several sectors, following the "Socio-economic Development Strategy for 2022-2026 of the Republic of Azerbaijan" and other strategic plans.

As the climate change focal point, the Ministry of Ecology and Natural Resources is responsible for coordinating, implementing, and reporting on the NAP. The Ministry advances the NAP process through collaboration with national planning institutions, the Ministry of Finance, sectoral ministries, and stakeholders, including academia, development partners, civil society, media, and the private sector at both national and local levels.

The long-term orientation of the NAP process requires result-oriented monitoring, reporting, and review. This approach will ensure effective process guidance, integration of new insights and lessons, and transparent information for stakeholders.

A review of NAP implementation and adaptation programs will occur every five years, adapting to any contextual changes. The NAP itself will undergo a comprehensive review and update in 2030, with long-term programs revised to reflect shifts in Azerbaijan's economy, development status, policy frameworks, international commitments, and assessed climate-related hazards, vulnerabilities, and risks.

Supported by the GCF/UNDP, "National Adaptation Plan (NAP) Support Project for adaptation planning and implementation in Azerbaijan" also has facilitated the development of Azerbaijan's Initial National Adaptation Plan to enhance climate change adaptation (CCA) measures. This initiative focuses on priority sectors, including water, agriculture, and coastal areas, identified through stakeholder consultations.

Annex 6 describes the initiation of the NAP development process in Azerbaijan. Substantive contributions to the chapter on climate resilience of mountain ecosystems were provided by the United Nations Environment Programme (UNEP). Through the Adaptation at Altitude program, supported by the Swiss Agency for Development and Cooperation, UNEP and its partners are promoting the integration of mountain regions into national and regional policy documents and encouraging regional dialogue and collaboration in the South Caucasus.

INITIAL NATIONAL ADAPTATION PLAN

INTRODUCTION

AZERBAIJAN 2024

1. INTRODUCTION

1.1. Context

1.1.1. Geophysical characteristics

Azerbaijan's geography is marked by a diverse range of biogeophysical features, including mountainous regions, lowland plains, and a long coastline along the Caspian Sea. The country's total land area is approximately 86,600 km², including Pirallahi, Chilov, Boyuk Zira, Garasu, Sangi Mughan and other islands in the Caspian Sea. There are diverse climatic zones ranging from semi-arid and desert-like regions in the central plains to subtropical areas in the south and alpine climates in the mountainous regions.

The country is divided into five geographical regions: four mountainous areas—the Greater Caucasus, Lesser Caucasus, Nakhchivan Autonomous Republic, and Lankaran—and one lowland region, the Kur-Araz or Central Aran.

The Caspian Sea, the largest inland body of water in the world, covers an average area of 370,000 km² and experiences water-level fluctuations of 10-20%. It plays a crucial role in moderating the coastal climate, while the Greater and Lesser Caucasus Mountains influence precipitation patterns and create distinct microclimates in certain areas.

Azerbaijan is situated in a semiarid zone, making it particularly vulnerable to climate change impacts. In the 2024 ND-GAIN Index, Azerbaijan ranked 73rd out of 181 countries. Due to its location in the northern hemisphere, Azerbaijan receives high levels of sunlight and heat. Summers are typically hot and dry.

The terrain of Azerbaijan is highly diverse, dominated by two main landforms—plains and mountains. Approximately 60% of Azerbaijan's territory consists of foothills and mountainous areas. The primary geomorphological units are the Greater Caucasus, the Lesser Caucasus (including the Garabagh Plateau), and the Talysh Mountains, which enclose the Kura-Araz lowland from the north, west, and southeast. The Nakhchivan Autonomous Republic is located around the mid-reaches of the Araz River, bordered by the Zangazur and Daralayaz Mountains.

Azerbaijan's lowest point is along the Caspian coast, lying below sea level at -26.5 meters (mBs), while its highest point is Mount Bazarduzu at 4,466 meters. The Kura-Araz lowland spans the area between the Greater Caucasus, Lesser Caucasus, and Talysh Mountains, forming the largest intermontane lowland in the Caucasus and occupying the central part of Azerbaijan.

Azerbaijan's capital, Baku, is the largest port on the Caspian Sea and serves as a significant economic, scientific, and cultural center in the Caucasus. The Greater Baku area extends across most of the Absheron Peninsula. Baku is particularly vulnerable to the falling levels of the Caspian Sea, which impact coastal infrastructure, industries, ecosystems, transportation routes, and the local fishing industry. As the country's largest urban center, Baku also faces climate-related challenges, including urban heat island effects and increased demand for water and energy.

Climate: Azerbaijan's climate is significantly shaped by its geographical position, terrain, and proximity to the Caspian Sea. Of the 11 global climate types identified by V.V. Köppen, 8 are found in Azerbaijan.

1. Semi-desert and dry desert climate: This climate type primarily occurs in the central lowland regions (areas up to 400 meters in the Kur depression), along the Caspian coast from the Samur River mouth to Kyzylagac Bay, in the plains along the Araz River in the Nakhchivan Autonomous Republic, and in the enclosed mountain depressions of the Talysh region (above 1000 meters). Winters are generally mild, though colder in the Araz plains and the enclosed mountain valleys of Talysh. Summers are hot, with temperatures occasionally exceeding 40°C.

Mild-warm climate with dry winters: This climate is found in the lower mountainous areas of the southern slope of the Greater Caucasus (up to 1000 meters), the Ganikh-Ayrichay depression (200-500 meters), and on the northern and eastern slopes of the Lesser Caucasus (400-1500 meters). Winters are mild with minimal precipitation, while summers are warm to mildly hot.

3. **Mild-hot climate with dry summers:** This climate type primarily occurs in the Lankaran-Astara region. Annual precipitation ranges from 100-150% of potential evaporation, sometimes exceeding it. Winters are mild, summers are warm to hot and dry, and autumns are very rainy. Between May and mid-August, rainfall is scarce, and droughts are frequent, requiring artificial irrigation.

4. **Cold climate with dry winters:** This climate is observed on the northeastern slopes of the Greater Caucasus (1000-2700 meters) and in the mid- to high-altitude regions (1400-2700 meters) of the Lesser Caucasus. Summers are cool, and winters are relatively mild.

5. **Cold climate with dry summers:** This climate characterizes the mid- to high-altitude zones (1000-3000 meters) of the Nakhchivan Autonomous Republic. Winters are cold and snowy, while summers are cool.

6. **Temperate-warm climate with evenly distributed precipitation:** This climate is typical for mountain forest zones on the southern slopes (600-1500 meters) and northeastern slopes (200-500 meters) of the Greater Caucasus. Winters are mild, and summers are warm to hot.

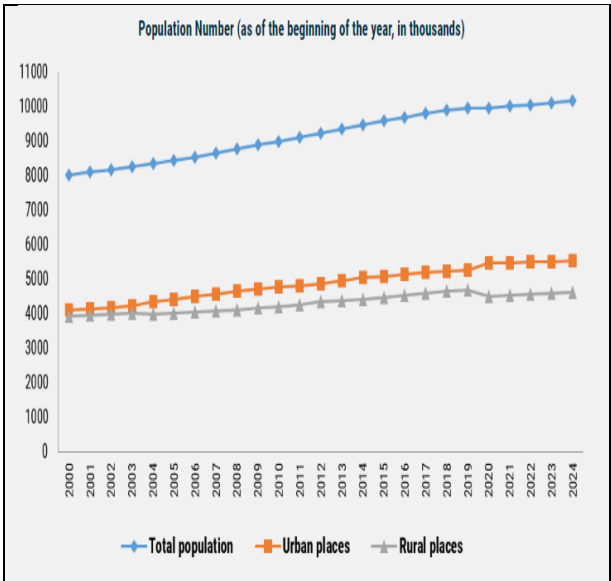
7. **Cold climate with abundant precipitation year-round:** This climate is unique to the southern slopes of the Greater Caucasus (1500-2700 meters), where upper forest areas transition into subalpine and alpine zones. Winters are cold, and summers are cool.

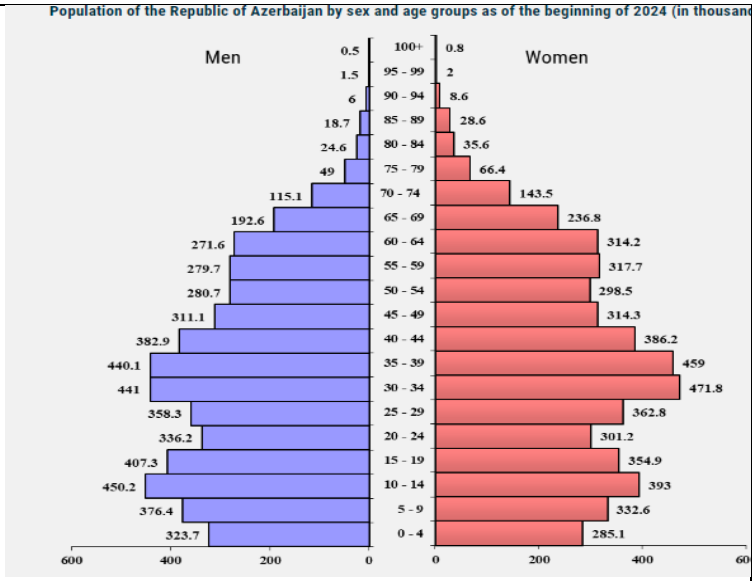
8. **Mountainous tundra climate:** This climate is found in the Greater and Lesser Caucasus above 2700 meters and in the Nakhchivan Autonomous Republic above 3200 meters. Both winters and summers are cold, with some areas retaining snow year-round.

The impacts of climate change—including reduced rainfall, water scarcity, increased droughts, and more intense hazardous hydrometeorological events like floods—pose significant challenges. With a large portion of the rural population dependent on irrigation for crop production, constraints on water resources are becoming increasingly severe.

1.1.2. Population profile

As of January 1, 2024, Azerbaijan's total population stands at 10,180,800. The capital city of Baku houses 23% of the population, with 2,344,900 people, making it the most populous urban center in the country. Urban areas, while key to the economy, are becoming more exposed to climate risks such as higher temperatures and growing infrastructure demands.





Currently, 54.5% of Azerbaijan's population resides in urban areas, primarily in major cities like Baku, Ganja, Sumgayit, and Mingachevir, a figure that is expected to grow in the future. In rural areas, where 45.5% of the population lives and agriculture is the main livelihood, climate change presents significant challenges.

The demographic profile shows a relatively young population, with approximately 60% being under the age of 40. Government reforms and various incentive programs have had positive effects on education and healthcare, resulting in an improved quality of life and increased life expectancy.

The population is projected to grow approximately 6% by 2030.

1.2. Information on Institutional Arrangements and policy

Institutional Arrangements

Azerbaijan has developed a comprehensive institutional framework to assess climate change impacts and facilitate cross-sectoral decision-making.

State Commission on Climate Change was created in 1997 to coordinate the country's commitments under the United Nations Framework Convention on Climate Change (UNFCCC).

In 2020, Azerbaijan renewed the composition of its State Commission on Climate Change, which is coordinated by the Cabinet of Ministers and led by its Deputy Chairman. The commission includes representatives from various ministries and institutions, such as:

- *Minister of Ecology and Natural Resources, Deputy Chairman of the commission*
- *Minister of Finance of the Republic of Azerbaijan*
- *Minister of Economy of the Republic of Azerbaijan*
- *Minister of Agriculture of the Republic of Azerbaijan*
- *Minister of Health of the Republic of Azerbaijan*
- *Deputy Minister of Foreign Affairs of the Republic of Azerbaijan*
- *Minister of Science and Education*
- *Deputy Minister of Emergency Situations of the Republic of Azerbaijan*
- *Head of State Water Resources Agency of the Republic of Azerbaijan*
- *Minister of digital development and transport of the Republic of Azerbaijan*
- *Minister of Energetics of the Republic of Azerbaijan*
- *Deputy Chairman of State Statistics Committee of the Republic of Azerbaijan First Deputy Chairman of Azerbaijan Republic State Urban Planning and Architecture Committee State Oil Company of Azerbaijan (SOCAR) Azerenergy Open Joint Stock Company*

In 2020, the State Commission on Climate Change set below new tasks:

- Enhance organizational capacity to reduce the negative impacts of climate change
- Strengthen inter-organization coordination to optimize water usage
- Increase preparedness and coordination among organizations to reduce natural disaster risks
- Identify and secure financial resources for more effective climate mitigation change
- Develop and implement national and regional programs to mitigate adverse effects of climate changes

Ministry of Ecology and Natural Resources (MENR) is the primary governmental body responsible for formulating and enforcing environmental policies that align with Azerbaijan's commitment to climate resilience. MENR plays a vital role in climate adaptation through policy formulation, environmental monitoring, public awareness, international collaboration and capacity building.

The MENR develops comprehensive national environmental policies that incorporate climate adaptation strategies, ensuring that all sectors are aligned with climate goals and conduct monitoring programs to assess the impact of climate change on ecosystems, biodiversity, and natural resources.

The MENR also facilities public awareness campaigns and educational programs that promote understanding of climate change impacts and resilience strategies, empowering communities to engage in sustainable practices.

International Collaboration is one of the main activity directions of the MENR. The Ministry engages in international environmental agreements and collaborations, enhancing Azerbaijan's capacity to address transboundary climate challenges. MENR also collaborates with local governments and non-governmental organizations to build capacity for effective climate governance. This includes providing training and resources to local officials to strengthen their ability to implement adaptation strategies.

National Hydrometeorology Service of the Ministry of Ecology and Natural Resources plays a crucial role in providing the necessary data and information for climate adaptation efforts by weather forecasting, climate scenario development and management of the early warning systems in Azerbaijan. The service has a climate change centre, which was in charge of developing national climate change communications.

State Water Resources Agency (SWRA) is integral to managing Azerbaijan's water resources, especially in the context of climate adaptation. Sustainable Water Management that ensuring sustainable water resource management practices is one of the main activity directions of the SWRA. SWRA is the key state organization responsible for provision of water supply to the agricultural bodies and amelioration of lands. SWRA oversees water reservoirs, irrigation schemes, distribution channels, and collector-drainage networks across the country. It is also responsible for irrigation projects currently under construction. In most regions, departments managing irrigation channels and collector-drainage networks operate independently under SWRA's oversight.

Ministry of Agriculture (MoA) is a body of executive authority responsible for shaping and implementing state policy in the field of agriculture. The Ministry provides practical support to local executive bodies in carrying out agrarian reforms and holds exclusive authority over breeding, quarantine, and sanitary measures.

The Ministry of Agriculture plays a significant role in promoting modern irrigation technologies in Azerbaijan, where effective irrigation is essential for enhancing productivity and maintaining arable land. In collaboration with state bodies such as the State Agrarian Service Agency, the Ministry runs a broad range of programs focused on sustainable land use and the implementation of water-saving technologies.

The ministry works closely with rural communities to address the specific challenges posed by climate change, promoting localized solutions and building capacity for sustainable farming practices

Ministry of Emergency Situations (MES) is responsible for implementing measures to reduce the risks of natural disasters, flood and flash floods, landslides, avalanche, forest fires, strong winds as well as managing emergency responses and designating emergency zones when necessary.

Regional centers of the Ministry of Emergency Situations (MES) operate across all regions of Azerbaijan. These centers focus on disaster impact mitigation, rescuing people, and reducing incurred losses from various types of disasters. They also engage in proactive risk reduction by raising public awareness and reinforcing infrastructure to reduce vulnerability to natural disasters.

Water User Associations (WUAs) were established in accordance with the law of the Republic of Azerbaijan on Amelioration and Irrigation. The main goals of these associations are to ensure efficient use of irrigation schemes; collect water charges; resolve disputes that arise among water users.

The main challenge for WUAs in the region is their limited material and technical capacity, which restricts their ability to adequately serve the interests of water users.

Local Municipalities

State-owned facilities of local importance located in the municipal lands are under the ownership of the municipalities. The use and management of these facilities is governed by the law of the Republic of Azerbaijan on water economy of municipalities. According to this law, the municipalities can establish water economy enterprises to operate water economy facilities that are in their balance. Municipalities are also responsible for maintaining irrigation systems and collector-drainage networks within their areas. Additionally, they can manage water bodies under their ownership and develop action plans to ensure their protection.

1.3. Legal and Policy Frameworks and Regulations[1]

At the national level, Azerbaijan adopted the "Strategic Roadmap on Social-Economic Development" in 2021, which will allow the country to create a new development model based on short (2025), medium (2030) and long-term measures (post 2030). The Strategic Development Road Maps (SDRM), up to 2025 and beyond, cover eight priority sectors of the economy, including the development of the manufacture and processing of agricultural products, the manufacture of small and medium entrepreneurship-level consumer goods, the oil and gas industry, development of heavy industry and machinery, tourism, logistics and trade, vocational education and training, financial services, communication and information technologies and utilities. However, future consideration of climate change consequences and risks required adequate NAP process on place.

The Strategic Development Road Map for agriculture emphasizes the need for enhanced monitoring and evaluating of CCA, as well as the UNFCCC Technology Needs Assessment (TNA), which highlights the needs in the agriculture and water sectors.

Coastal areas on the other hand are relevant for SDRMs with economic importance around the Caspian Sea, including tourism, logistics and trade. Given the expected increased frequency of extreme events on the Caspian Sea coastal areas, such as extremely high waves, strong winds and flooding, there is a need to develop adaptation programs for those areas. The NAP process will support the development of mechanisms to reduce the negative impacts of climate change, develop policy and implementation measures in accordance with the above programs.

Numerous legislative documents and programs provide a foundation for preparing against the negative effects of climate change. However, there is sufficient information in the legislation on climate change adaptations. Examples of these laws and policies include water, construction and forest codes, land reclamation and environmental agriculture laws, as well as regulatory rules for a few activities. These laws contain sufficient provisions and regulations to reduce the risk of adverse effects of climate change.

Adaptation in legislation and policy documents include rules, regulations and measures that reduce climate change vulnerability risks and increase capacities. The following activities are envisaged in the state programs and strategic road maps:

- Water pricing, water saving Irrigation and irrigation scheduling
- Wastewater recycling and use
- Dryland agriculture and agricultural insurance
- Construction of processing enterprises for agricultural products
- Moving agricultural activities to less hazard-prone zones and crop management
- Strengthening dams around rivers and flood risk zonings, designing retention areas
- Increasing water holding capacity of reservoirs
- Reforestation in basins and improvement of roads
- Construction of infrastructure to reduce water losses in irrigation
- Making paved canals in irrigation network
- Prevention of water wastage, protection of water sources
- Optimization of water use, reduction of flood and flood risks
- Coastal zoning

[1] https://e-qanun.az/

Land code

The Land Code regulates land relations in Azerbaijan and identifies different types of land ownership. The Land Code contains the main provisions on land use, protection, restoration and rational use. According to the Code, land plots under the 20-50-meter coastal strip of the Azerbaijani section of the Caspian Sea cannot be alienated while remaining in state ownership and can be used and leased only for state purposes by the decision of the relevant executive authority. However, the Land Code does not contain any provisions on climate change adaptations and the fluctuations of the Caspian Sea levels.

Water code

The current water code, adopted in 1997, designates Azerbaijan's internal water resources (rivers, lakes, ground water etc.) as national asset. Water Code constitutes the basis of the water legislation and regulates the relations regarding the use of water bodies, their water resources, and their protection. All the water bodies constitute the water endowment of the country. According to the law, the water bodies can be publicly, municipally or privately owned. The public governance in the use and protection of the water bodies which are under the public ownership is exercised by the relevant bodies of executive power within the boundaries of their authorities. Despite its flexibility and modernity, there is no article on climate change adaptation in this code. At the same time, the code does not address the participation of communities and small farmers in water management. Although the Code defines the main executive bodies related to water management, it does not provide for the principles of cooperation between them. No issues related to gender-based water management are considered as well.

Law on Agrarian Insurance

This law regulates the relations related to the insurance of risks in the agricultural sector through a joint insurance mechanism, determines the legal, economic and organizational basis of agricultural insurance.

Agricultural producers are insured against one or more of the following risks on agrarian insurance subjects in accordance with the insurance rules:

- natural disasters.
- fires.
- plant diseases and pests.
- infectious diseases and poisonings.
- attack by wild animals and the spread and attack of especially dangerous pests.

The Law on Agrarian Insurance does not contain a specific reference to climate change, adaptation and possible climate-related risks. However, the law allows for insurance against climate-related natural disasters.

Law on amelioration and irrigation

The Law of the Republic of Azerbaijan on Amelioration and Irrigation is the key document governing amelioration/land reclamation and irrigation activity in the territory of Azerbaijan. According to the law, the amelioration and irrigation systems can be under public, municipal, and private ownership. In this law, the activities of the water user associations, municipalities and executive bodies are regulated in an interrelated manner. All water rights are determined by the state. According to this law, the state retains an exclusive right on the management, distribution and the use of the water resources that are under its ownership. It should be noted that nearly all irrigation systems in the Republic of Azerbaijan are owned by the state. The law also stipulates that irrigation activities must not deteriorate the environmental situation.

However, this law lacks provisions on integrated water management, its significance, and climate change adaptation. It does not address community participation in water governance or consider gender-based aspects of water management. While the law emphasizes the importance of sustainable water resource use, it does not outline specific mechanisms for achieving this, nor does it include any provisions related to climate change and adaptation.

Law on water supply and wastewater

Adopted in 2000, this law aims to regulate the provision of water to the population, enterprises as well as the management of wastewater. According to the law, the Cabinet of Ministers and the local bodies of executive power are key executive bodies.

This law establishes the main water rights and wastewater management rights. Article 5 of the Law envisions the key principles of water supply and wastewater management. Article 6 indicates the main duties of the water supply and wastewater institutions. According to Article 10, the permission to use water is granted by the local bodies of executive power.

This law also does not address climate change adaptation and integrated use of water resources.

Law on water economy of municipalities

Adopted in 2001, this law defines the role of municipalities in managing water economy facilities. According to the law, municipal water facilities include systems and structures for the use, restoration, and protection of water resources not owned by public or private entities or water user associations. Municipalities are authorized to establish and manage water facilities on lands under their ownership and are responsible for operating small water sources within their territories. The law empowers municipalities to oversee water management within their jurisdictions.

In practice, this law functions poorly in Azerbaijan. It lacks provisions for the involvement of small entrepreneurs, farmers, and communities in water management and contains no references to climate change adaptation.

Table 4 provides a comprehensive overview of water legislation that guides and influences agricultural water use in Azerbaijan, along with an assessment of existing laws' climate change-related content.

Law on State of Emergency

The Law on State of Emergency in the Republic of Azerbaijan, adopted in 2004, allows for a temporary state of emergency to be declared across Azerbaijan or in specific regions to protect the country and ensure the security of its citizens. A state of emergency imposes additional responsibilities and a special operational regime on state authorities, administrative bodies, enterprises, departments, organizations, community and civil society organizations, and citizens. The primary aim of a state of emergency is to stabilize the situation promptly, restore citizens' rights and freedoms, and address the consequences of natural, environmental, or other disasters. According to Article 2 of the law, a state of emergency can be declared in response to natural disasters (e.g., floods, landslides), epidemics, epizootics, major environmental accidents, and other similar emergencies.

Town Planning and Building Code

Urban Planning and Building Code of Azerbaijani Republic, adopted in 2012, serves as the main legal document governing construction safety and regulations throughout Azerbaijan. It establishes the principles for all town planning and building activities in Azerbaijan and is the sole document providing a legal framework for structural safety, including for school buildings and coastal areas. The Code also defines the roles of government, municipalities, and companies concerning land use and building activities.

Article 4 and 5 outline main directions of the government policy and authority in the field of urban planning and building. Article 6 addresses the authority of municipalities while Article 9 stipulates principles of fire and environmental safety of constructions and buildings.

Article 60 mandates that all the material used in buildings must be fire-resistant and reliable to prevent the spread of fires. Articles 61 specifies that walls, doors, ceilings and floors should be constructed from fire resistant materials and provide easy fire compartmentalization. Additionally, fire compartments must be easily accessible during a fire. Article 62 requires that stairways are accessible and usable during emergency evacuations, and Article 54 stipulates that all construction materials must be certified in line with relevant standards. The Code does not contain specific provisions on climate change adaptation or potential climate-related risks.

Law on Fire Safety

Law on Fire Safety provides legal ground for non-structural and structural fire safety of all types of buildings, including historical buildings, private houses, schools etc. The current law on fire safety was adopted in 1997. The law determines legal ground and principles of state fire protection and control. The law is enforced for the provision of fire protection on the territory of the Azerbaijan Republic of human life and health, national treasures, all types of property.

Article 9 of the Law on Fire Safety designates the State Fire Service as the primary governmental body responsible for ensuring fire safety across all types of buildings. Article 5 outlines the functions of relevant authorities concerning fire safety. According to this article, related executive bodies have the following responsibilities:

- ✓ Implement fire safety measures in buildings, schools, enterprises and managed areas
- ✓ Establish and support fire service teams within workplaces and schools
- ✓ Organize fire safety awareness campaigns and educate the public on fire prevention
- ✓ Provide strict compliance with norms, standards and regulations of fire safety by government authorities, enterprises and organizations as well as citizens
- ✓ Develop and oversee the execution of fire safety measures
- ✓ Conduct fire safety training and increase public awareness of fire prevention measures.

The Law does not contain a specific reference to climate change, adaptation and possible climate-related risks.

The Law on Civil Defense

The Law on Civil Defence, adopted in 1997, establishes the legal framework and principles of civil defence in the Republic of Azerbaijan, regulating public responsibilities in this area. According to Article 5, the goal of civil defence is to implement preventive measures to avert emergencies, minimize potential damage and losses, and mitigate emergencies and their consequences.

Article 6 defines the responsibilities of the state, companies, communities and individuals regarding civil defence. It mandates that all relevant parties work to minimize the impacts of emergencies.

Article 11 mandates that the Ministry of Emergency Situations in Azerbaijan is responsible for raising public awareness on population protection. However, the law does not specifically address climate change adaptation or potential climate-related risks.

The Law on the Protection of the Environment

The Law on the Protection of the Environment, adopted in 1999, provides the legal, economic, and social foundations for environmental protection in Azerbaijan. One of the law's key goals is the efficient use of

natural resources, establishing principles for their sustainable use and restoration. Article 10 mandates that the relevant executive authority set thresholds for natural resource usage and manage the disposal of harmful substances, household waste, and industrial byproducts into the environment.

The law outlines the rights and responsibilities of the state, local self-governing bodies, citizens, and public unions in environmental protection. While it does not specifically address children, it recognizes the right of all people to a clean environment. Although the law does not reference climate change adaptation or climate-related risks explicitly, several of its prescribed activities can be interpreted as adaptation measures.

The Law on Environmental Safety

The Law on Ecological Safety, enacted in 1999, provides comprehensive guidelines for protecting the public from natural and human-made hazards. It specifies the rights and responsibilities of the state, local authorities, individuals, and public organizations, as well as guidelines for information generation, dissemination, and ecological safety requirements. The law establishes a legal framework to safeguard the lives and health of citizens and protect environmental resources. Under the law, the state and local authorities are responsible for reducing environmental risks and addressing the consequences of environmental disasters.

While the law does not specifically reference climate change adaptation or climate-related risks, several of its provisions can be interpreted as adaptation activities.

Forest code

The Forest Code, adopted in 1997, establishes the legal framework for the management, protection, restoration, and use of Azerbaijan's forests, shrublands, and forest soils. It identifies forest resources as shared national wealth and forms the foundation of forest legislation, aiming to balance forest resource use with conservation. All forests in Azerbaijan constitute the national forest fund. The Code does not provide opportunities for private sector or local community participation in forest management. Although it does not specifically address climate change adaptation or climate-related risks, several activities outlined in the Code can be considered adaptation measures.

Laws of Azerbaijani Republic on Municipalities

Laws of Azerbaijani Republic on Municipalities (e.g. law on Water Economy of Azerbaijan) designates municipalities as the main institutions responsible for disaster risk reduction (DDR) activities on municipal lands. According to law, hazard risks can be reduced by joint efforts of municipalities, communities and governments. Law on Management of municipality lands stipulate that municipality lands should be managed effectively this management should not cause high hazard risks. Although these laws do not contain specific provisions on climate change and adaptation, disaster protection activities can be considered as adaptation activities.

Orders and decrees of the President of Azerbaijan[2]

In addition to laws and regulations, there are Presidential decrees and decisions of the Cabinet of Ministers that include climate change adaptation (CCA) are listed below. Although many of these rules and regulations

[2] President.az

contain provisions to adapt and reduce the risk of natural disasters, there are no specific "reminders" of climate change and adaptation.

- Decree of the President of the Republic of Azerbaijan on approval of the "Regulations on the Electronic water economy information system", 13.02.2021, N1289
- Order of the President of the Republic of Azerbaijan "On additional measures to ensure the efficient use of water resources", 27.08.2020, N2178
- Order of the President of the Republic of Azerbaijan "On improvement of water supply management in the Republic of Azerbaijan", 11.06.2004, N 252
- Decree of the President of the Republic of Azerbaijan "On measures to improve management in the field of amelioration and water economy", 23.02.2006, N 372
- Order of the Republic of Azerbaijan "On privatization of small hydropower plants", 21.12.2001, N 844
- Order of the President of the Republic of Azerbaijan "On measures to improve the supply of irrigation water to arable lands and to meet the needs of the population for drinking water" 15.05.2013, N2894
- Order of the President of the Republic of Azerbaijan "On measures to improve the supply of irrigation water to arable lands and to meet the needs of the population for drinking water", 05.06.2017, N2962
- Order of the President of the Republic of Azerbaijan "On measures to combat the harmful effects of mudflows and floods and eliminate the emergency situation", 03.08.2018, N384
- Decision of the Cabinet of Ministers of the Republic of Azerbaijan on the "Rules of state accounting of waters," 17.01.2000, N7
- "Rules for determination of water protection zones, their coastal protection strips, sizes, borders and use" Decision of the Cabinet of Ministers of the Republic of Azerbaijan, 24.03.2000, N56
- "Regulations on the rules of paid water use in the Republic of Azerbaijan" Decision of the Cabinet of Ministers of the Republic of Azerbaijan, 18.03.2006, N84
- "Rules for exercising state control over the use and protection of water bodies", Decision of the Cabinet of Ministers of the Republic of Azerbaijan, 25.09.1998, N195
- "Rules of standardization in the field of use and protection of water objects", Decision of the Cabinet of Ministers of the Republic of Azerbaijan, 15.10.1998, N206
- "Preparation and implementation of water use limits" Decision of the Cabinet of Ministers of the Republic of Azerbaijan, 15.10.1998, N206
- "Development, coordination, state examination, approval and implementation of schemes of combined use and protection of water resources", Decision of the Cabinet of Ministers of the Republic of Azerbaijan, 15.10.1998, N206
- "Rules for approval of internal water use plans and general system plans for water use", Decision of the Cabinet of Ministers of the Republic of Azerbaijan, 15.10.1998, N206
- "On the rules of maintaining the state water cadastre", Decision of the Cabinet of Ministers of the Republic of Azerbaijan, 05.12.1995, N261
- "Rules of water use", Decision of the Cabinet of Ministers of the Republic of Azerbaijan, 17.08.2014, N262
- "Rules for approval of the annual water economy balance for the Republic", Decision of the Cabinet of Ministers of the Republic of Azerbaijan, 03.05.2019, N208
- "Rules for construction, operation and maintenance of telecommunication facilities and facilities in the border areas of the Republic of Azerbaijan, including border rivers, in the Azerbaijani part of the

Caspian Sea (lake)", Decision of the Cabinet of Ministers of the Republic of Azerbaijan, 06.01.2006, N3

- "Rules for Determining and Using Flood Zones, Their Size, and Boundaries" (July 27, 2004 № 99)
- State Protection Rules for Historical and Cultural Monuments (August 2, 2001, №132).
- Regulations on state regulation of land use and use (October 23, 2003, 75975).
- Regulations on Monitoring of the Environment and State Natural Resources (July 1, 2004, №90).
- Regulations of the State Committee for Urban Planning and Architecture of the Republic of Azerbaijan (November 9, 2007, №647).
- Rules for the gradual implementation of state control in the field of construction by the Ministry of Emergency Situations of the Republic of Azerbaijan (December 6, 2008, №273).
- Rules of state control over the use and protection of lands (November 28, 2000, №421).
- Rules for maintaining the State Land Cadastre (June 7, 1999 №94).
- Rules for the use of lands intended for railway transport and lands belonging to the special protection zone of the railway (February 23, 2005, №33).
- Rules for issuing permits for engineering and agricultural works on lands exposed to exogenous geological processes (May 1, 2000, №79).
- General bases and principles of land zoning (May 1, 2000, №79)
- Decision of the Cabinet of Ministers of the Republic of Azerbaijan on approval of "Types of protection measures and their application in areas with high probability of occurrence of potentially dangerous natural and man-made events" (February 6, 2017 № 31)
- Decision of the Cabinet of Ministers of the Republic of Azerbaijan on additional measures to identify landslide-prone areas and restrict construction work in these areas (March 5, 2015 № 56)

Towards Green Energy

A clean environment and "green energy" development have been identified as priority directions in Azerbaijan.

"Azerbaijan 2030: National Priorities for Socioeconomic Development", approved by the President of the Republic of Azerbaijan dated February 2, 2021, constitutes the strategic basis of policies on the protection of environmental balance and renewable energy production in the country. Important goals have been set in the direction of one of the five National Priorities – becoming a country of clean environment and "green growth".

Azerbaijan has substantial renewable energy potential, estimated at 27,000 MW, including 3,000 MW of wind energy, 23,000 MW of solar energy, 380 MW of bioenergy, and 520 MW of hydropower generated by mountain rivers.

Law No. 339-VIQ of the Republic of Azerbaijan "On the Use of Renewable Energy in the Production of Electricity" was adopted on May 31, 2021 to advance Azerbaijan's renewable energy sector and improve the legislative and institutional framework in this field.

Azerbaijan is a reliable and responsible member of the international community in the tackling the consequences of global climate change. Our country has set the goal of reducing greenhouse gas emissions by 35 percent by 2030 compared to the base year (1990) as a contribution to initiatives to mitigate the effects of global climate change.

In November 2021, at the COP26 Conference, our country made a new commitment to reduce emissions by 40 percent by 2050 and to create a "net zero emission" zone in the liberated territories.

In this regard, the Nakhchivan Autonomous Republic, and Garabagh and East Zangazur regions liberated from occupation have been declared a “green energy” zone. Activities on environmental protection and restoration of the ecosystem have been identified as one of the primary goals in the process of restoration and reconstruction of liberated territories.

According to the Decree of President of the Republic of Azerbaijan Ilham Aliyev “On Measures Related to the Establishment of a Green Energy Zone in liberated territories of the Republic of Azerbaijan” dated May 3, 2021, a Concept has been developed in cooperation with Japan’s “TEPSCO” and relevant measures have been initiated.

Currently, Azerbaijan's total electricity generation capacity is 8,320.8 MW, with the capacity of renewable energy, including major hydropower plants, of 1,687.8 MW, which accounts for 20.3 percent of the total capacity. By 2030, the main goal is to increase this figure to at least 30 percent.

Several initiatives are underway to evaluate and realize the potential for electricity generation using renewable energy sources. Starting from 2020, cooperation documents have been signed with “Masdar”, “ACWA Power”, bp, “Fortescue Future Industries”, “China Gezhouba Group Overseas Investment”, “TotalEnergies”, “Nobel Energy”, “A-Z Czech Engineering”, and “Baltech”.

On January 13, 2022, a groundbreaking ceremony was held for the 240 MW “Khizi-Absheron” Wind Power Plant. On October 26, 2023, the opening ceremony took place for the 230 MW “Garadagh” Solar PV Plant, the largest renewable energy station in the Caucasus and Caspian regions.

On December 17, 2022, the “Agreement on a Strategic Partnership in the field of Green Energy Development and Transmission between the Governments of the Republic of Azerbaijan, Georgia, Romania and Hungary” was signed in Bucharest.

Regular meetings of ministers have been held since the ninth Southern Gas Corridor Advisory Council Ministerial Meeting and the first Green Energy Advisory Council Ministerial Meeting. Under the agreement, green energy produced in the Caspian Sea will be exported to Europe through the “Caspian-Black Sea-Europe” Green Energy Corridor.

On February 3, 2023, the 9th Southern Gas Corridor Advisory Council Ministerial Meeting and the 1st Green Energy Advisory Council Ministerial Meeting were held in Baku.

On March 1, 2024, the 10th Southern Gas Corridor Advisory Council Ministerial Meeting and the 2nd Green Energy Advisory Council Ministerial Meeting were held in Baku. On December 11, 2023, the decision was made to hold the 29th session of the Conference of the Parties to the UN Framework Convention on Climate Change, COP29, in Azerbaijan on November 11-22, 2024. This is a clear example of the international community's great respect for and confidence in Azerbaijan.

Furthermore, the year 2024 has been declared the “Green World Solidarity Year” in the Republic of Azerbaijan by a decree of the President of the Republic of Azerbaijan dated December 25, 2023.

INITIAL NATIONAL ADAPTATION PLAN

CURRENT CLIMATE CHANGE

AZERBAIJAN 2024

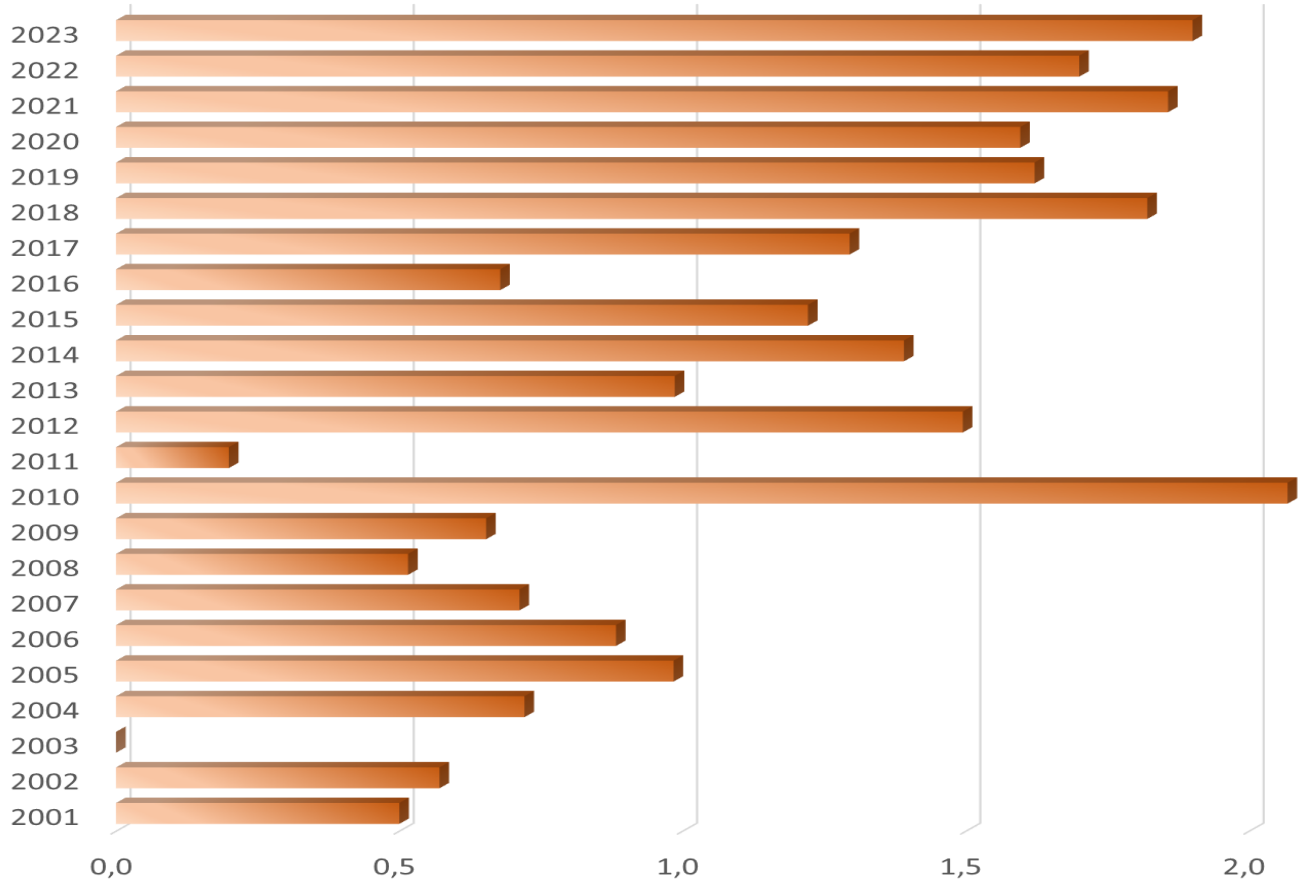
2. CURRENT CLIMATE CHANGE

2.1. Temperature

In recent decades, climate change has led to rising air temperatures across the entire country, with temperature anomalies varying by season and region. For instance, the number of frosty days in winter has decreased, a trend most noticeable in mountainous areas.

In the period covering the years 2000-2023, the average annual temperature is 14.7 °C in Kura-Araz, 10.6 °C in the foothills and below 0 °C in the highlands, the absolute maximum temperature in Nakhchivan (Julfa) is +46 °C (02.08.2000), the absolute minimum temperature in Nakhchivan (Julfa) is −30 °C (28.12.2022).

Annual average temperature anomaly



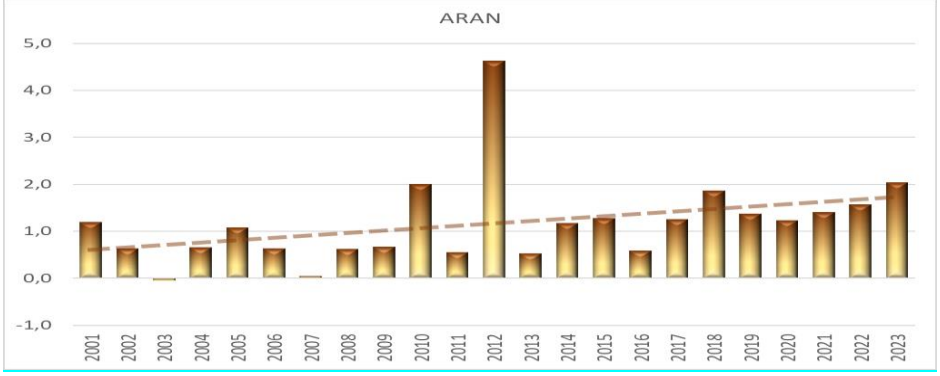
In Azerbaijan, the temperature anomaly across the country over the past 23 years has been 1.1^{0}C. In 2023, the average temperature reached 14.6^{0}C. This is 1.9 degrees higher than the norm for years 1971-2000 (12.7^{0}C). The highest average temperature in recent decades was 14.8°C in 2010

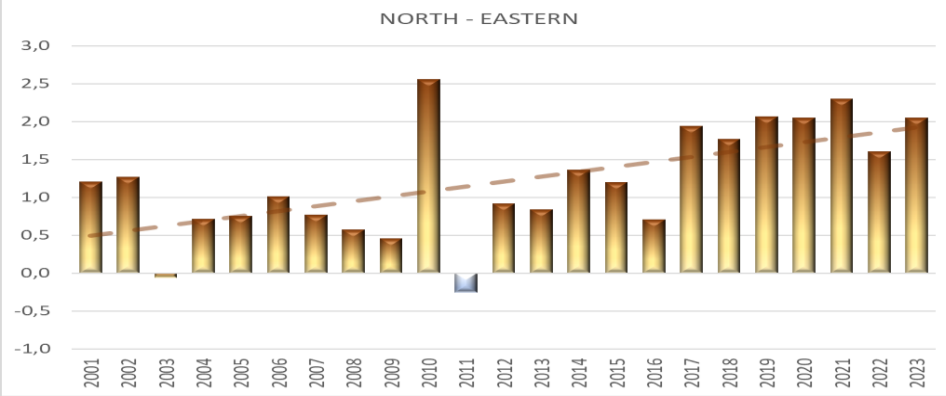
Considering the country's varied relief, average annual temperature and precipitation anomalies were calculated for 8 regions with distinct climatic conditions (Aran, North-East, North-West, Mountainous-Shirvan, West, South, Absheron and Nakhchivan AR) based on data from 35 hydrometeorological stations.

For period of 2001-2023 the average temperature anomaly in Aran region was +1.0°C, (compared to the 1971-2000)

The highest average temperature anomaly in region was 4.6°C in 2012

The highest anomaly was observed in 2012 +6.7°C Zardab, +5.8°C Mingachevir





For period of 2001-2023 the average temperature anomaly in north-eastern region was +1.2°C, (compared to the 1971-2000)

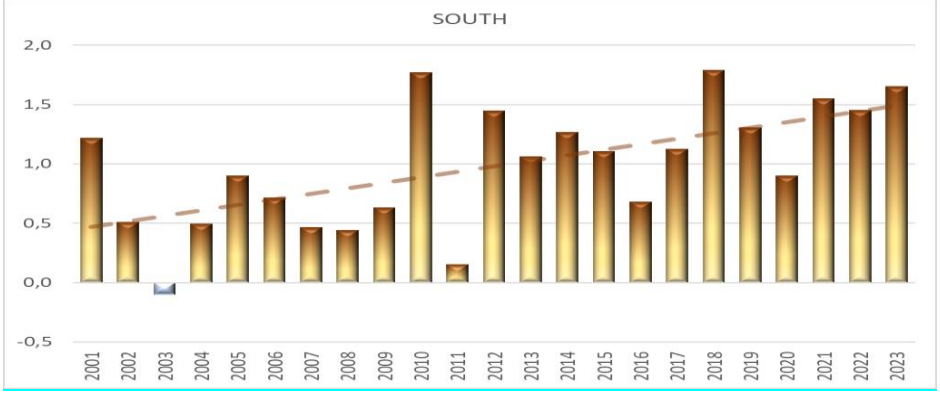
The highest average temperature anomaly in region was 2.6°C in 2010

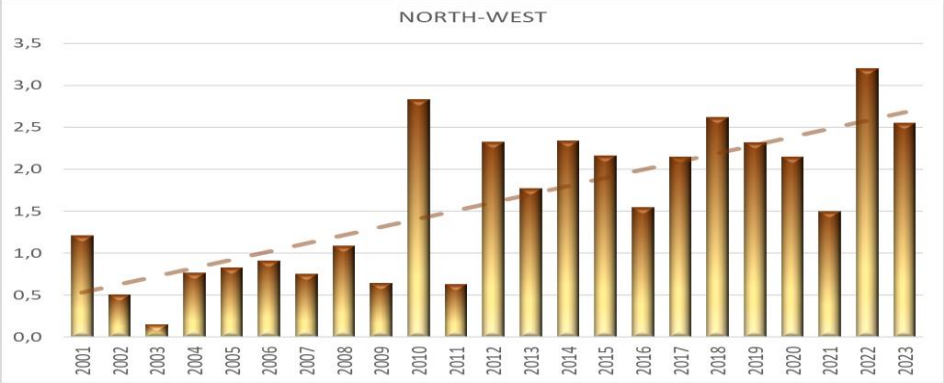
Highest anomaly was observed in 2010 +2.3°C Guba, 2023 +3.3°C Gyryz.

For period of 2001-2023 the average temperature anomaly in southern region was +0.8°C °C, (compared to the 1971-2000)

The highest average temperature anomaly in region was 1.8°C in 2010 and 2018

Highest anomaly was observed in 2010 +1.9°C Lankaran, 2018 +1.9°C Bilasuvar





For period of 2001-2023 the average temperature anomaly in north-west region was +1.6°C, (compared to the 1971-2000)

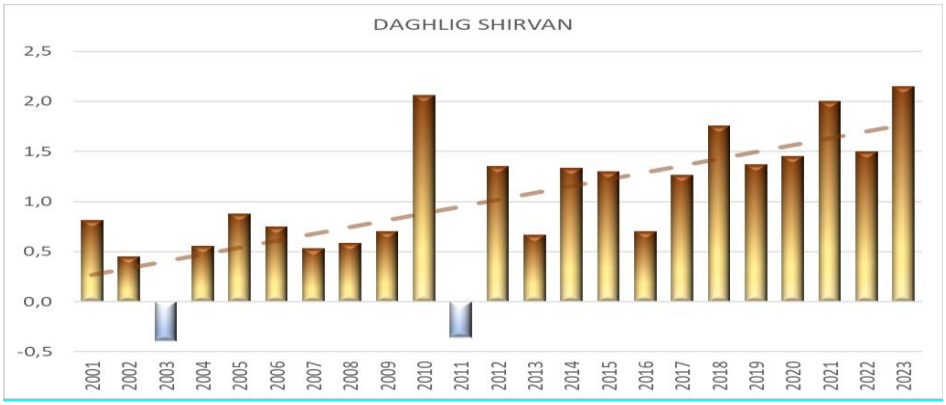
The highest average temperature anomaly in region was 3.2°C in 2022

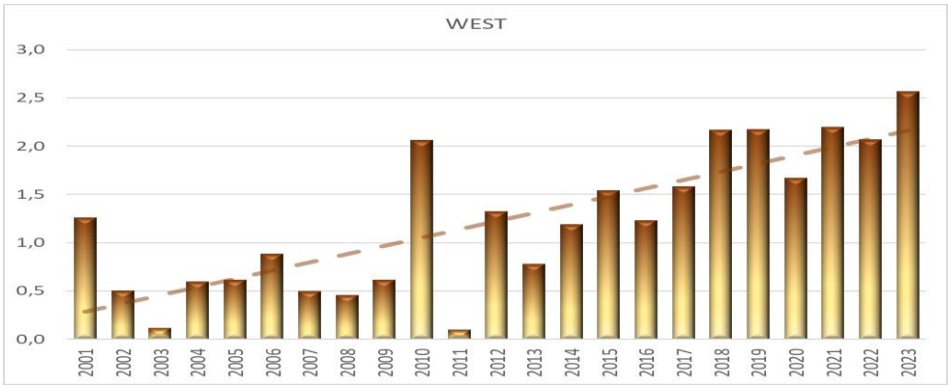
Highest anomaly was observed in 2022 +3.8°C Shaki.

For period of 2001-2023 the average temperature anomaly in Daghlig Shirvan region was +1°C, (compared to the 1971-2000)

The highest average temperature anomaly in region was 2.2°C in 2023

Highest anomaly was observed in 2023 +2.2°C Maraza.





For period of 2001-2023 the average temperature anomaly in western region was +1.1°C, (compared to the 1971-2000)

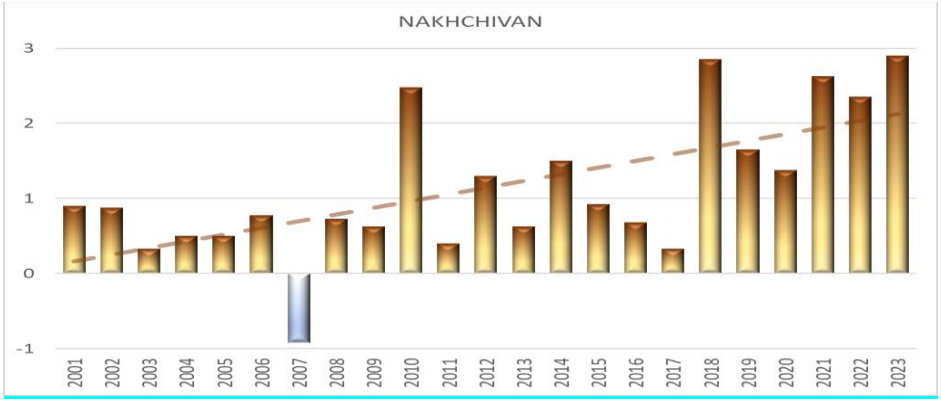
The highest average temperature anomaly in region was 2.6°C in 2023

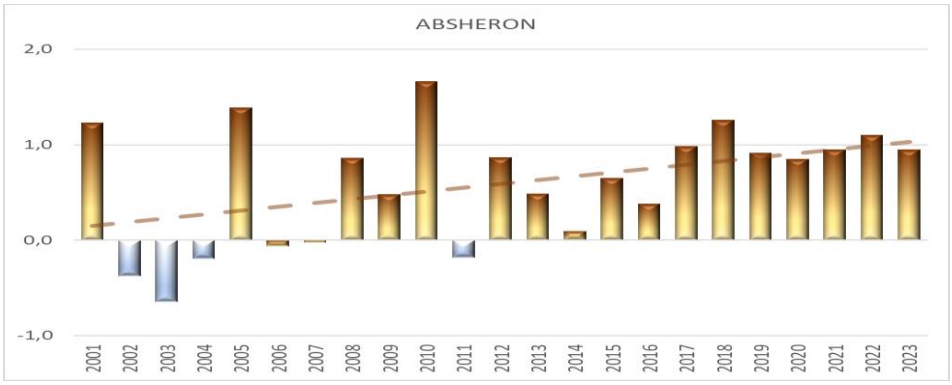
Highest anomaly was observed in 2019 +2.6°C Gadabay, 2018 +2.1°C Ganja, 2021 +2.8°C Akhstafa.

For period of 2001-2023 the average temperature anomaly in Nakhchivan AR was +1.1°C, (compared to the 1971-2000)

The highest average temperature anomaly in region was 2.9°C in 2023

Highest anomaly was observed in 2018 +2.9°C Nakhchivan, 2010 +3.5°C Shahbuz, 2021 +3.8°C Sharur, and 2023 +4°C Julfa.



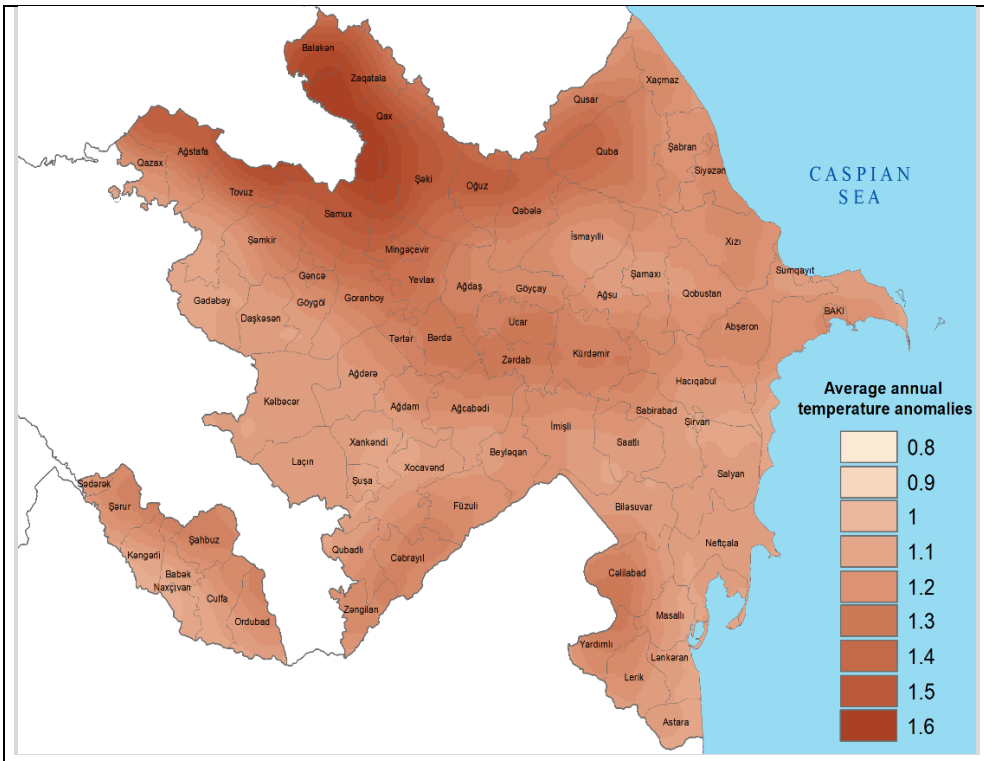


For period of 2001-2023 the average temperature anomaly in Absheron was +0.6°C, (compared to the 1971-2000)

The highest average temperature anomaly in region was 1.7°C in 2010

Highest anomaly was observed in 2018 +1.8°C Baku, 2005 +4°C Alat.

Average annual temperature anomalies for 2001-2023 yr. were analyzed



The air temperature anomaly in most parts of the country varies between positive 0.9-1.2^{0}C

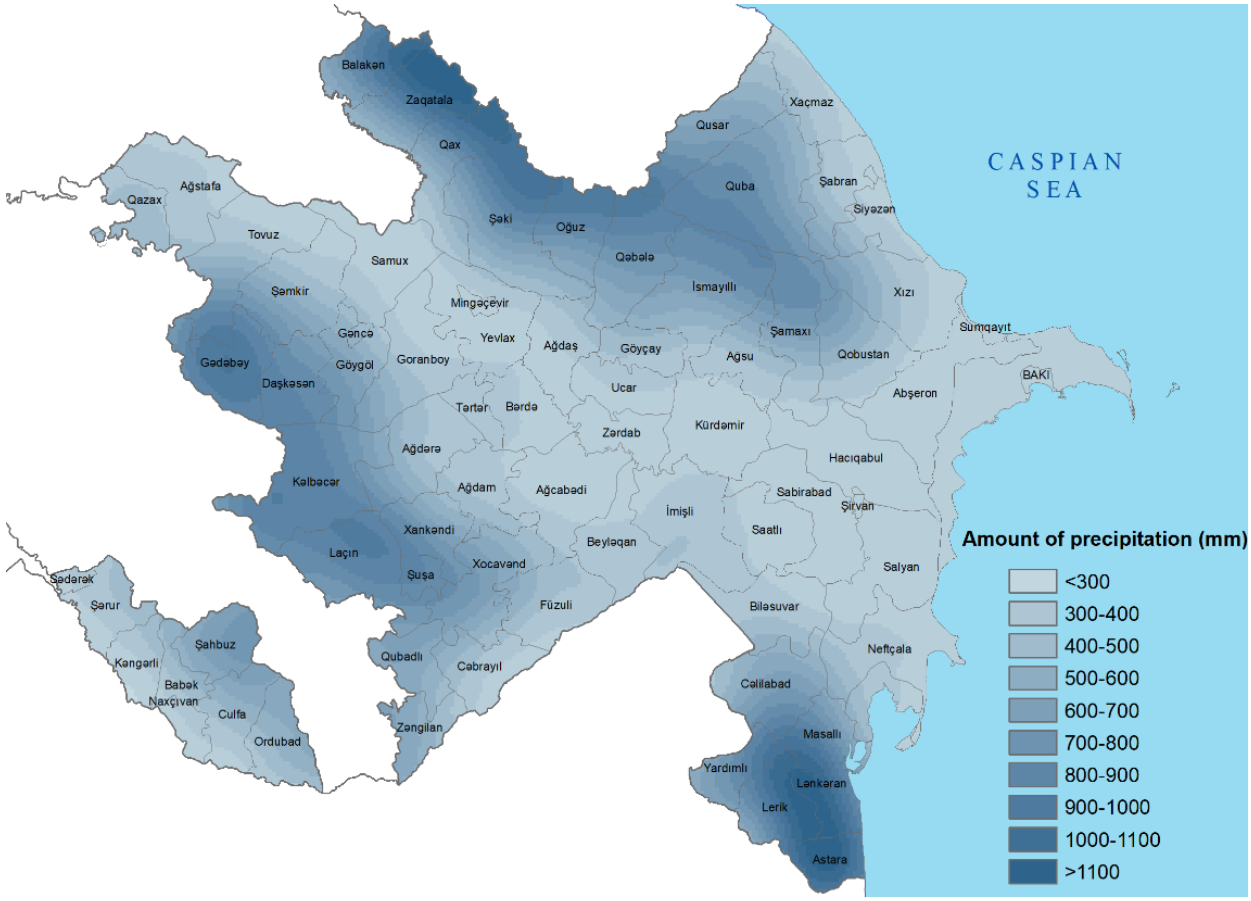
The highest positive anomaly is observed in the northwestern region of 1.3-1.6 ^{0}C

The least positive anomaly is observed in coastal areas of 0.6-0.9 ^{0}C.

2.2. Precipitation

Recent decades are characterized by an increase in precipitation extremes. It is also distinguished by its contrasting distribution in time and space: when there is a drought in one part of the country heavy rains cause floods in another part.

Average amount of precipitation for the country during 2001-2023 years



In the last two decades, the multi-year average amount of precipitation was 464 mm.

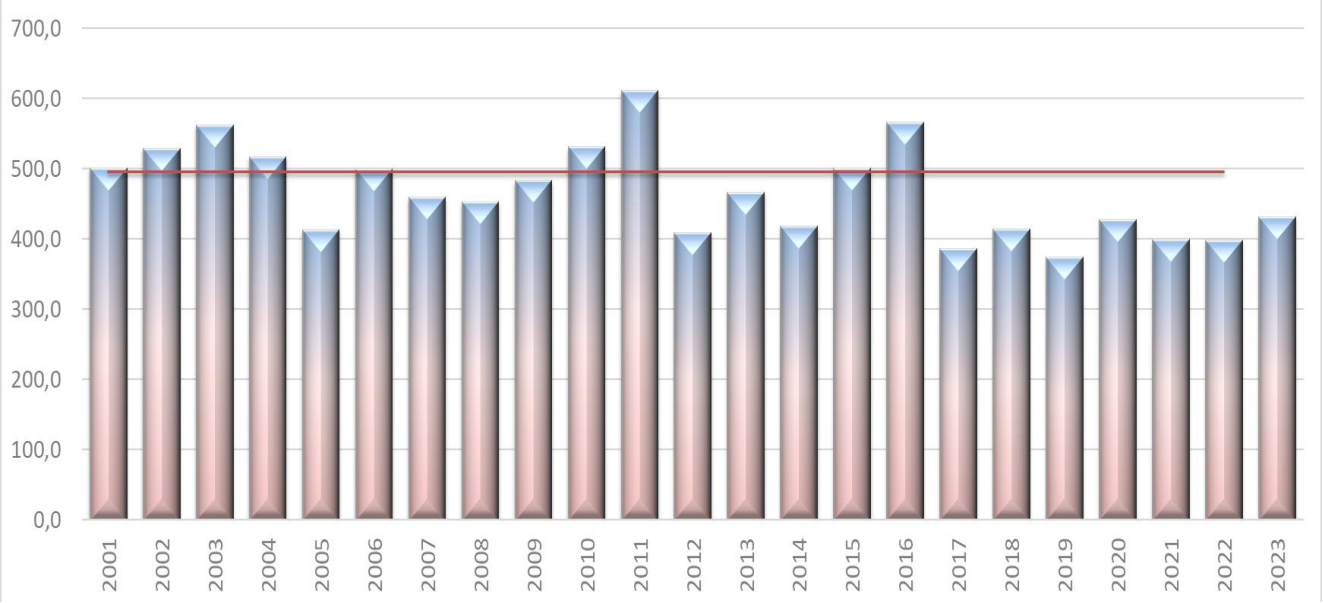
In the territory of Azerbaijan, the least average annual precipitation falls in southeastern Gobustan.

The amount of annual precipitation is less than 300 mm in the Kura-Araz plain, the plains along Araz river in Nakhchivan MR, and the Absheron peninsula. The amount of precipitation gradually increases from the plains to the mountains.

Precipitation in the mountains increases from sea level to a certain height (2600–2800 m in the Greater and Lesser Caucasus, 2600–3000 m in Nakhchivan MR) and then gradually decreases. The maximum amount of annual precipitation in these areas is 1400–1600 mm on the southern slope of the Greater Caucasus, 800 mm on the north-eastern slope, 800-900 mm in the Lesser Caucasus and Nakhchivan MR.

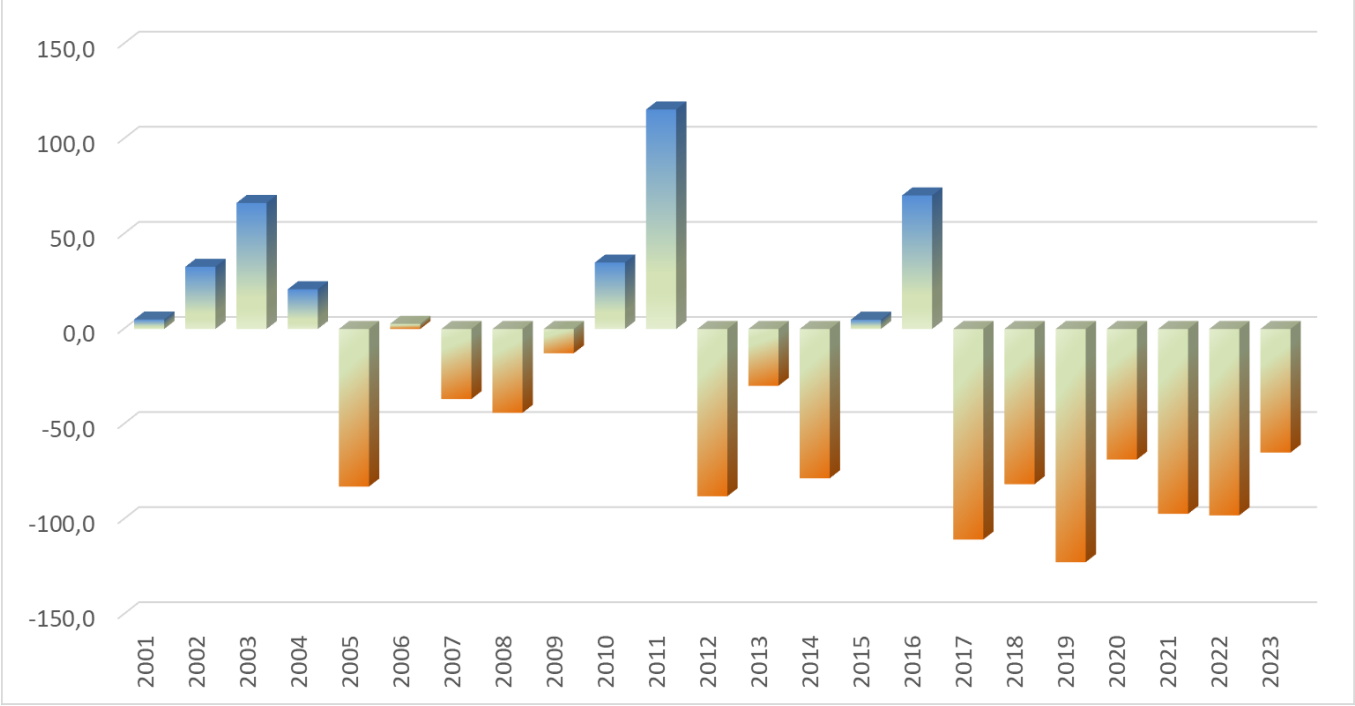
Unlike other mountainous areas of the republic, the amount of precipitation increases to 1700-1800 mm in Talysh mountains within elevation zones 200-600 m height, and then decreases to 700-900 mm by increase of height.

Amount of annual precipitation



Over the past 23 years, precipitation across the country has decreased by 6.3% compared to the 1971-2000 norm (493 mm). Over the past 13 years, this decrease has been 10%.

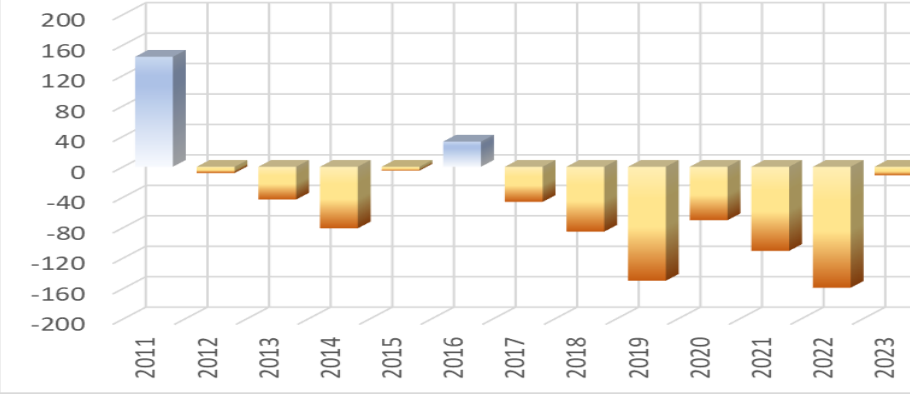
Average precipitation anomalies

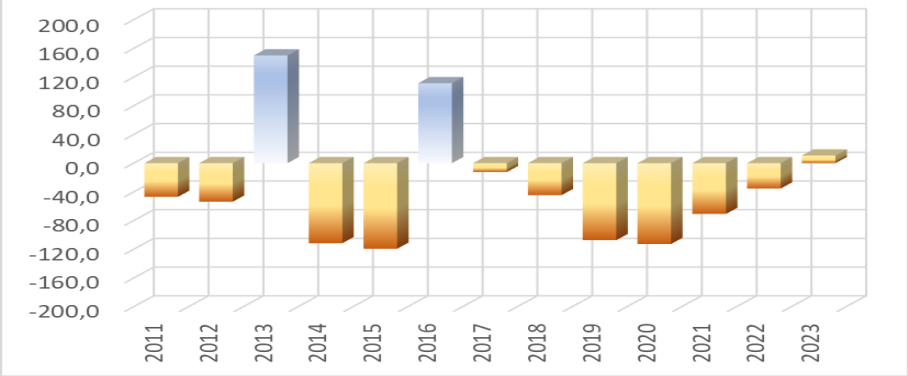


Over the past 23 years, the average precipitation anomaly in the country was 30.4 mm compared to the 1971-2000 norm. The largest precipitation anomaly was a decrease of 122 mm in 2019.

Over the past 13 years, the average amount of precipitation in the Aran region has decreased by 45.5 mm, which is 13.5% of the 1971-2000 norm (333.2 mm).

The highest anomaly in region was -159 mm in 2022, which is 47.7% of the 1971-2000 norm (333.2 mm).



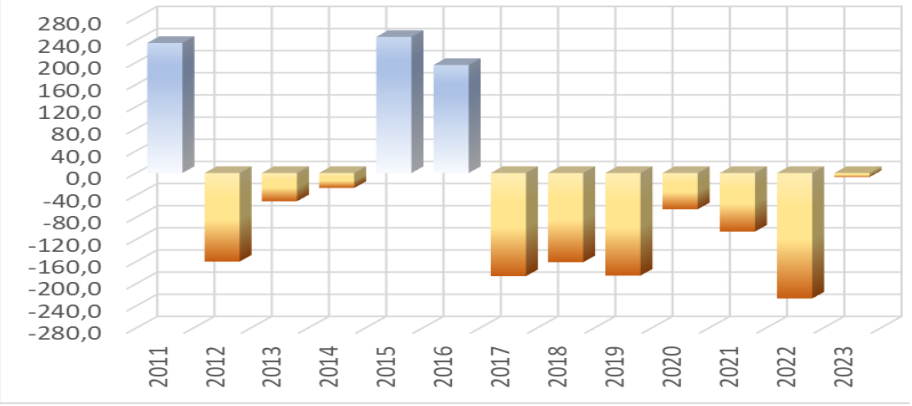


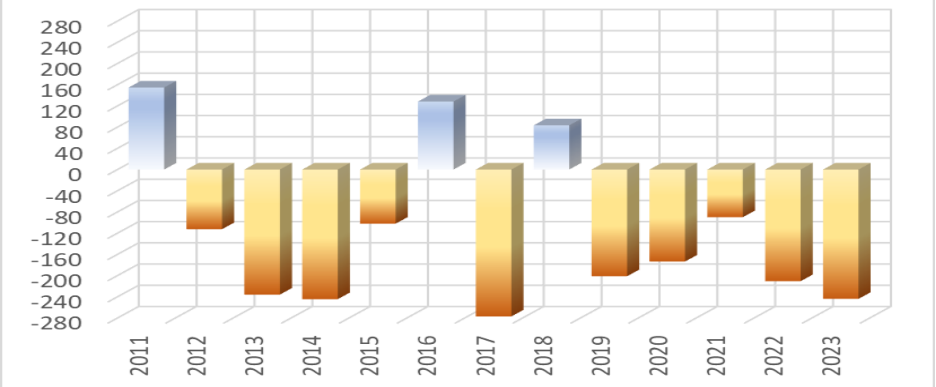
Over the past 13 years, the average amount of precipitation in the north-east region has decreased by 34 mm, which is 6.5% of the 1971-2000 norm (528.7 mm).

The highest anomaly in region was -119.4 mm in 2015, which is 22.6% of the 1971-2000 norm (528.7 mm).

Over the past 13 years, the average amount of precipitation in the Southern region has decreased by 38.5 mm, which is 5.2% of the 1971-2000 norm (735 mm).

The highest anomaly in region was -226.7 mm in 2022, which is 30.8% of the 1971-2000 norm (735 mm).



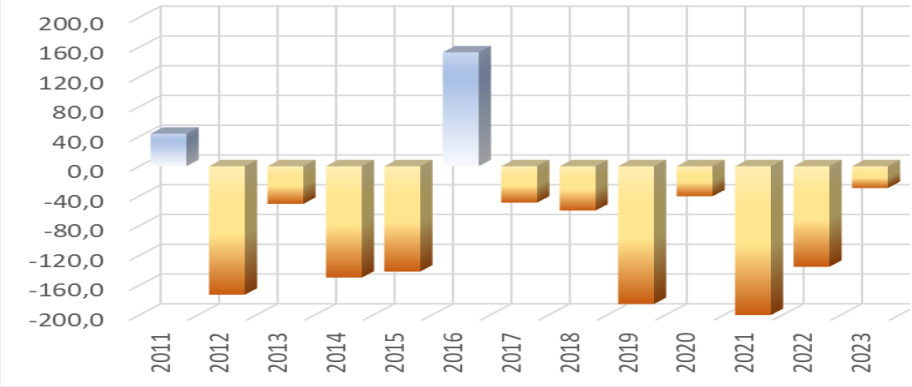


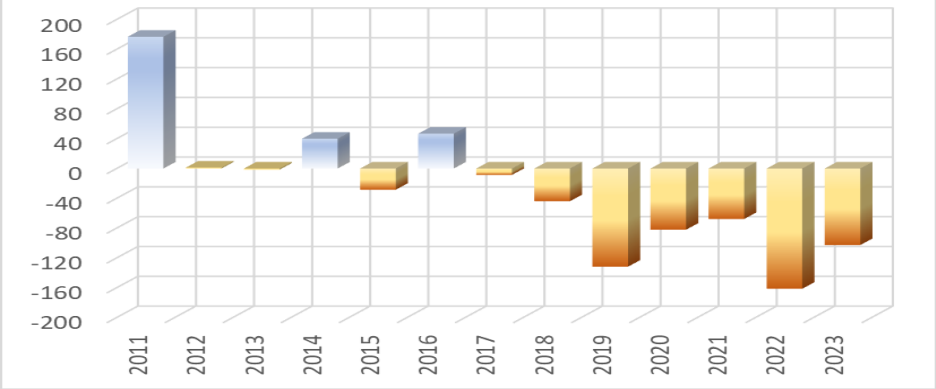
Over the past 13 years, the average amount of precipitation in the north-west region has decreased by 117 mm, which is 12.9% of the 1971-2000 norm (908 mm).

The highest anomaly in region was -277.1 mm in 2017, which is 30.5% of the 1971-2000 norm (908 mm).

Over the past 13 years, the average amount of precipitation in the Daghlig Shirvan region has decreased by 80 mm, which is 16% of the 1971-2000 norm (497 mm).

The highest anomaly in region was -226.6 mm in 2021, which is 45.6% of the 1971-2000 norm (497 mm).



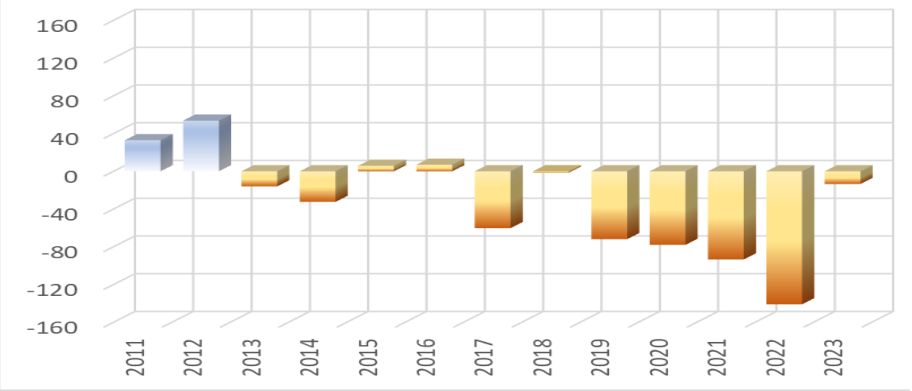


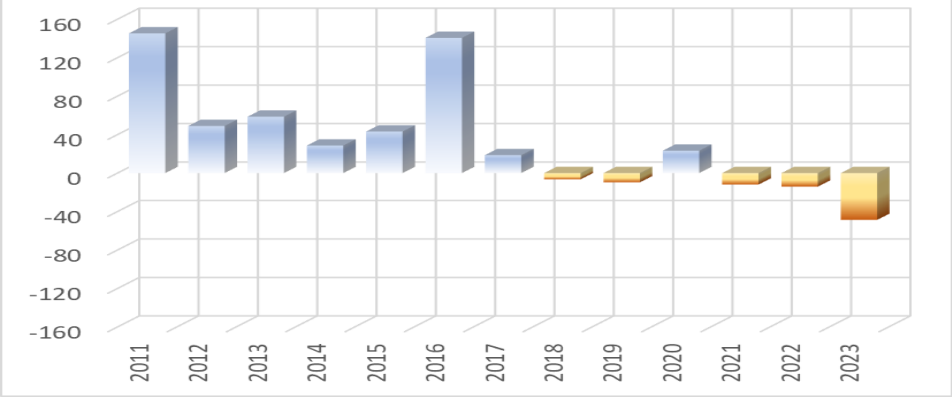
Over the past 13 years, the average amount of precipitation in the Western region has decreased by 28 mm, which is 6.5% of the 1971-2000 norm (427 mm).

The highest anomaly in region was -161.4 mm in 2022, which is 37.8% of the 1971-2000 norm (427 mm).

Over the past 13 years, the average amount of precipitation in the Nakhchivan AR has decreased by 31 mm, which is 11% of the 1971-2000 norm (280 mm).

The highest anomaly in region was -141 mm in 2022, which is 50% of the 1971-2000 norm (280 mm).

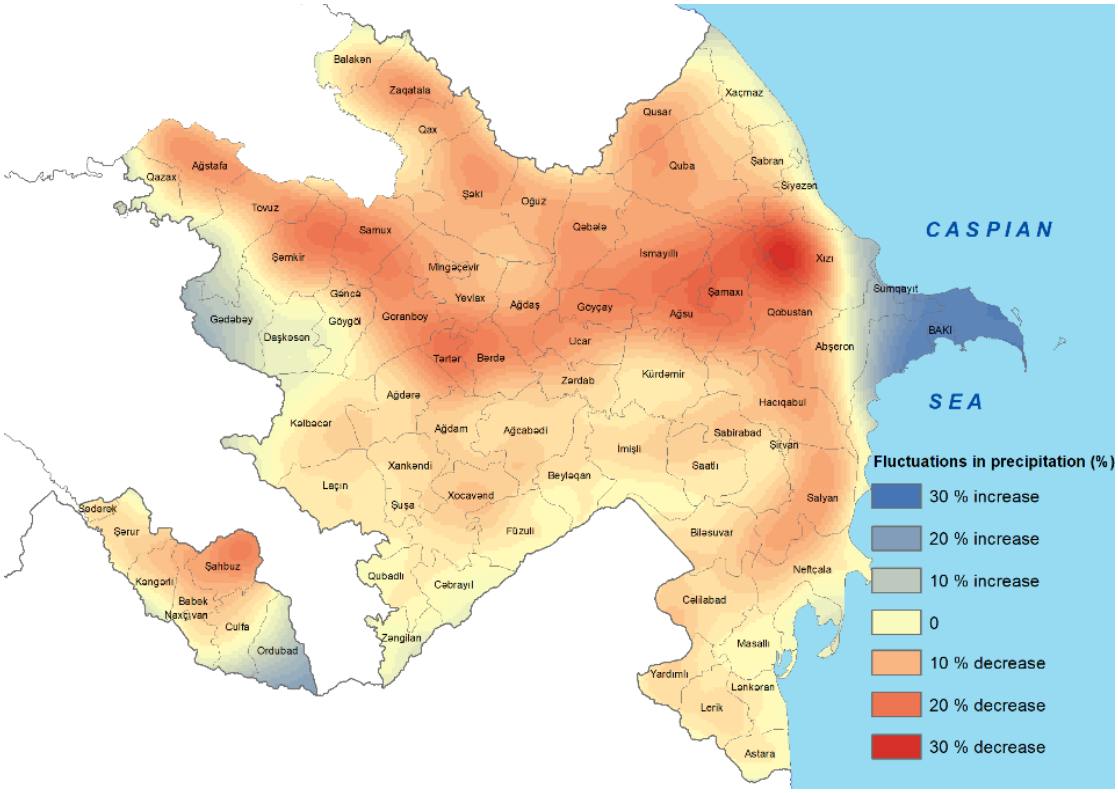




Over the past 13 years, the average amount of precipitation in the Absheron region has increased by 32 mm, which is 14% of the 1971-2000 norm (229 mm).

The highest anomaly in region was -48.7 mm in 2023, which is 21.3% of the 1971-2000 norm (229 mm).

The map below illustrates the precipitation trends across the country over the past 23 years, (compared to the 1971-2000 norm).



Although a decrease in precipitation is observed in most parts of the country, an increase in local precipitation with an aerosol factor in many large cities of the world is also recorded in Baku.

INITIAL NATIONAL ADAPTATION PLAN

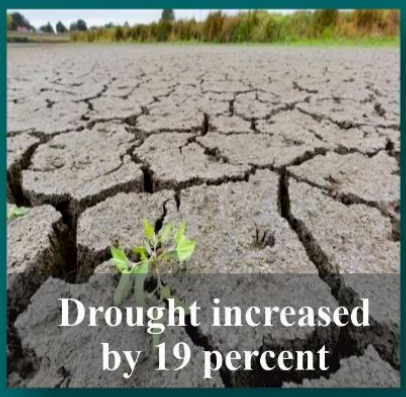
CLİMATE CHANGE RİSK MAPPİNG

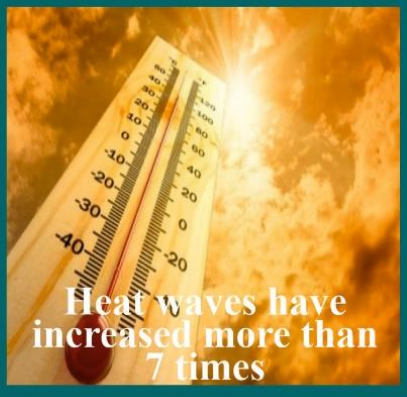
AZERBAIJAN 2024

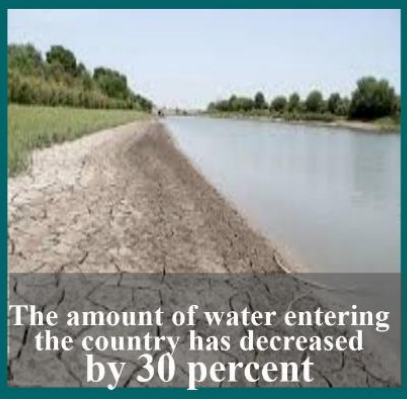
3. CLIMATE CHANGE RISK MAPPING

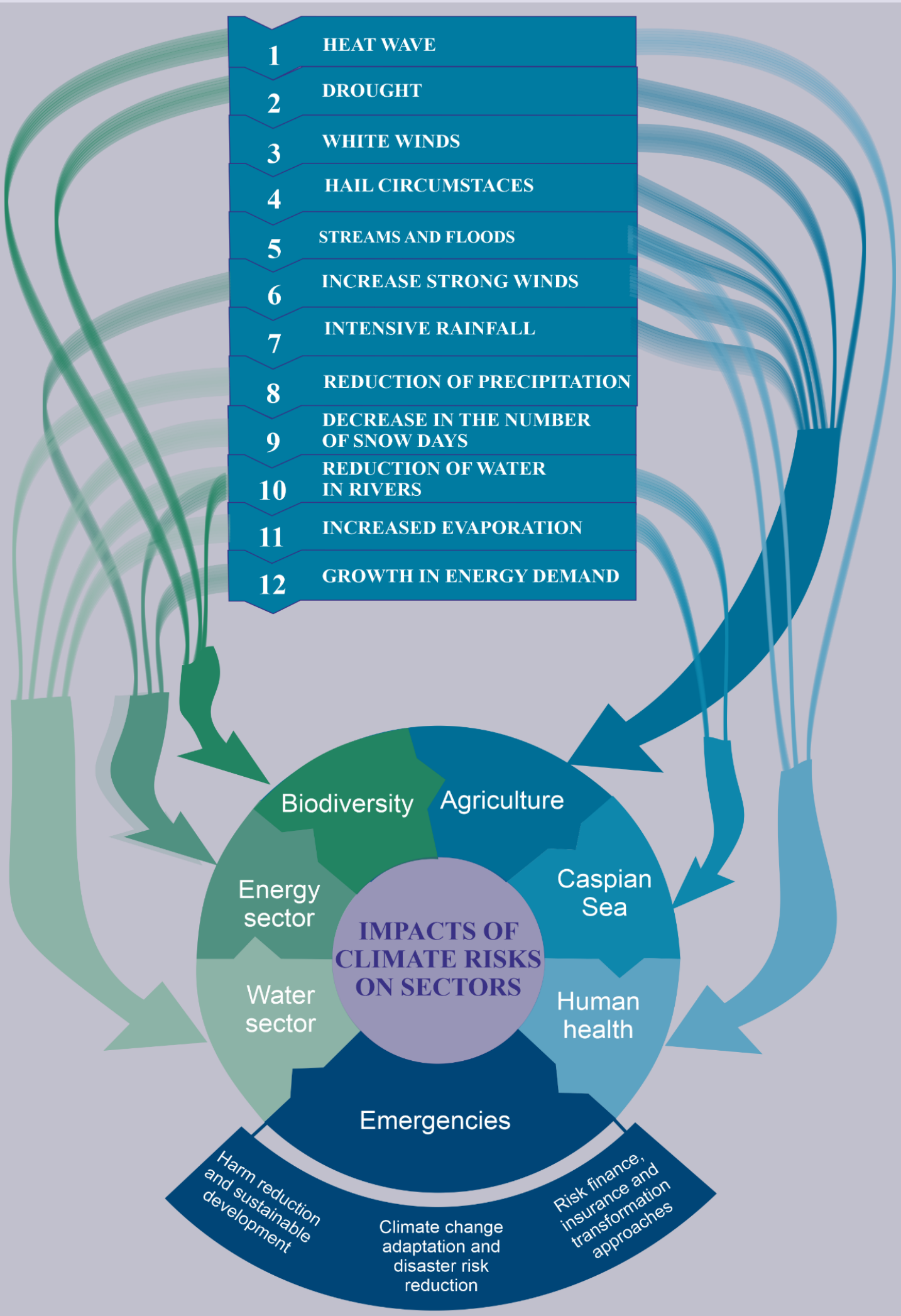
Azerbaijan's unique geographical location and diverse landscape make it a model for eight distinct climate types within a relatively small territory. The country faces a range of environmental challenges associated with climate change, similar to those in steppe, semi-desert, coastal, and mountainous regions worldwide. Key issues include land erosion, melting glaciers, wetland degradation, sea level changes, forest fires, and diminishing water resources.

INCREASING OF WEATHER AND CLIMATE RISKS IN THE LAST 10 YEARS IN AZERBAIJAN





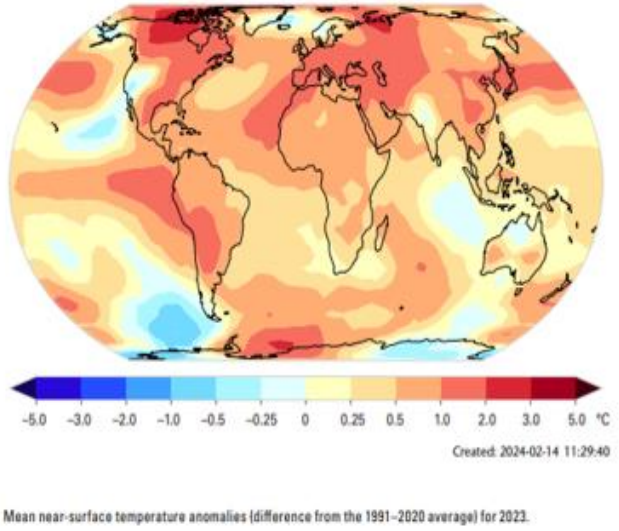



1 HEAT WAVE
2 DROUGHT
3 WHITE WINDS
4 HAIL CIRCUMSTACES
5 STREAMS AND FLOODS
6 INCREASE STRONG WINDS
7 INTENSIVE RAINFALL
8 REDUCTION OF PRECIPITATION
9 DECREASE IN THE NUMBER OF SNOW DAYS
10 REDUCTION OF WATER IN RIVERS
11 INCREASED EVAPORATION
12 GROWTH IN ENERGY DEMAND
Biodiversity
Agriculture
Energy sector
Caspian Sea
IMPACTS OF CLIMATE RISKS ON SECTORS
Water sector
Human health
Emergencies
Harm reduction and sustainable development
Climate change adaptation and disaster risk reduction
Risk finance, insurance and transformation approaches

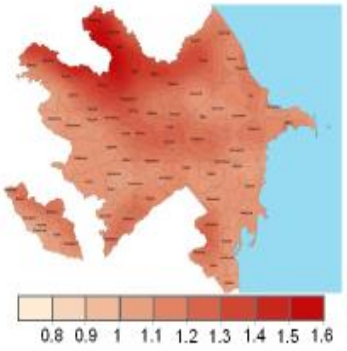
According to the World Meteorological Organization, the 10-year average global temperature for 2014-2023 was 1.2°C higher compared to pre-industrial levels. A rise in temperature above 1.5°C will increase risks to health, livelihoods, food security, water supply, human security and economic growth.

The WMO report confirmed that 2023 was the warmest year on record, with the global average near-surface temperature at 1.45°C higher compared to pre-industrial baseline.

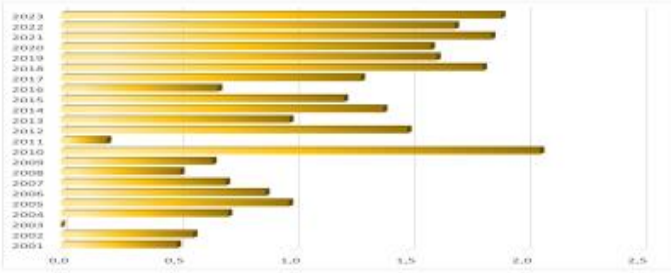
In Azerbaijan in 2023, the temperature anomaly was 1.9 degrees.



Mean near-surface temperature anomalies (difference from the 1991–2020 average) for 2023.

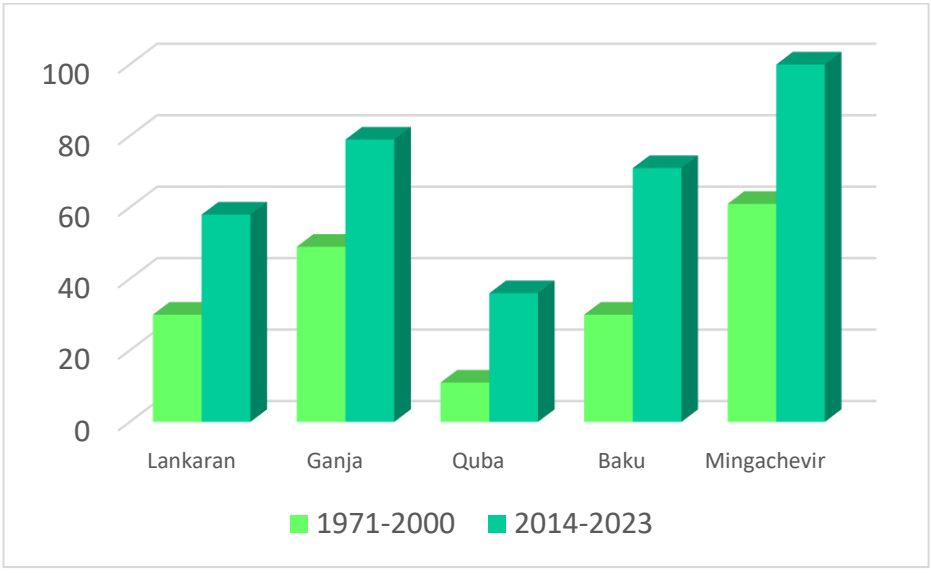


Mean Temperature anomalies for 2001-2023 (difference from the 1971-2000)



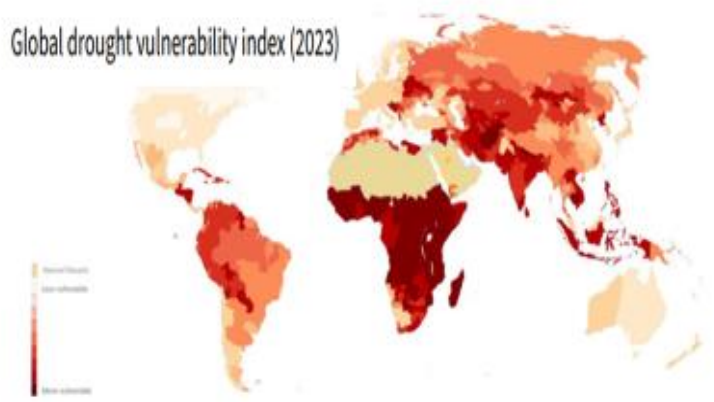
3.1. Hot days

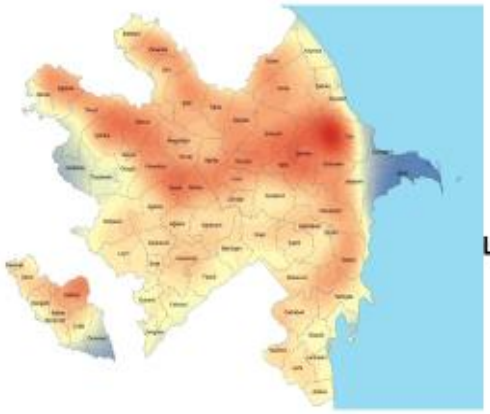
Over the past 10 years, due to climate change, the number of days with an average temperature above 30°C has increased by up to two times compared to the 1971-2000 average.

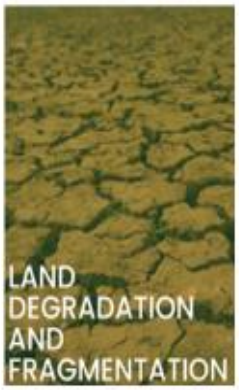


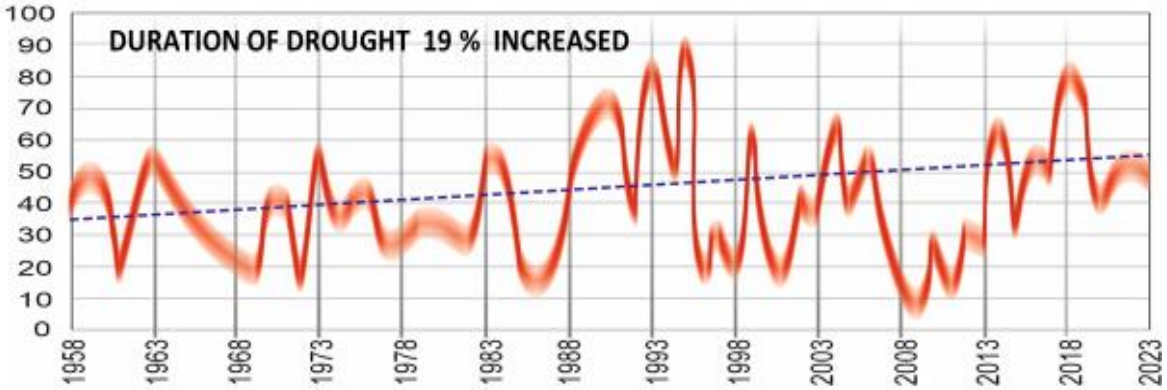
3.2. Drought

The duration of drought has increased by 19%. Over the past 10 years, the decrease in the total amount of precipitation by 10% had a significant impact on agriculture. The fact that agricultural production is directly dependent on climate conditions has made it the most vulnerable sector to climate change.









3.3. Melting of glaciers

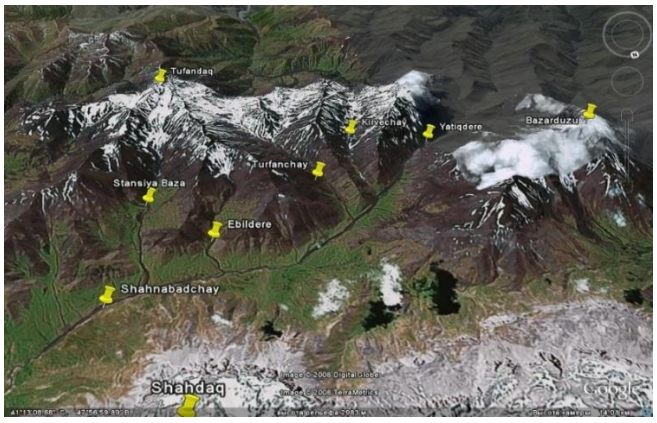
In Azerbaijan, mountain glaciers are found in the Gusarchay basin on the northeastern slope of the Greater Caucasus.

Since 2003, the National Hydrometeorology Department under the Ministry of Ecology and Natural Resources has undertaken studies to further analyze the glaciers in the Gusarchay basin.

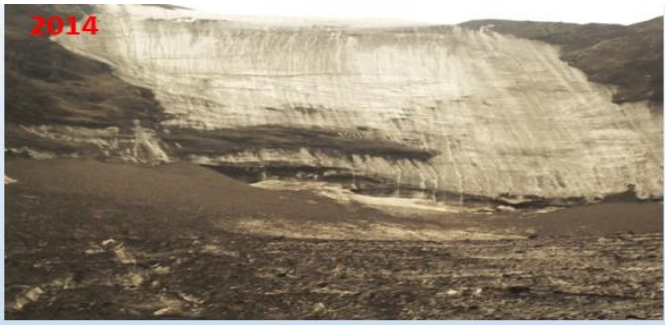
In December 2009, the opening of the Integrated Hydrometeorological and Ecological Research Center in the glacier area (Shakh Plain) provided a conducive environment for intensive and effective glacier studies.

A mountain tundra climate prevails in the high-altitude zone (3,500-4,400 m) of the Main Caucasus and Side Range, where glaciers are located. This climate is characterized by high humidity, cold summers, and harsh winters. Until recent times, no continuous hydrometeorological observations had been conducted in the glacial zone.

The average annual temperature in this zone is consistently negative, ranging from -4°C to -5°C. In July, the average temperature remains below 5°C, while in January, it drops below -10°C. Annual precipitation ranges from 600 to 800 mm, with an average wind speed of 2-4 m/s. The average snow depth is 120-140 cm.



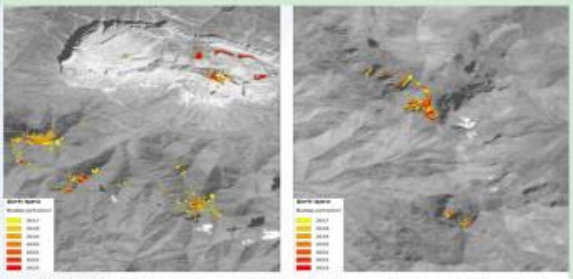
The first recorded information about these glaciers, including their area dates back to 1890. 8 glaciers with a total area of 4.9 km² were identified.
In the mid-1960s, the existence of these glaciers was confirmed through an expedition conducted by the Institute of Geography of the Azerbaijan National Academy of Sciences and the analysis of updated maps. 8 glaciers were observed in the Gusarchay basin, specifically in the Yatigdara River basin, the Abildara River basin (Tufandagh glacier), and the Duzyurd River basin (Shahdagh glacier). The total area of these glaciers was 3.2 km².



2024

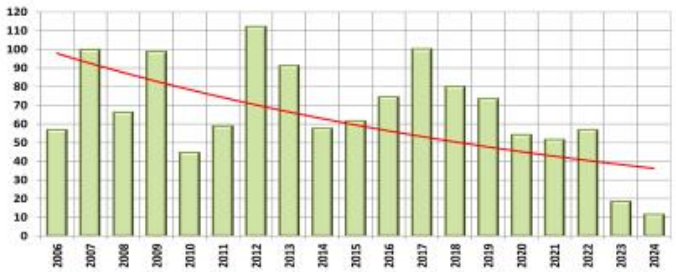
Research by NHS is conducted along various routes during July and August, under favourable weather conditions. During these studies, the initial coordinates of the glaciers were determined using GPS devices, and data such as elevations above sea level, exposure, and other characteristics were recorded and photographed. These observations indicate the intensifying melting process in the glaciers

Each year, during the first half of March, snow measurements are carried out along five routes on the northeastern slopes of the Greater Caucasus to predict water levels during the spring-summer flood season. As indicated by recent data in the diagram, over the past 19 years, there has been a decline in water content within the snowpack. This is attributed to the reduction in frosty days in the mountainous regions of the Greater Caucasus, caused by climate change, leading to premature melting of snow. The multi-annual variation of water level in snow cover over the north-eastern slope of the Greater Caucasus



Daimi buzlaq ərazilərinin illər üzrə yayılma arealı (**sol** Böyük Qafqaz, **sağ** Kiçik Qafqaz)

In the basins of the rivers, the water content of the snow cover has decreased



Reduction of amount of water in the rivers

3.4. Heat wave

One of the key manifestations of modern climate change is the occurrence of heat waves (HW). Heat waves have significant impacts on various sectors such as health, agriculture, forestry, transport, and energy.

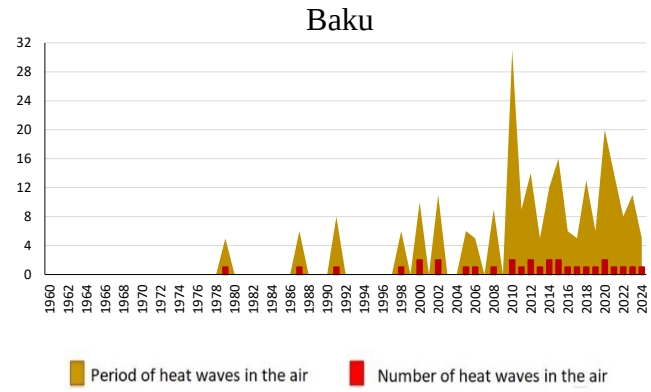
To detect these events, daily maximum air temperatures during the summer months (June-August) from 1961 to 2024 were analysed. Currently, four meteorological stations, located in diverse climatic regions, are used for this analysis: Baku (moderately hot semi-desert and dry desert climate with dry summers), Ganja (semi-desert and dry desert climate with dry winters), Shaki (moderately hot climate with evenly distributed precipitation), and Lankaran (moderately hot climate with dry summers).

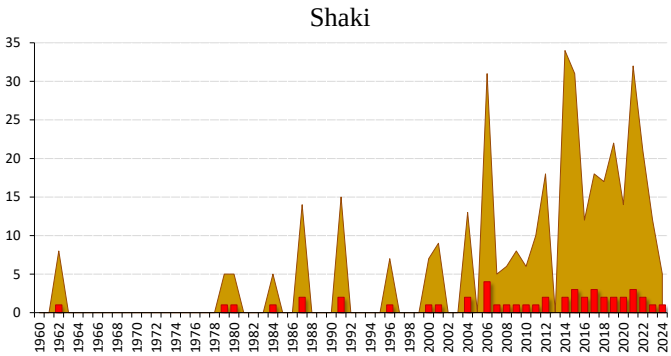
Although heat waves have been observed across Azerbaijan from 1961 to 2024, their frequency has significantly increased in the last 25 years.

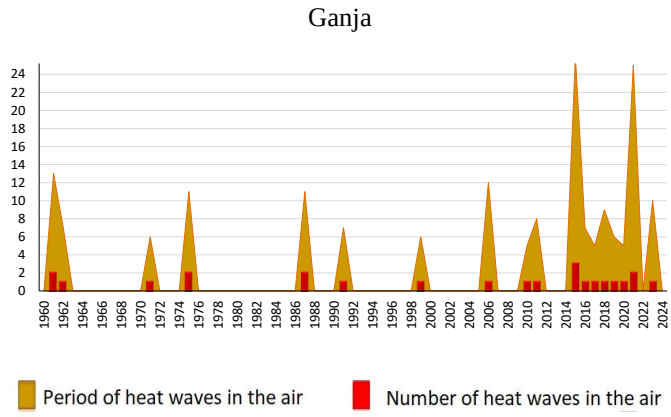
The occurrence of heat waves, both in terms of frequency and number, varies across time and regions. Notably, in 2010, 2018, and 2019, severe heat waves affected the entire country.

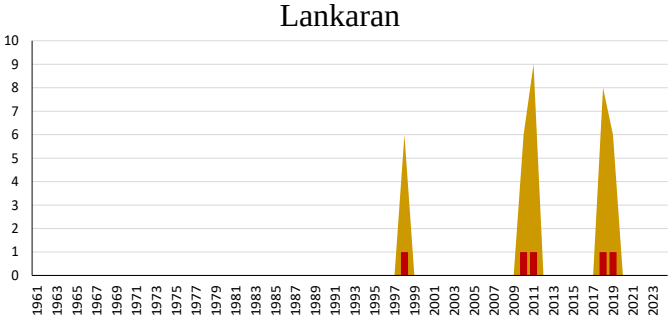
Compared to the period between 1961 and 1990, all stations recorded an increase in both the frequency and duration of heat waves. During the earlier period, Baku experienced 2 heat waves, Ganja and Shaki each recorded 5, while no heat waves were observed in Lankaran. In the following decades, these numbers rose significantly, reaching 29 cases in Baku, 16 in Ganja, 41 in Shaki, and 5 in Lankaran.

The most substantial increase was observed in Baku and Shaki. In Baku, the country's largest city by area and population, the rise in heat waves is likely due to the urban heat island effect (caused by dense infrastructure, asphalt, etc.). In contrast, the increase in Shaki is more closely linked to climate warming in mountainous regions.





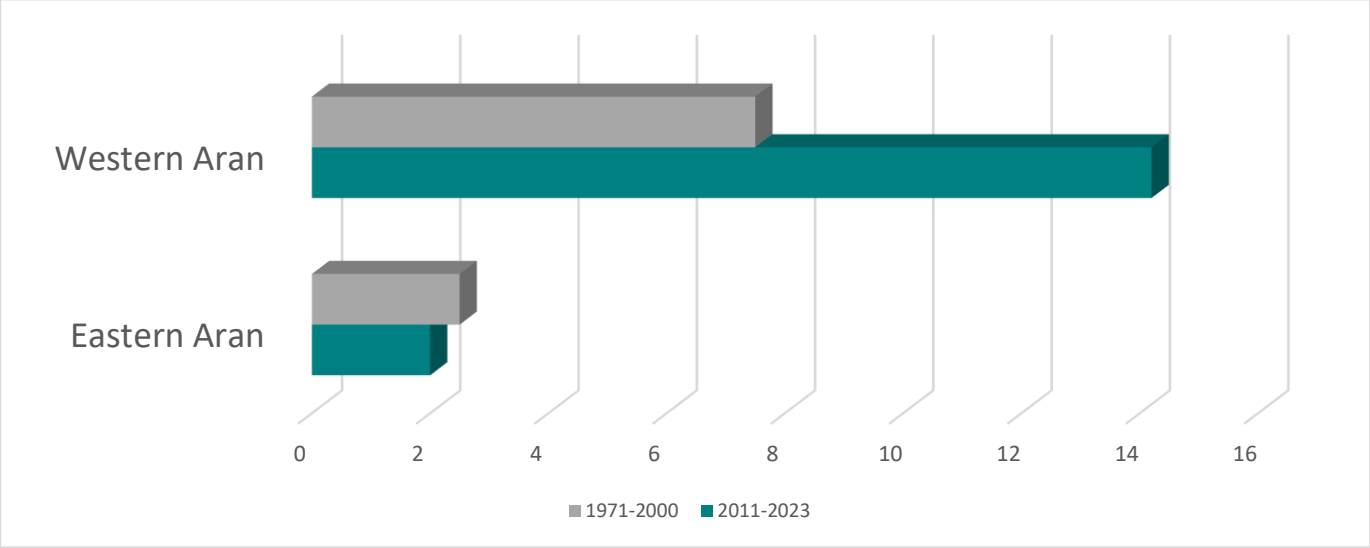




White winds

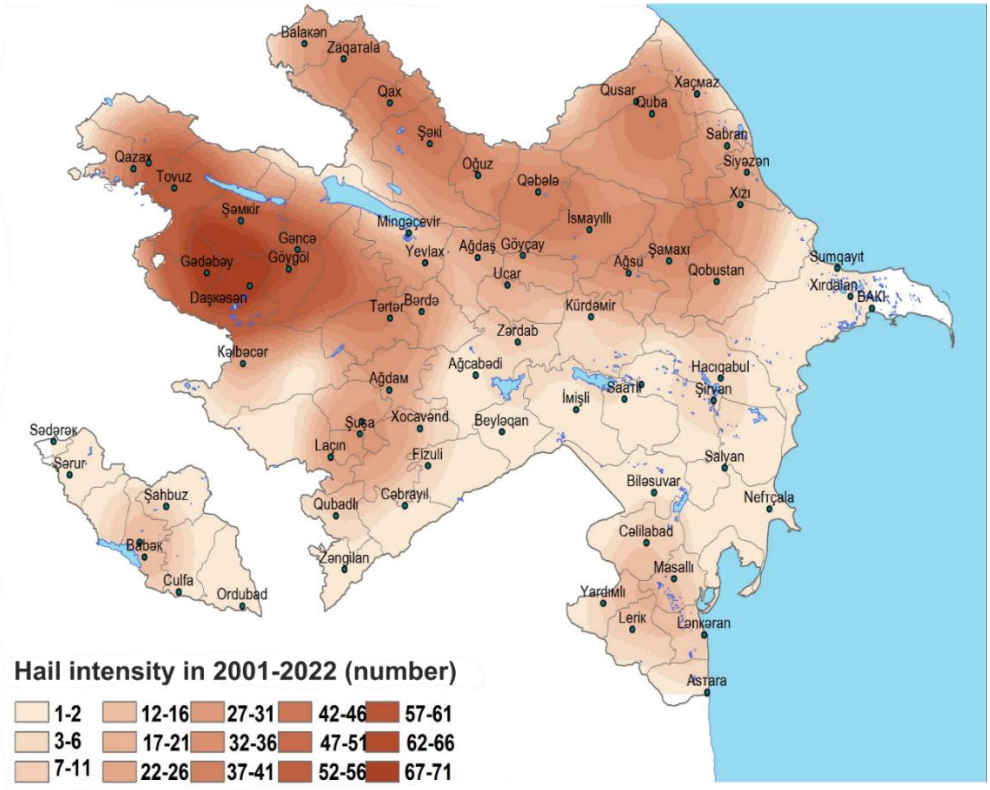
In the hot season of the year in the territory of Azerbaijan hot-dry winds, locally called as white winds, observed with high temperatures and low humidity which is a significant risk factor for agriculture.

Over the last 13 years, the number of white winds has increased. During these periods, there were 5 times more white winds than in 1971-2000.



Hail cases

Over the past 23 years, the country has experienced a rise in dangerous atmospheric phenomena as a result of climate change. The number of days with hail has more than doubled compared to the historical average.



Hail events in the country are mostly observed in mountainous and foothill zones. Most Hail events occurred in the western, northern and northwestern regions.

3.5. Floods and Floods risk mapping

The Republic of Azerbaijan is among the regions with the highest incidence of floods. Floods are most intense in the mountain systems of the Greater and Lesser Caucasus, which cover nearly half of the country. The southern slopes of the Greater Caucasus and the highlands of the Nakhchivan region are particularly prone to flooding. In these mountain systems, the following flood-prone areas can be identified:

- Southern slope of the Greater Caucasus
- North-western of the Greater Caucasus
- North-eastern slope of the Lesser Caucasus (Shahdagh and Murovdagh ranges)
- South-western slope of the Lesser Caucasus
- Territorial rivers of Nakhchivan

Most streams occur in the highland areas of Shaki-Zagatala and Nakhchivan. 85-87% of streams occurred in the territory of the country caused by rainwater.

Flooding is also common along the Kura River, the southern slopes of the Greater Caucasus, and the rivers of the Lankaran-Astara region during high water periods.

Given that climate change models predict no increase in water resources, regulating reservoirs on large rivers is essential to manage peak flows and prevent flooding.

In the future, the planned construction of reservoirs on smaller rivers could play a significant role in flood reduction, providing an active tool in mitigating natural disasters.

Floods risk mapping 2015-2023

Based on the analysis, the most flood and flood-risk areas of the country are in the Balaken-Shaki region of the southern slope of the Greater Caucasus: Talachay - 30 cases, Ayrishay - 21 cases, Kurmukchay - 17 cases, Kishchay - 12 cases, Girdimachay - 21 cases in the Gabala-Ismayilli region, Pirsaatchay - 16 cases, Demiraparanchay - 14 cases, Goranchay 22 cases on the northern slope of the Lesser Caucasus, Ganjachay 17 cases, Dastafurchay 16 cases, Asrikchay 13 cases, and 13 cases occurred in the Gabirli river in transboundary rivers.

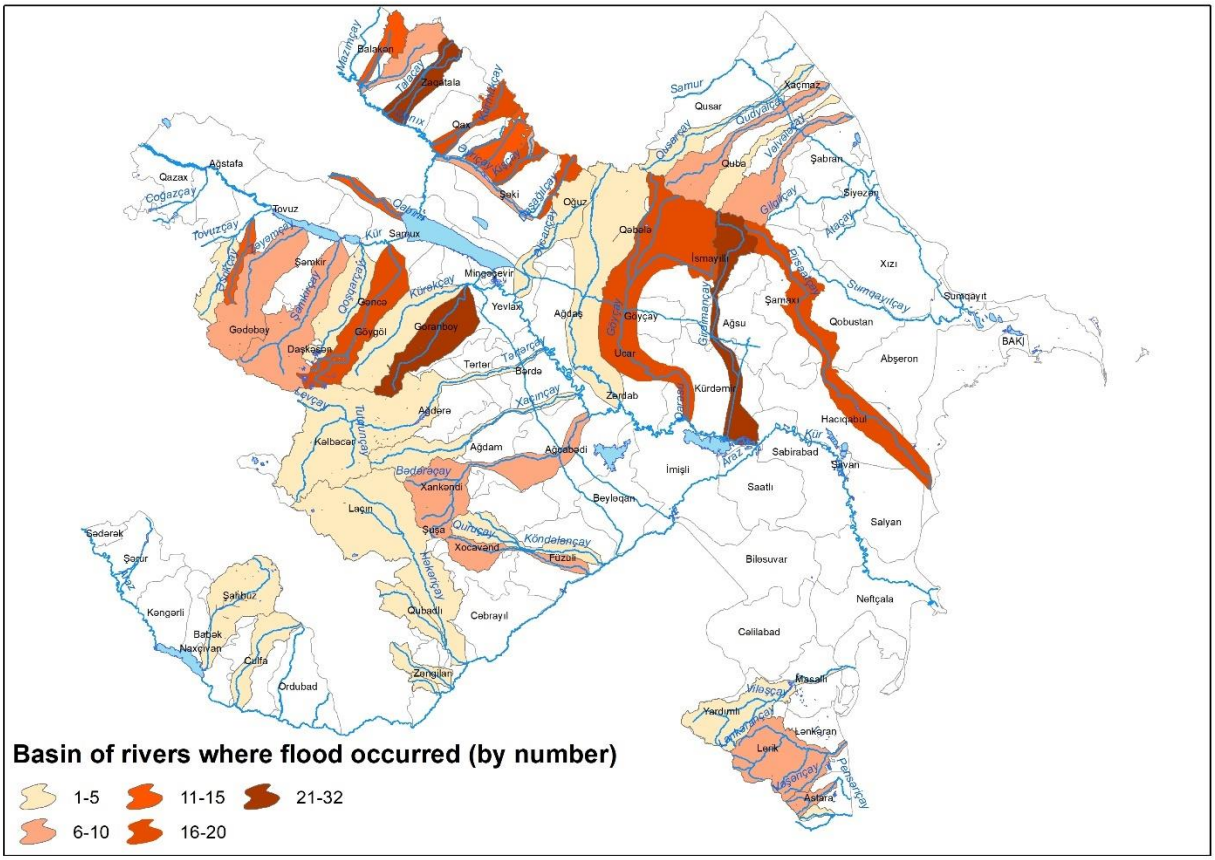
Number of mud flows during 2015-2023 in rivers

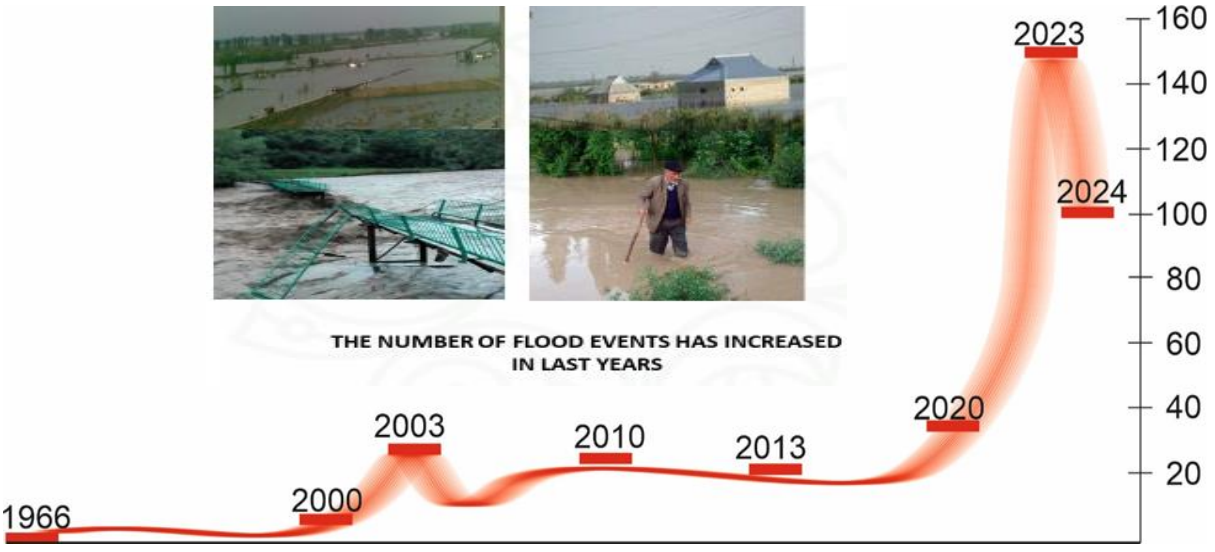
	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Balaken-Sheki										
Balakenchay		1				2	5	3	3	**14**
Talachay		1		2		2	7	5	13	**30**
Mukhachay									1	**1**
Boyukchay								2		**2**
Gashgachay								1		**1**
Kurmukchay	2	1		1		4	3	2	4	**17**
Chukhadurmazchay									1	**1**
Damarchinchay									5	**5**
Kishchay		2		2	1	3	1		3	**12**
Shinchay	2	2				1	1	1	3	**10**
Katekhchay				1			2		3	**6**
Karachay								1	1	**2**
Ayrichay	1	1		1		2	1	4	11	**21**
Agchay	1	1							1	**3**
Hamamchay	1	1								**2**
Guba-Khachmaz										
Karachay									1	**1**
Kharmidorchay						1				**1**
Gusarchay									1	**1**
Gudiyalchay								1	1	**2**
Valvalachay						1		1	6	**8**
Cimichay										**0**
Jagajugchay										**0**
Gilgilchay									1	**1**
Chukhurazemichay										**0**
Atachay										**0**
Khalkhalchay								1		**1**
Agchay								1	1	**2**
Khinaligchay	1					2			1	**4**

Gabala-Ismayilli										
Karasuchay									3	**3**
Alijanchay									1	**1**
Demiraparanchay		1		2		2	1	1	7	**14**
Destamazchay										**0**
Tikanlichay	1								2	**3**
Bumchay	1									**1**
Turyanchay								1	2	**3**
Mirzabeylichay	1									**1**
Akhokhchay									1	**1**
Goychay		2	1	1		1		1	3	**9**
Gulyanchay									1	**1**
Agsuchay				2					1	**3**
Girdimanchay		2	2		1	2	1	2	11	**21**
Jeyrankechmezchay										**0**
Pirsaatchay	1	1	3		1	3		3	4	**16**
Lesser Caucasus										
Cogazchay										**0**
Zayamchay		2							2	**4**
Shamkirchay						1	2		2	**5**
Dastafurchay				1		2	2	2	9	**16**
Kurakchay	1						1		1	**3**
Ganjachay						2	4	4	7	**17**
Goshgarchay										**0**
Akhinjachay										**0**
Esrikchay						2	4	5	2	**13**
Badacay							1			**1**
Gedabeychay									1	**1**
Amirvarchay									1	**1**
Ayrichay Dashkesen									1	**1**
Goranchay	2		3	1	2	4	1	2	7	**22**

Nakhchivan MR										
Nakhchivanchay						1			1	**2**
Alinjachay							1			**1**
Lankaran-Astara										
Lankaranchay		1	1				3	1		**6**
Vasaruchay	1									**1**
Tangerudchay			1						3	**4**
Istisuchay										**0**
Vilashchay		1						1		**2**
Boladichay	1	1								**2**
Vilashchay	1	1	1							**3**
Transit										
Gabirri						1		3	9	**13**
Bolqarchay									2	**2**

FLOODS RISK MAP (2015-2023)

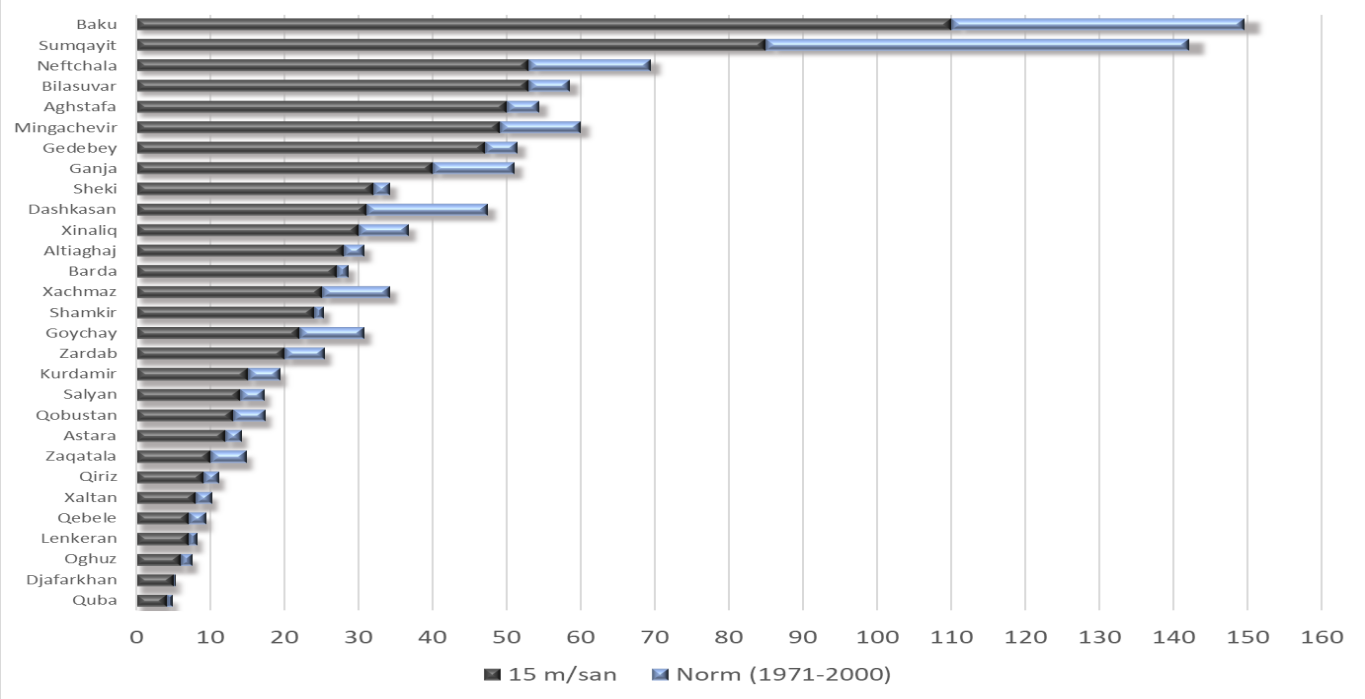




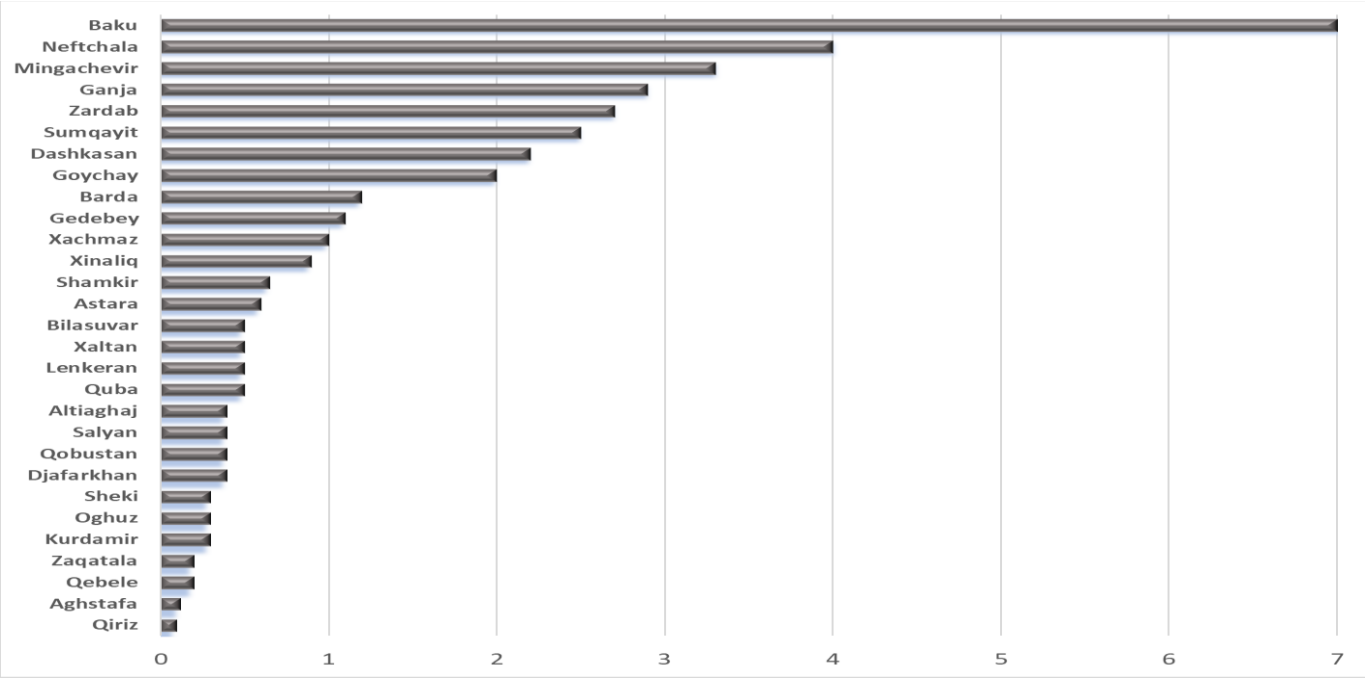
3.6. Strong winds

The number of days with strong winds exceeding 15 m/sec has increased by 3.5 times compared to the 1971-2000 average, a trend observed across all regions.

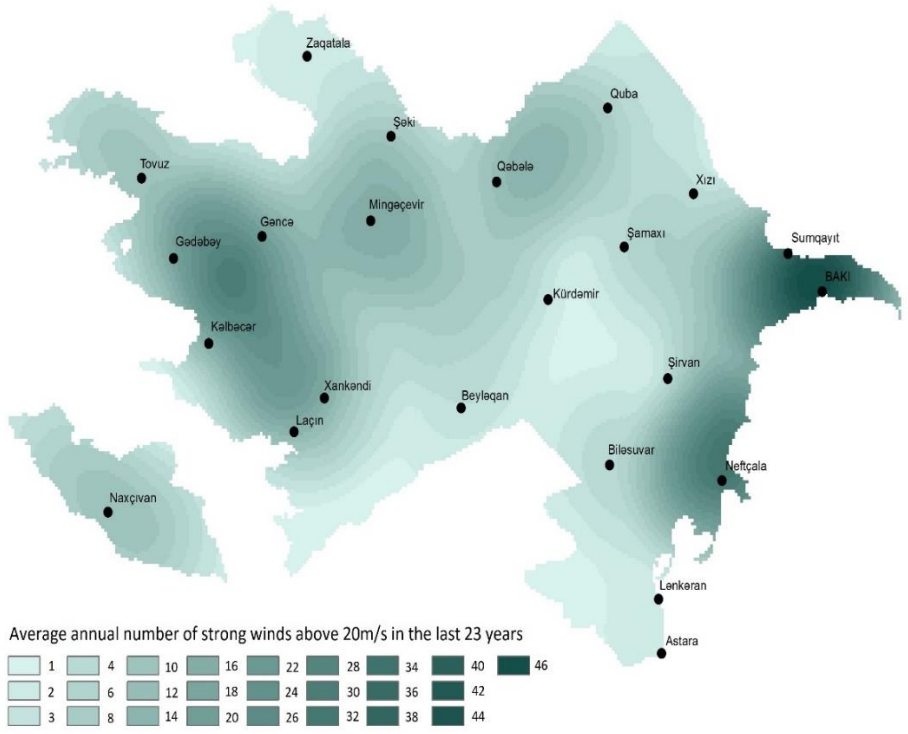
The number of days with strong winds exceeding 15 m/sec



The number of days with strong winds exceeding 30 m/sec



Strong winds map (above 20 m/s)

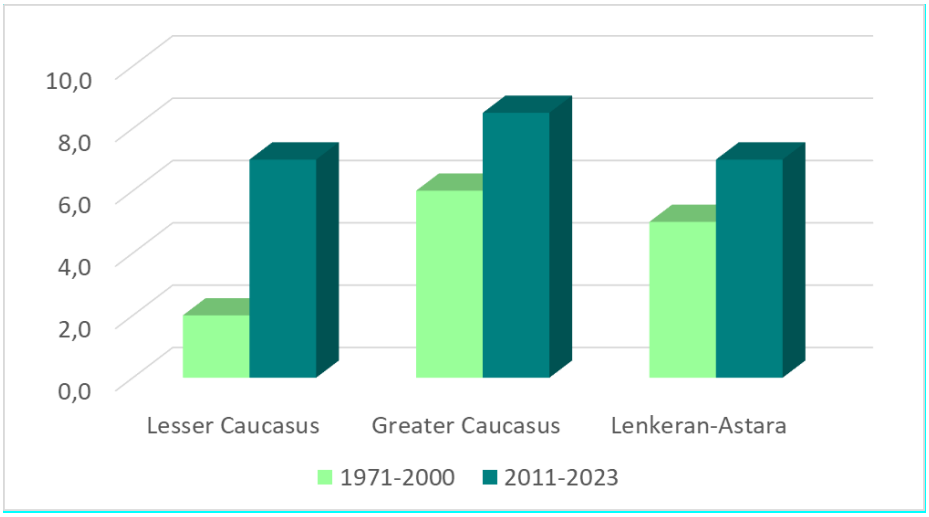


Strong winds above 20 m/s are most often observed in the Absheron Peninsula, Neftchala, mountainous areas in the western region of the country and on the shores of the Mingachevir reservoir.

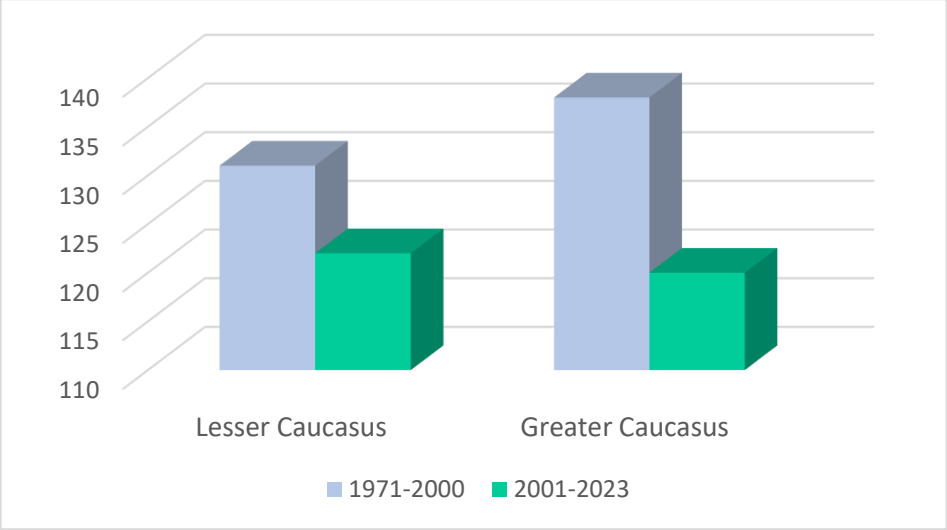
Intensive rainfall

Compared to the 1971-2000 average, the number of days with precipitation exceeding 30 mm in some areas has more than tripled.

Over the past 13 years, the number of days with heavy rainfall across the country has significantly increased compared to the historical norm.



Reduction of precipitation



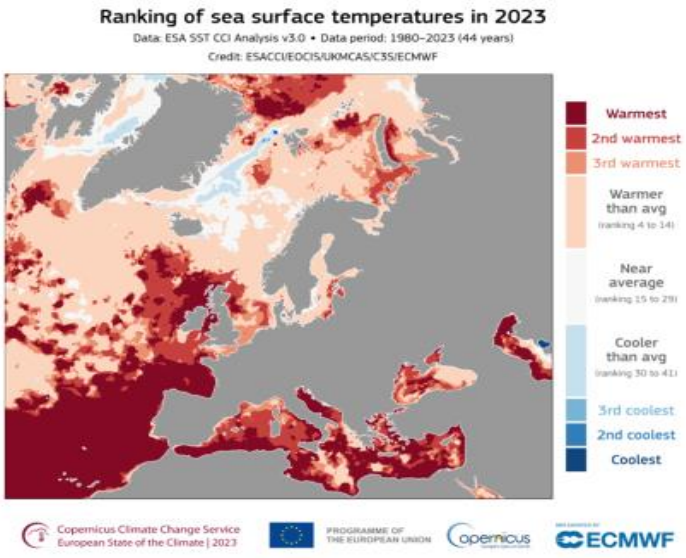
Over the past 23 years, the number of rainy days in some areas has decreased by 10% compared to the 1971-2000 average.

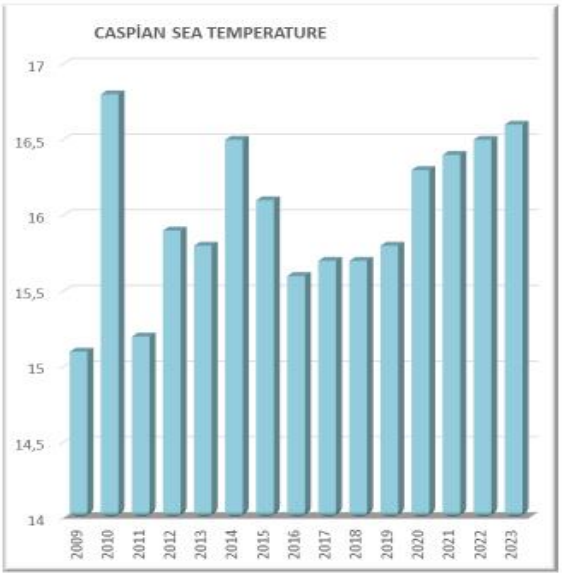
3.7. Decline in water level of the Caspian Sea

As a closed water basin, the Caspian Sea is subject to inevitable periodic changes in its water levels. The primary factor influencing these fluctuations is the climate of the Caspian basin, with changes in water levels largely depending on the elements of its water balance-namely, river inflows, precipitation, and evaporation. Tectonic movements on the seabed also play a role in these fluctuations.

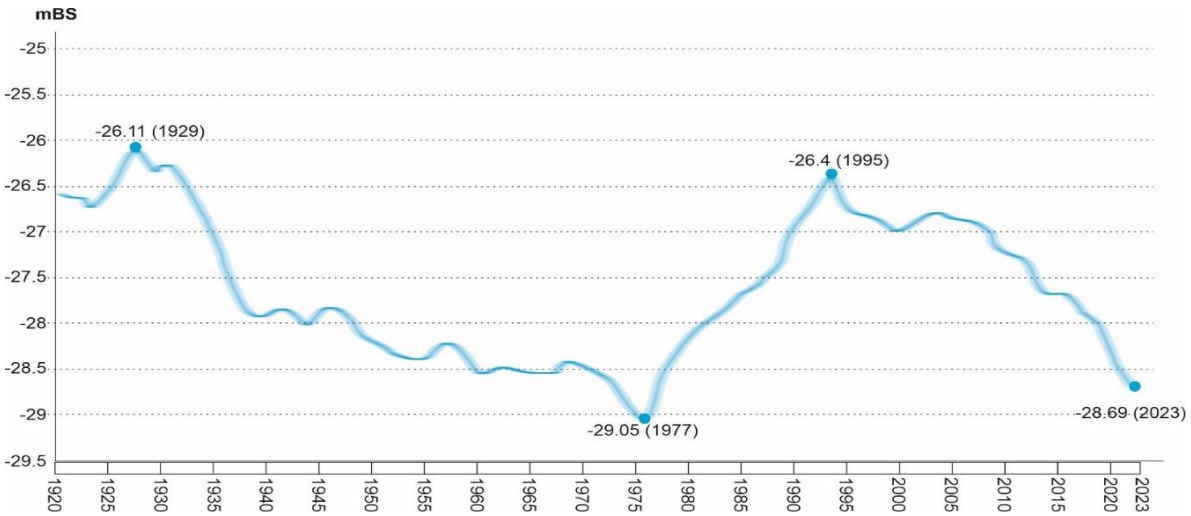
Currently in parallel to reduction of precipitations and increase of evaporation, a decline in the flow of the Volga River, the main source of water for the Caspian Sea, is significantly contributing to the decrease in sea levels. The lowest recorded level in the 20th century was in 1977. However, from 1977 to 1995, the sea level rose by 2.5 meters, only to begin falling again in the following years. Since 2006, the Caspian Sea has experienced a continuous decline and from 1995 to the present day, the difference has made 2.27 meters.

The decrease in the level has seriously affected the ecosystem of the sea and coastal area, including biological diversity, and coastal infrastructure, including cultural, tourism-recreational facilities.





Caspian Sea annual mean water level fluctuations at the Baku City station



Multi-annual variation of level of the Caspian Sea. The Azerbaijani sector of the Caspian Sea coastline stretches for 850 km. Currently, 10 administrative districts of the country, including the Absheron Peninsula, are situated along the coast. Unofficial estimates indicate that over 4 million people live in these coastal areas. Azerbaijan's largest cities, Baku and Sumgait, are located on the Caspian coast, along with over 75% of the country's industrial capacity.

Numerous forecasts regarding Caspian Sea level fluctuations exist in the literature, many made during the decline in sea levels in the 1960s and 1970s. Forecasts in different periods were different. Some predicted a drop to -31.0 meters, while others suggested a rise to -25.0 meters or higher.

Currently, some predictions are based on different climate scenarios, with projections indicating a potential decline of several meters by the end of the century. Such a drop could severely impact the Caspian marine ecosystem, industries, coastal infrastructure, and other economic activities. For instance, ports may need to be permanently relocated, and shipping lanes might require deepening.

To address these challenges, it is essential to develop more precise sea level projections, incorporating data from basin countries and other scientific research institutions.

3.8. Forest fires

The forest area in Azerbaijan covers 1,040.7 thousand hectares, accounting for nearly 12% of the country’s total land area. This translates to approximately 0.12 hectares of forest per person, which is four times less than the global average of 0.48 hectares. Forests typically thrive at elevations ranging from 50-100 meters to 1,700-1,800 meters and up to 2,000 meters. The republic's forests are predominantly located on the slopes of the Greater and Lesser Caucasus and the Talysh Mountains, with around 95% situated in mountainous regions and only 5% in the plains.

In recent years, forest fires have emerged as a significant environmental issue in Azerbaijan, mirroring a global trend. Historically, these fires were primarily caused by natural events such as lightning strikes, volcanic eruptions, and the spontaneous combustion of peat bogs during dry, hot periods. However, in recent decades, human negligence toward nature has increasingly contributed to these fires, exacerbated by global climate change.

Each year, forest fires ravage several hectares of this vital natural resource, leading to water shortages, heightened soil erosion, loss of biodiversity, deterioration of air quality, and an increase in carbon dioxide and other greenhouse gases in the atmosphere. Over the past 20 years, there has been an increase in both the number of fire incidents and the area affected by fires on the country's forest lands. The highest number of fires was recorded in 2022, with 66 incidents resulting in damage to approximately 870 hectares of land.

INITIAL NATIONAL ADAPTATION PLAN

CLIMATE CHANGE VULNERABILITY INDEX

AZERBAIJAN 2024

4. CLIMATE CHANGE VULNERABILITY INDEX

4.1. Assessment of climate change vulnerability index in the regions of Azerbaijan

Climate change vulnerability index (CCVI) assessment for Azerbaijan and its 14 regions is assessed based on ND-GAIN methodology as it contains many indicators to assess vulnerability indexes. Each sector - food, water, health, human habitat – was assessed in terms of exposure, sensitivity, adaptive capacity and vulnerability.

Sectorial indicators for assessment of climate change vulnerability indexes are given below

Climate change element	INDICATORS			
	AGRICULTURE	**WATER**	**HEALTH.**	**HUMAN HABITAT**
Exposure indicator 1	Projected change of agricultural cereal yield	Projected change of annual runoff	Projected change in vector-borne diseases due to changes in length of transmission season (LTS)	Projected change of warm periods
Exposure indicator 2	Projected population change	Projected change of annual groundwater recharge (GWR)		
Sensitivity indicator 1	Food import dependency	Freshwater withdrawal rate	Age dependency ratio	Flood sensitivity of regions
Sensitivity indicator 2	Rural population	Water dependency ratio		
Adaptive capacity index 1	Agriculture capacity	Dam capacity	Medical staffs	Quality of trade and transport infrastructure
Adaptive capacity index 2	Child malnutrition	Access to reliable drinking water	Level of employment	Income of population in comparison to poverty level

For each of sector, current and projected values of these indicators have been assessed based on available statistical data, providing a basis for calculating the climate change vulnerability index.

To assess vulnerability for the entire Republic of Azerbaijan and its regions, the results for exposure, sensitivity, and adaptive capacity indexes were first compiled for the periods 2024-2040 and 2041-2069. Average values of these indexes were then calculated for each sector over these periods, and the Climate Change Vulnerability Index was determined using the following formula:

$$I_v=(I_e+I_s+1-I_{ac})/3$$

where I_v, I_e, I_s and I_{ac} are accordingly vulnerability, exposure, sensitivity and adaptation capacity indexes.

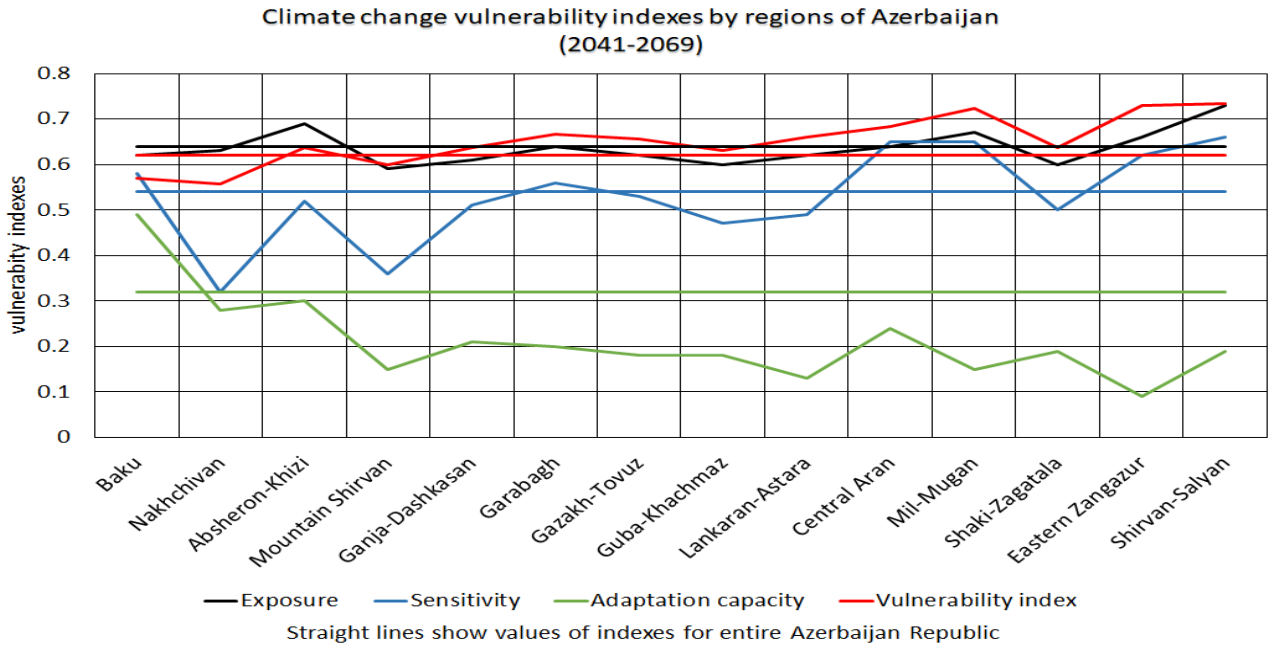
Based on results of assessments for different sectors, average values of exposure, sensitivity and adaptation capacity indexes were calculated. Using these averages and the formula mentioned above, a vulnerability index was determined for each sector.

Current and future (2024-2040 and 2041-2069) climate change exposure, sensitivity, adaptation capacity and vulnerability index in Azerbaijan and regions

N	Region	CCVI											
		Exposure			Sensitivity			Lack of adaptive capacity			Vulnerability index		
		2001-2023	2024-2040	2041-2069	2001-2023	2024-2040	2041-2069	2001-2023	2024-2040	2041-2069	2001-2023	2024-2040	2041-2069
1	**Baku**	0.57	0.60	0.62	0.51	0.54	0.58	0.49	0.49	0.49	0.53	0.55	0.57
2	**Nakhchivan**	0.56	0.59	0.63	0.25	0.29	0.32	0.28	0.28	0.28	0.51	0.54	0.56
3	**Absheron-Khizi**	0.63	0.66	0.69	0.42	0.47	0.51	0.31	0.31	0.31	0.58	0.61	0.64
4	**Mountainous Shirvan**	0.52	0.55	0.59	0.28	0.32	0.36	0.15	0.15	0.15	0.55	0.57	0.60
5	**Ganja-Dashkasan**	0.53	0.57	0.61	0.42	0.27	0.51	0.21	0.21	0.21	0.58	0.61	0.64
6	**Garabagh**	0.57	0.60	0.64	0.44	0.50	0.55	0.21	0.21	0.21	0.60	0.64	0.67
7	**Gazakh-Tovuz**	0.54	0.58	0.62	0.45	0.49	0.53	0.18	0.18	0.18	0.60	0.63	0.66
8	**Guba – Khachmaz**	0.53	0.57	0.60	0.40	0.43	0.47	0.18	0.18	0.18	0.58	0.61	0.63
9	**Lankaran-Astara**	0.55	0.58	0.62	0.43	0.47	0.49	0.13	0.13	0.13	0.62	0.65	0.66
10	**Central Aran**	0.53	0.58	0.64	0.58	0.61	0.65	0.24	0.24	0.24	0.62	0.66	0.68
11	**Mil-Mugan**	0.58	0.62	0.67	0.57	0.61	0.65	0.15	0.15	0.15	0.67	0.69	0.72
12	**Shaki-Zagatala**	0.54	0.57	0.60	0.44	0.47	0.50	0.19	0.19	0.19	0.60	0.62	0.64
13	**Eastern Zangazur**	0.58	0.62	0.66	0.48	0.51	0.62	0.09	0.09	0.09	0.66	0.70	0.73
14	**Shirvan - Salyan**	0.62	0.67	0.73	0.59	0.63	0.66	0.19	0.19	0.19	0.67	0.70	0.73
15	**Azerbaijan Republic**	0.56	0.61	0.64	0.45	0.50	0.54	0.32	0.32	0.32	0.56	0.59	0.62

Forecasted values of these climate change indexes by 2041-2069 by regions and by Azerbaijan Republic (represented by straight lines) are illustrated in the figure below.

Table Climate change exposure, sensitivity, adaptation capacity and vulnerability indexes by regions of Azerbaijan (2041-2069)



Based on the assessment of climate change indexes for the period of 2041-2069, the total exposure index varies within 0.59 -0. 73 with an average value for Azerbaijan Republic equal to 0.64, maximal value relates to Shirvan -Salyan and minimal to Mountainous Shirvan regions.

The sensitivity index varies within 0.32-0.66 with an average value for Azerbaijan Republic equal to 0.54 maximal value relates to Shirvan -Salyan and minimal to Nakhchivan regions.

The lack of adaptation capacity index varies within 0.10-0.50 with an average value for Azerbaijan Republic equal to 0.32, maximal value relates to Baku and minimal to Eastern-Zangazur regions.

The vulnerability index varies within 0.56-0.73 with an average value for Azerbaijan Republic equal to 0.62, maximal values relate to Eastern-Zangazur and minimal to Nakhchivan regions.

Summary on CCVI

The calculated values for climate change exposure, sensitivity, adaptive capacity and vulnerability indexes for Azerbaijan Republic indicate that by 2041-2069, these values are slightly higher than those reported in such assessments as World Bank, ND-GAIN.

Climate change vulnerability index in Azerbaijan

CCVI approaches	Exposure	Sensitivity	Adaptation capacity	Vulnerability index
According to this report	**0.64**	**0.54**	**0.32**	**0.62**
ND-GAIN	**0.35**	**0.40**	**0.41**	**0.45**
WB	**0.45**	**0.45**	**0.07**	**0.61**

In World Bank (WB) assessment conducted in 2009, Azerbaijan ranked near the middle among 28 assessed countries of Eastern Europe and Central Asia. As shown in the table, the exposure and sensitivity indexes in this study is higher than WB and ND-GAIN reports. The difference is mainly due to the use of more

recent data in this report, which reflects extreme high temperatures, lower precipitations, scare water resources, high drought indexes and so on. Accordingly, in both mountain zones and desert flat plain areas serious droughts in recent years made Azerbaijan most climate change vulnerable region in the South Caucasus.

Regarding the adaptive capacity index, it was relatively low in the WB report compared to the other assessments, mainly because Azerbaijan's economy has grown significantly in the last 10 years since the WB assessment. However, despite this economic progress, the marked increase in climate exposure and sensitivity over the last decade has made Azerbaijan more vulnerable to climate change compared to other countries in the region.

The assessments in this report for regions and entire country can be considered a reliable basis for projecting future (2041-2069) climate change vulnerability for Azerbaijan and its regions.

The climate change adaptation measures for the future can be planned depending on significance of values of climate change indexes changing from region to region. To categorize these changes from region to region their values were divided into 3 group according to their significance (high, medium and lower) as shown in below.

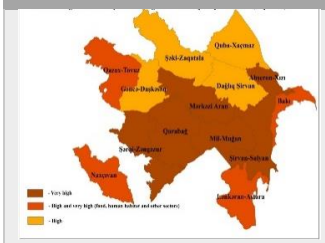
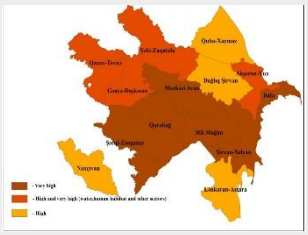
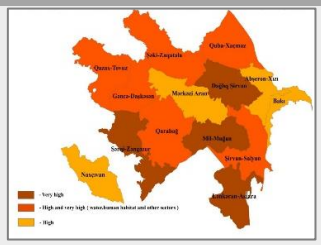
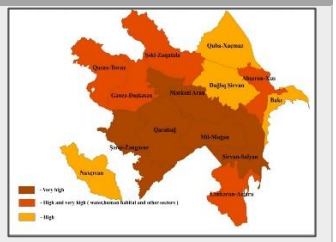
Climate change indexes **high** (yellow color), **high and very high** (in different sectors) (red color) and **very high** (brown color) severity characteristics by regions of Azerbaijan (2041-2069)

N	Region	Exposure	Sensitivity	Adaptive capacity	Vulnerability index
1	Baku	**0.62**	**0.58**	**0.49**	**0.57**
2	Nakhchivan	**0.63**	**0.32**	**0.28**	**0.56**
3	Absheron-Khizi	**0.69**	**0.51**	**0.31**	**0.64**
4	Mountainous Shirvan	**0.59**	**0.36**	**0.15**	**0.60**
5	Ganja-Dashkasan	**0.61**	**0.51**	**0.21**	**0.64**
6	Garabagh	**0.64**	**0.55**	**0.21**	**0.67**
7	Gazakh-Tovuz	**0.62**	**0.53**	**0.18**	**0.66**
8	Guba –Khachmaz	**0.60**	**0.47**	**0.18**	**0.63**
9	Lankaran-Astara	**0.62**	**0.49**	**0.13**	**0.66**
10	Central Aran	**0.64**	**0.65**	**0.24**	**0.68**
11	Mil-Mugan	**0.67**	**0.65**	**0.15**	**0.72**
12	Shaki-Zagatala	**0.60**	**0.50**	**0.19**	**0.64**
13	Eastern Zangazur	**0.66**	**0.62**	**0.09**	**0.73**
14	Shirvan -Salyan	**0.73**	**0.66**	**0.19**	**0.73**
15	**Republic of Azerbaijan**	**0.64**	**0.54**	**0.32**	**0.62**

Based on significance of values of 4 climate change related indexes corresponding to one of 3 identified groups, relevant adaptation measure listed in NAP document can be selected for such sensitive sectors as agriculture, water resources and coastal zones and others, Urgent implementation of these measures across all three groups, with varying scales as appropriate, is necessary to prevent future challenges in climate change adaptation.

These indicators can be used in the NAP evaluation and monitoring process to track annual changes in each index for vulnerable sectors. By doing so, the effectiveness of adaptation measures can be assessed, and, if negative trends or slow progress are observed, adjustments to these measures can be made to enhance resilience in specific areas.

Below are shown maps of distribution over the republic forecasted by 2041-2069 values of the climate change exposure, sensitivity, lack of adoptive capacity and vulnerability indexes by regions of Azerbaijan.

Climate change exposure indexes by 2049-2061	Climate change sensitivity indexes by 2049-2061	Lack of adaptive capacity indexes by 2049-2061	Climate change vulnerability indexes by 2049-2061
			
As one can see from above map very high climate change exposure index is observed in Absheron-Khizi, Mil-Mugan Central Aran, Shirvan -Salyan and Garabagh and Eastern Zangazur regions. This relates to geographic locations of these regions and increase of such phenomes as heat waves, low precipitation and droughts.	As one can see from above map very high climate change sensitivity index is observed in Baku, Mil-Mugan Central Aran, Shirvan -Salyan and Garabagh and Eastern Zangazur regions. This relates to increase of such phenomes as strong winds, intensive rainfalls heat waves, low precipitation and droughts.	As one can see from above map very high climate change adaptive capacity index is observed Mil-Mugan Central Aran, Mountainous Shirvan, Lankaran Astara and Eastern Zangazur regions. This relates to comparatively variation between the regions values of used in the assessment economic development indicators.	As one can see from above map very high climate change vulnerability index is observed Mil-Mugan Central Aran, Mountainous Shirvan-Salyan, Garabagh and Eastern Zangazur regions based on the assessment of average regional vulnerability by use of climate change exposure, sensitivity and adaptive capacity indexes.

4.2. Identification of most climate change vulnerable rayons of Azerbaijan

Assessment of climate change impact and vulnerability was carried to select 20 most vulnerable regions in Azerbaijan for given below most vulnerable to climatic change categories:

- ✓ Water resources (water shortage and flooding)
- ✓ Agriculture
- ✓ Coastal zones of Caspian Sea

In below table are shown most characteristic regions for each of above selected vulnerable categories. Regions with water shortage (dry areas) and flooding issues were shown in different columns.

Regions with priority climate change affected sectors

N	Agricultural districts Category I	Dry areas (or water shortage) Category II		The most flood-prone areas Category III	Caspian Sea Coastal regions Category IV
1	Imishli	Central Aran districts	Saatli	Balakan	Lankaran
2	Sabirabad		Imishli	Zagatala	Neftchala
3	Kurdamir		Beylagan	Gax	Salyan
4	Beylagan		Hajigabul	Shaki	Shabran
5	Salyan (Astara)		Shirvan	Gabala	Khachmaz
6	Bilasuvar		Salyan	Ismayilli	Siyazan
7	Masallı		Neftchala	Shamakhi	Khizi
8	Jalilabad		Bilasuvar	Guba	Baku city
9	Aghsu		Agjabadi	Gusar	Sumgayit city
10	Zardab				Astara
11	Yevlakh		Yevlakh	Tovuz	Absheron Peninsula
12	Mingachevir		Zardab	Dashkasan	
13	Gobustan		Ujar		
14	Ismayilli		Kurdamir		
15	Shamakhi		Goychay	Salyan	
16	Guba		Agdash	Lerik	
17	Gusar				
18	Gabala	Northeastern part of the Greater Caucasus	Shabran	Ganja	
19	Oghuz		Siyazan	Nakhchivan	
20	Shaki		Khizi	Gadabay	
21	Zagatala		Khachmaz	Lachin	
22	Shamkir	Mountainous Shirvan part of the Greater Ca-ucasus	Agsu	Kalbacar	
23	Goranboy		Shamakhi	Shusha	
24	Samukh		Gobustan	Fizuli	
25	Barda	Shaki-Zagatala region of the Greater Caucasus	Acinohur plain: Southern part of Shaki, and Gakh	Zangilan	
26	Tartar				
27	Aghdam				
28	Ganja			Gubadli	
29	Gadabay	Lesser Caucasus	Agstafa Jeyranchol)	Jabrail	
30	Tovuz		Tovuz (Jeyranchol)	Tartar	
31	Nakhchivan		Shamkir Jeyranchol)	Sabirabad	
32	Sharur		Samukh	Neftchala	
33	Coastal Regions		Goranboy	Fuzuli	
34	Lankaran		Ganja	Sadarak	
35	Neftchala		Tartar	Sharur	
36	Salyan		Agdam		
37	Shabran		Agjabedi		
38	Khachmaz		Barda		
39	Siyazan	Nakhchivan AR	Nakhchivan		
40	Khizi		Sadarak		
41	Absheron Peninsula		Sharur		
42	Masalli		Julfa		
43	Gazakh		Ordubad		
44	Goygol		Kangarli		
45	Agdam		Babek		
46	Fuzuli				
47	Jabrail	Lankaran-Astara region	Lankaran (plains)		
48	Shusha		Jalilabad district		
49	Sadarak	Absheron Peninsula	Baku, Sumgayit		
50			Fuzuli		
			Jabrail		

In order to assess climate change impact and vulnerability in Azerbaijan regions in first turn was selected 40 regions with 2 or more of above most vulnerable to climatic change categories. In column "Corresponding vulnerable categories of above Table" are shown categories of climate change vulnerable areas characteristic for the given region (see table above).

40 regions of Azerbaijan Republic with climate change issues					
N	Region	Corresponding vulnerable Categories (I, II, III, IV)	N	Region	Corresponding vulnerable categories
1	Sabirabad	I, III	21	Absheron Peninsula	I, II, IV
2	Saatli	I, II	22	Gadabay	I, III
3	Imishli	I, II	23	Shaki	I, II, III
4	Beylagan	I, II	24	Gabala	I, III
5	Hajigabul	I, II	25	Ismayilli	I, III
6	Shirvan	I, II	26	Shamakhi	I, III
7	Salyan	I, II, III, IV	27	Gobustan	I, II
8	Neftchala	I, II, III, IV	28	Gusar	I, III
9	Bilasuvar	I, II	29	Tovuz	I, II, III
10	Agjabadi	I, II	30	Shamkir	I, II
11	Yevlakh	I, II	31	Gazakh	I, II
12	Zardab	I, II	32	Goygol	I
13	Ujar	I, II	33	Ganja	I, II, III
14	Kurdamir	I, II	34	Agdam	I, II
15	Masalli	I ,I	35	Fuzuli	I, II, III
16	Barda	I, II	36	Jabrail	I, II, III
17	Tartar	I, II, III	37	Shusha	I, III
18	Astara	I, II	38	Sadarak	I, II, III
19	Jalilabad	I, II	39	Sharur	I, II. III
20	Lankaran	I, II, IV	40	Nakhchivan	I, II, III

In order to select 20 most priority regions mostly vulnerable to climate change and where series of urgent adaptation measures are needed to be implemented in first turn some indicators of climate in last period have been compared with their values corresponding to period without serious climate change impact.

Recent assessment indicate a rise in air temperature and a reduction in precipitation occur in Azerbaijan, leading to an increase in arid areas and prolonged drought periods, as well as water shortage in irrigation and other sectors.

Over the last years, water shortages and droughts have become more common in Absheron and other parts of the country. Due to rising extreme temperatures and decreasing precipitations, drought severity has intensified, causing many small watercourses to dry during summer periods, precisely when irrigation demand is highest. The extended duration of dry periods had caused considerable damage to local agriculture in Siyazan, Shamakhi, Gobustan, Shaki, Tovuz, Jalilabad, Agjabedi, Imishli and others. Starting from 2014 almost in each year occurring drought and resulting period of water shortage were an extreme event from this point of view.

The Aran Economic District, which he biggest agricultural region of Azerbaijan completely depends on irrigation, primarily from the Mingachevir reservoir. Water shortages in this area are a common issue faced by farmers. Other big economic districts largely depend on irrigation Absheron, Nakhichevan, Tovuz, Yevlakh, Gobustan Shaki, Tovuz, Zaqatala, Ganja and Gazakh. All of these districts produce important agricultural goods, like wheat, grape, cotton, fruits and vegetables.

It should be noted that as in result of drought last years reservoirs on Kura and Araz rivers Mingachevir, Shamkir, Araz couldn't be filled and downstream water shortage in Kura river lead to entering of salty

waters of Caspian Sea during winds into the river for a distance of more than 30km and created huge water supply problems in Neftchala and Salyan regions.

In addition to above described it should be noted that severity of climatic hazards have significantly in creased in all regions of Azerbaijan.

Baku and Sumgayit are high risk cities vulnerable to heat-waves, strong-winds, sea-waves, landslides and mudflows. The frequency and severity of these climatic events are expected to increase in the coming years, and have direct and indirect impact on human health and livelihoods. Coupled with a rapidly growing population, this likely will result in serious implications for public health.

The most significant flood in the Kura River occurred in 2010, resulting in flooding in Salyan, Neftchala, Sabirabad regions and some parts of Shirvan city with flood damages in industrial factories, farmer plants, yards and residential areas, with estimated loses exceeding $500 million.

The April 2003 flood in the Shamakhi-Gobustan region alone affected 31,500 people and caused an economic loss. Earlier, in June 1997, a flood in the Tovuz-Ganja region affected 75,000 people.

The orographic features of Azerbaijan enable west winds to become stronger along the Kura River Basin and mainly in the Caspian Sea coastline. The strong winds in this area also have a direct impact on the severity of the sea-waves in Absheron Guba Khachmaz and Lankaran regions

The intensity of hailstorms has significantly increased in the last 20 years in Azerbaijan and are mainly observed in Shamakhi, Shaki, Tovuz, Ganja and other areas.

The areas prone to landslides in Azerbaijan have expanded significantly in recent years, particularly in Lankaran region and on the Absheron peninsula. Landslides during heavy rains have caused significant damage to human settlements, industry, farms and roads.

Heat waves have already increased in frequency several times in last years and projected increases in dangerously hot days over 35ºC will increase the incidence of heat stroke, heat exhaustion and aggravate cardiovascular and respiratory diseases. The increased incidence of flooding, mudflows and landslides due to changing precipitation patterns will result in additional loss of life throughout vulnerable areas of the country.

Indicators related to some elements of demographic changes per each 1000 persons have also been taken into account during the assessment.

A summary of indicators related to climate stressors—such as temperature increases, reduced precipitation, water shortages, the growing frequency and severity of droughts, heat waves, flooding, sea level changes, and more—along with sensitivity and adaptation capacity, has identified 20 regions as priority areas highly impacted by climate change. These regions are particularly vulnerable in relation to the water sector, agricultural production, and coastal zones.

In selecting regions, in addition to focusing on the above three sectors, consideration was also given to ensuring representation from all areas of the country, including at least one characteristic region from the recently liberated territories. In cases where multiple regions within an area were considered, priority was given to those with the most severe recent climatic hazards and the highest health impacts.

Visit to above selected priority vulnerable regions have been organized to get more precise information on

- ✓ Existing climate change adaptation situation
- ✓ Existing climate change adaptation capacities
- ✓ Recommendations to improve climate change adaptation planning and capacities

20 Regions of Azerbaijan Republic with priority climate change issue

20 Regions of Azerbaijan Republic with priority climate change issues			
1	Yevlax	11	Lankaran
2	Jalilabad	12	Neftchala
3	Agdam	13	Shaki
4	Jabrayil	14	Khachmaz
5	Fuzuli	15	Siyazan
6	Ganja	16	Absheron Peninsula
7	Nakhchivan	17	Salyan
8	Shamakhi	18	Imishli
9	Tovuz	19	Gobustan
10	Sharur	20	Agjabadi

It was planned to meet with representatives of region executive powers, municipalities, agricultural, water management, environment protection organizations, NGOs, private sector, experts in the field of environment and agriculture to discuss issues related to climate change sensitivity, its impact to economy, environment, health of population and different sectors. All these issues were included into a questionnaire containing following questions

- ✓ Climate change awareness in the region
- ✓ Climate change effects in region in general and by sectors
- ✓ Future concerns about climate changes
- ✓ Existing adaptation capacity and adaptation activities in current situation
- ✓ What kind of adaptation can help to address future climatic change impact

Regarding adaptation measures also bellow issues have been included were particularly emphasized in survey:

- ✓ **Rehabilitation of water supply infrastructure:** To reduce water losses, application of water-saving technology in water users sectors, treatment and reuse of water use of rain and other alternative water sources, awareness rising on water saving methods.
- ✓ **Agriculture**: Use of climate change-resistant crop types, crop rotation, windbreak against soil erosion, application of modern irrigation and multination technology.
- ✓ **Coastal zone** Construct protection infrastructure, development of adaptation plan depending on see level change.
- ✓ Early warning and awareness systems: Enhance early warning and awareness rising system in relation to hazardous climatic events.
- ✓ Challenges in climate-relevant technology provision: Address issues related to the application of climate change relevant technology and methods

Field meetings were conducted during the visit to Aran and also other regions where agricultural and water sectors are most vulnerable to climatic changes adaptation measures identified in the Fourths National Communication on Climatic changes have been fully supported and also was expressed concerns were about water shortage situation in recent years during which agricultural crops do not receive the required water norms and crop productivity was low. For example, according to information of farmers in Gobustan in years when irrigation water was sufficient for wheat production productivity was almost 2 times higher than the wheat planted arable land areas in Shamakhi and Agsu.

In Salyan, Zardab, Kurdamir, Ujar, Yevlakh, and Imishli, it was noted that irrigated lands in the Kur-Araz lowland, which are affected by varying degrees of salinity due to high groundwater levels, are among the most climate-sensitive areas. Agricultural practices in these regions should consider multiple factors, including the use of the area's substantial reserves of mineral groundwater for crop irrigation, with appropriate utilization measures.

Discussions also highlighted the vulnerability of winter pastures, which serve as a critical fodder base for livestock, to climate change impacts. In Shamakhi and Shaki, participants emphasized that effective agricultural practices in mountain regions, particularly for crops grown in the foothills and mid-altitude areas, should be grounded in scientific methods.

Key concerns were raised regarding the limited use of soil conservation farming practices and the scarcity of alternative water sources. Suggestions included the creation of artificial reservoirs to collect atmospheric precipitation for irrigation. The Fourth National Communication on Climate Change's recommendations for cultivating heat-tolerant, drought-resistant, and long-growing crop varieties were well-received across all regions. Participants agreed on the need for educational training and material support to implement these measures effectively.

Additionally, agro-technical, agro-chemical, forest reclamation, and hydro-technical measures were discussed as essential for soil erosion control and fertility enhancement. Addressing organizational issues in farming was also noted as a priority, with calls for educational training and financial support.

For coastal areas in Absheron, the Lankaran-Astara region, and the Samur-Davachi lowlands, discussions focused on the impact of Caspian Sea level changes, noting the economic and environmental challenges posed by past rises and the current decline. Efficient coastal zone management, with consideration of both present and future climate changes, was deemed crucial to mitigate the environmental and economic impacts of fluctuating sea levels. It was requested that adaptation measures be developed to address various sea level scenarios.

In Neftchala and Salyan, a primary concern was the reduction in flow and water levels in the Kura River, which, during summer winds, allows saline Caspian Sea waters to flow upstream by as much as 30 km. This salinity (7-9 g/L) poses significant challenges for local water use. A proposal was made to include a solution for this issue among the list of adaptation measures.

In general results of discussions on adaptation measures in relation to climatic change issues in above 20 regions can be summarized according to below tables

N	Regions	Water shortage in results of air temperature increase	Extreme climatic events related problems	Impact of climatic changes on health	Drought and desertification and other agricultural problems	Water, soil, air and other environmental quality related problems	Coastal zone problems
1	Yevlax	+	+	+	+		
2	Jalilabad	+	+	+	+	+	
3	Agdam	In addition to CC impact there are serious environmental problems during occupation period					
4	Jabrayil						
5	Fuzuli						
6	Ganja	+	+	+		+	
7	Nakhchivan	+	+	+			
8	Shamakhi		+			+	
9	Tovuz	+	+		+		
10	Sharur	+	+	+	+	+	
11	Lankaran		+			+	+
12	Neftchala	+	+	+	+	+	+
13	Shaki		+	+		+	
14	Khachmaz		+			+	+
15	Siyazan	+	+	+	+	+	+
16	Absheron Peninsula	+	+	+	+	+	+
17	Salyan	+	+	+	+	+	
18	Imishli	+	+	+	+	+	
19	Gobustan	+	+	+	+	+	
20	Agjabadi	+	+	+	+	+	

It should be noted that selected 20 regions can be considered a priority areas to cover such most climate change vulnerable sectors as agriculture, water resources and coastal zone management.
This was based on results of climatic conditions, observed climatic hazards climate changes and priority sector in these regions.
During discussions in region, it was confirmed that selected regions were most relevant to develop and implement adaptation measures depending of considered sector.
Proposed in this NAP document adaptation measures can be used for region authorities and other organizations to adopt to climatic changes.

INITIAL NATIONAL ADAPTATION PLAN

CONTEXT OF CLİMATE CHANGE

AZERBAIJAN 2024

5. CONTEXT OF CLIMATE CHANGE

5.1. Water resources in the context of climate change

Renewable water resources. According to information of Azerbaijan State Water Resources Agency, surface water resources of Azerbaijan Republic including transboundary waters vary between 28.5 -30.5 km³. Of which share of transboundary waters made is about 19-20.5 km³ and 9.5-10 km³ belong local river flow. With the exception of the Samur River, the share of rivers flowing directly into the Caspian is 2.2-2.5 km³ s, of which 1-1.1 km³ belong to the flows of rivers of the northeastern slopes of the Greater Caucasus, and 1.2-1.4 km³ to the Lankaran natural region. The total water resources of Azerbaijan local rivers flowing into Kura, Ganikh and Araz from the territory of Republic is 7.5-7.8 km³.

In dry years water resources reduce till 22,6-27,0 km³ (with share of transboundary waters of 14,3-17,1 km³).

Upstream countries annually abstract about 25% of water resources of transboundary rivers. In result annual water resources entering to Azerbaijan from territories of neighbouring countries be transboundary are about 13,5-14 km³. Therefore, in total together with water resources of local rivers available water resources of the republic have been around 23,0-24,0 km³ in last century.

The potential reserves of underground water in Azerbaijan are 9.0 km³ (or 24657.5 thousand m³/day), and the confirmed reserves are 4.38 km³ (or 11930.9 thousand m³/day), of which 10358.7 thousand m³/day minerality is 1 up to g/l, and 1572.2 thousand m³/day are underground waters with 1-3 g/l (slightly saline). Mineral water resources of 18,885 thousand m³/day, industrial water resources of 365,3 thousand m³/day in the territory of the Republic. 249000 m³/day thermal water resources are available.

All the information related to water balance of country have been approved by the Cabinet of Ministers of the Republic of Azerbaijan.

Lakes. Azerbaijan has a total of nearly 250 lakes. Most of them are small, while Hajigabul, Sarysu, Masazyr, Jandargol, and others are relatively large. The lakes of the middle and high mountain areas (Goygol and Maralgol of the Kurekchay Basin, Major and Minor Alagoller of the Shamkir River Basin) are extremely aesthetically pleasing. The lakes of Azerbaijan have erosion-glacial, erosion-river, tectonic, and abrasive origins.

There is a number of standing and salt relict lakes in the Absheron peninsula. In the summer, most of the lakes dry up and become saline. Mountain lakes are used for the purposes of cattle watering, irrigation, fishing (Hajikabul, Sarysu, Aggol, and others), while the saltwater lakes of the Absheron peninsula are used to produce chemical agents as well as for medical treatment.

The lakes of the upland stream of rivers: the Bababat group of lakes, Ganlygol (the Nakhchivan River Basin), Goygol (the Shamkirchay River Basin), and others have turned into water reservoirs. They supply additional volumes of water to rivers in the summertime.

Glaciers. Azerbaijan has several glaciers within its territory. They mainly span the Bazarduzu (with an area of 3.62 sq.km.), Bazaryurd (1 sq. km), Tufan (0.51 sq. km), and Shahdag (1.08 sq. km) peaks of the Major Caucasus Mountains. One can also come across other areas of eternal ice that can be found at a height of 4,000 meters above sea level.

Water reservoirs. The climate in most parts of Azerbaijan is semi-arid. To expand the areas of irrigation in a dry climate and to provide water to agricultural lands, many small and large reservoirs, water intakes and storage tanks have been created. Currently there are 153 reservoirs in the country, where the total volume of reservoirs is around 21.9 billion m3. Most reservoirs are regulated and used for irrigation.

There are 61 reservoirs with a volume of more than 1 million m³ each. During the occupation of Armenia, Azerbaijan was deprived of the use of reservoirs with a total water capacity of more than 640 million m³. The Sarsang Reservoir, with a capacity of 565 million m³ in the formerly occupied territories, was capable of providing water to irrigate over 100,000 hectares of land.

Reservoirs are essential for supporting both livelihoods and agricultural development in Azerbaijan by regulating floodwaters and producing energy. As a country facing increasing water scarcity, particularly under the pressures of climate change, Azerbaijan depends on reservoirs for reliable water storage and regulation. Rising temperatures and unpredictable rainfall patterns have intensified the need for consistent water sources to meet growing domestic and agricultural demands, especially during dry periods. In rural areas, where agriculture is a primary livelihood, the availability of irrigation water from reservoirs is crucial. Limited rainfall makes these communities heavily reliant on irrigation to grow crops and sustain livestock. Reliable water storage through reservoirs not only supports food production but also bolsters the economic stability of these rural populations.

Without adequate water storage and management, water scarcity would lead to reduced agricultural yields, economic instability, and increased climate vulnerability. Thus, reservoirs play a critical role in securing Azerbaijan's water resources, sustaining rural livelihoods, and mitigating the adverse impacts of climate change.

Some of the major reservoirs and hydroelectric stations created in the major rivers are Mingachevir, Shamkir, Yenikand, Varvara, Araz and Sarsang. These facilities serve multiple purposes, including energy production irrigation and water supply.

The largest water reservoirs (Mingachevr, Shamkir, Araz, and Sarsang reservoirs) are designed for multi-purpose use, while most other ponds are used exclusively for irrigation.

№	Reservoir	Surface area, km^2	Capacity, km^3
1	Mingachevir reservoir	605	15.730
2	Shamkir reservoir	116	2.680
3	Yenikand reservoir	23.2	1.580
4	Aras Dam	145	1.254
5	Sarsang Reservoir	14.2	0.565
6	Taxtakorpu Reservoir	8.71	0.270
7	Jeyranbatan reservoir	13.9	0.186
8	Aghstafachay reservoir	6.3	0.120
9	Varvara reservoir	22.5	0.060
10	Xanbulanchay reservoir	24.6	0.052
11	Xachınchay reservoir	1.76	0.023

The largest reservoir is Mingachevir (1953). Area - 605 km^2, volume- 16.1 km^3, length-70 km, max. width-18 km, the average depth is 27 m, the largest is 75 m. The altitude is 83 m. Is used for energy, agriculture, water transport, multi-year flow regulation and etc.

The Shamkir reservoir was built on the Shamkir section of the Kura River in 1982. The total volume- 2,677 mln.m^3, operational capacity- 1425 mln.m^3. The normal water level in the tank is 158 m, and the surface area is 115 km^2.

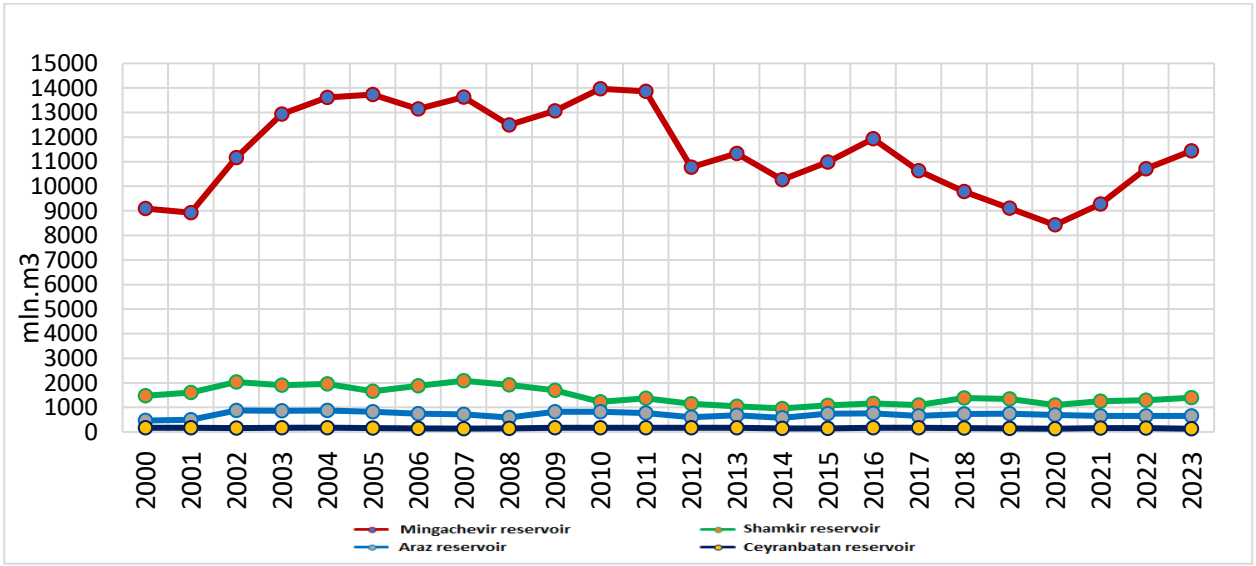
The Yenikand reservoir is a large reservoir in the Shamkir district. It is the third largest reservoir in the Caucasus after the Mingachevir and Shamkir reservoirs. The water volume in the reservoir is 158 mln m^3.

The Varvara reservoir is located 20 km to the south of the Mingachevir reservoir. It was built in 1952. The total area is 22.5 km^2, and the reservoir volume is 60 mln m^3

			
Jeyranbatan reservoir (1958) is located in the Absheron. It was built in to provide drinking water to the growing population of Baku and Sumgayit. The reservoir volume is 186 mln m^3	The Sarsang reservoir (1976) on the Tartar River, in Tartar district. Volume 565 mln m^3. During occupation period over 30 years around100,000 hectares of agricultural land in the areas of Tartar, Agdam, Barda, Goranboy, Yevlakh and Aghjabadi remained without the irrigation water.	The Agstafachay reservoir was built on the Agstafa river in 1969. The total volume of the reservoir is 120 million m^3. The reservoir provides irrigation water up to 135 hectares of land in the Qazakh, Shamkir and Tovuz regions.	The strategically important role in water supply for the cities of Baku, Sumgayit and the entire Absheron belong the Tahtakorpu water reservoir. The construction of a hydroelectric complex also increased the additional energy potential of nearby areas.

- Currently, water supply for Azerbaijan's population, industry, agriculture, energy, and other economic sectors relies on the existing network of water reservoirs, canals, pipelines, sewerage, and purification systems. However, the increasing population and rising demand for agricultural and consumer products are expected to drive up water consumption, underscoring the need for thorough planning to ensure efficient water resource management.

  It is also important to note that reductions in transboundary water inflows have significantly decreased water discharge levels in the lower Kura River. In recent years, reductions in the water levels of major reservoirs and abstraction volumes from primary canals have been observed (excluding the last three years, during which water discharges from transboundary rivers increased). This trend is largely the result of reduced river flow (see Figures below).

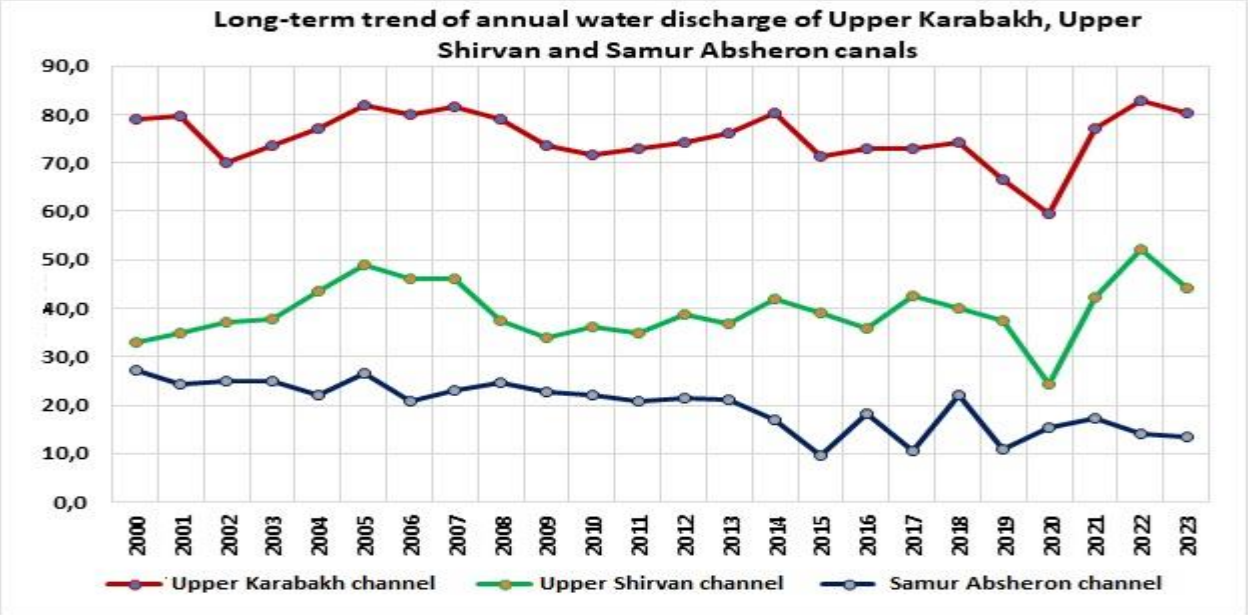


Irrigation and reclamation. Currently, out of 2 million square kilometers of arable land in Azerbaijan, where as 1.5 million out of them are irrigated areas, which contain about 90% of the total productivity of agricultural lands. Complex reclamation measures were applied to 610,000 hectares of irrigated land, and collector-drainage networks were installed for those areas. The Upper Garabagh canal and the Shirvan irrigation canal are two major channels in Azerbaijan.

Azerbaijan's agricultural sector heavily relies on irrigation, with approximately 60-70% of the nation's water resources dedicated to this purpose. The Shirvan irrigation canal, one of the country's primary

channels, plays a crucial role in this system. Recognizing the canal's significance and the challenges posed by its aging infrastructure, President Ilham Aliyev issued a decree on April 8, 2024, initiating its comprehensive reconstruction. This project aims to enhance the canal's capacity to 180 cubic meters per second and extend its length to 204.3 kilometers, ensuring it meets modern standards and effectively supports the irrigation needs of Azerbaijan's agricultural lands

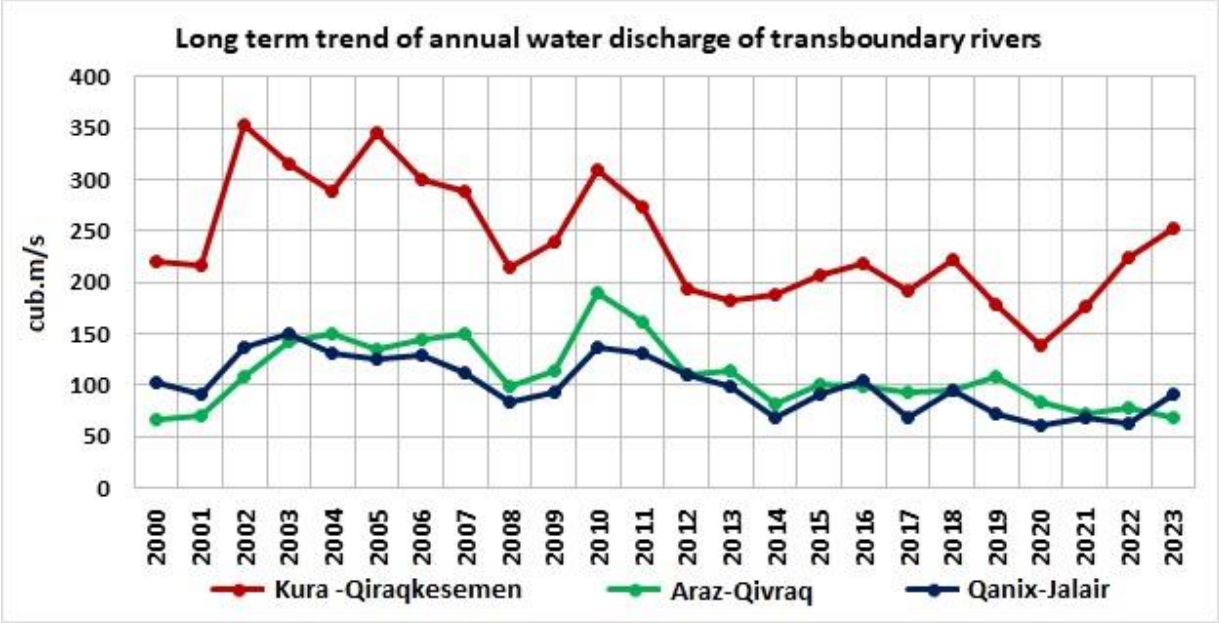
In 2022, 13.7 billion m^3 of water was withdrawn from water sources. 10.7 billion m^3 of it was taken from surface sources, 3 billion m^3 from underground sources. In total, 3.6 billion m^3 (ie 26%) of the taken water was considered as loss. https://www.stat.gov.az/source/environment/



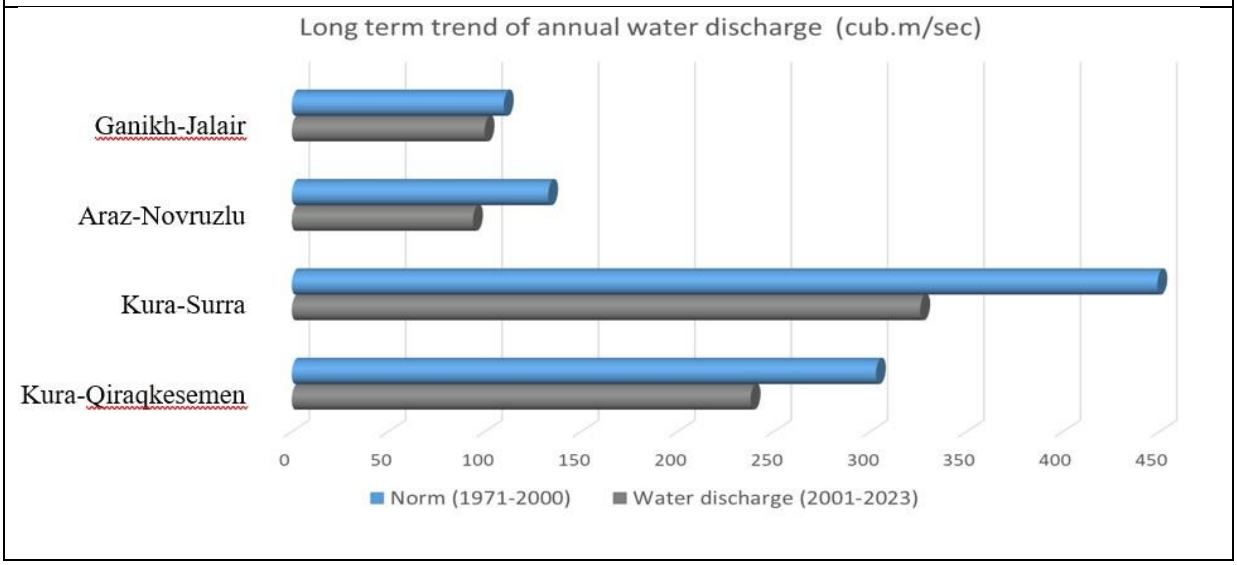
5.2. Current impact of climate changes on water resources

Over the last decade, climate change has posed a multi-faceted challenge to Azerbaijan's water security. On one hand, the country faces the destructive force of nature through increasingly severe floods, particularly during spring. On the other hand, increasing summer heats bring prolonged droughts, putting immense stress on Azerbaijan's water resources. These events not only endanger agricultural activities, but also threaten infrastructure and endanger lives and livelihoods. Moreover, the variability in precipitation patterns intensifies water scarcity issues, challenging ability to meet the growing demands of population and economy. Significant flow reduction had been observed in both: local and transboundary rivers.

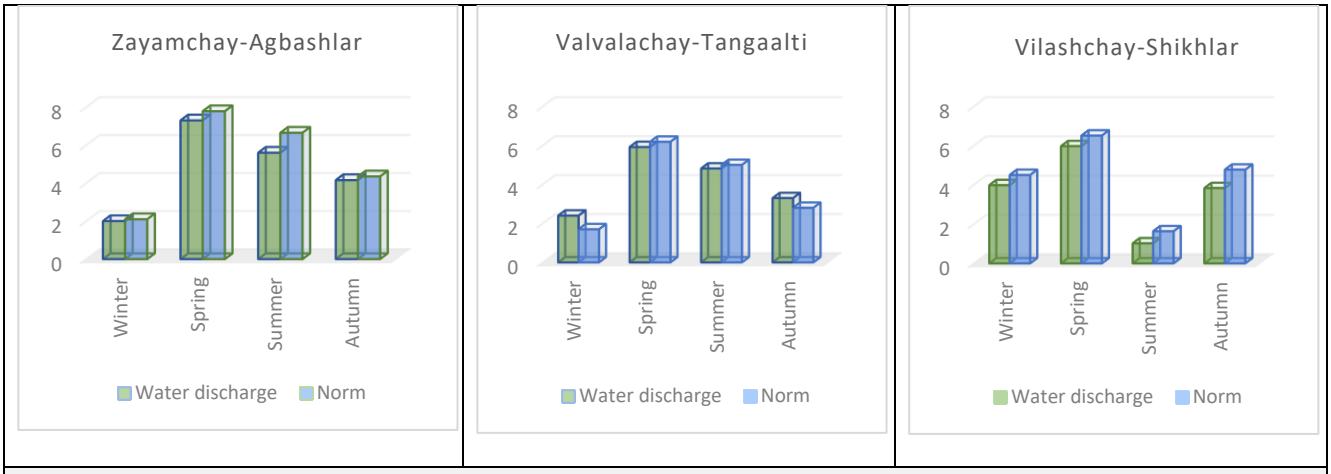
It can clearly be seen from below figures how negative trends are occurring in long term changes of annual water discharges of transboundary rivers.



In comparison to the amounts of water resources in previous climatic norm period (1971-2000) during 2001-2023 water resources of transboundary and local rivers have been reduced significantly. This can be seen from below figures.



Flow reductions in local rivers have been observed throughout the year, with particularly significant decreases in water discharge rates (m³/sec) during the summer months (see figure below).



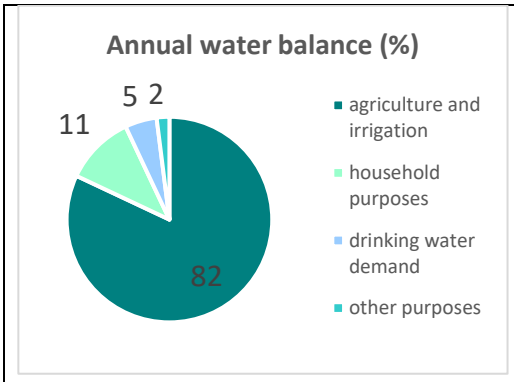
In the last 23 years, the trend of water discharges in different parts of the inland rivers has been observed.

The assessment of change of water resource s in 2001-2023 compared to 1971-2000 shows that the annual decrease during the last period ranges from 7% to 27%. Using cumulative integral curves, it was monitored whether the changes shown are related to human activity and climate changes.

Comparative change of water resources of the Republic in 2001-2023 and 1971-2000 by seasons

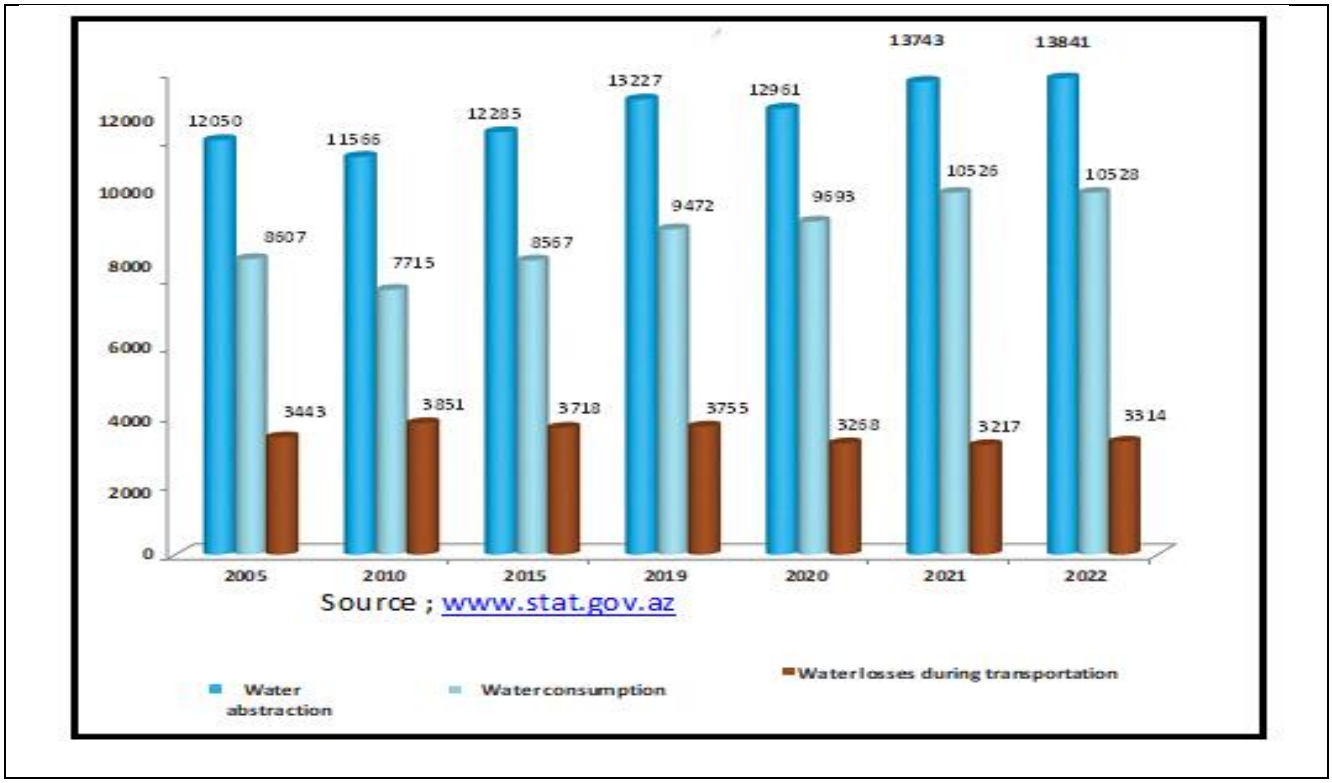
Currently under climate change impact in average water resources of country are reduced by 15%. Also 25% of transboundary waters are taken by upstream countries for various purposes use and only 13.5-14.0 billion m^3 of water enters the territory of Azerbaijan. Therefore, in last 23 years water resources of the country in result of upstream water abstraction and climate change impact are reduced till 19.0-21.0 billion m^3.

Water Use Issues: In the context of worsening climate change and limited water resources, the presence of multiple independent institutions in Azerbaijan's water sector has created significant challenges in coordination and management. Ensuring a reliable water supply has been designated as a priority in Azerbaijan's socio-economic policy. The establishment of the State Water Commission and, subsequently, the Azerbaijan State Water Resources Agency, aims to create a centralized and unified water resource management mechanism. Despite the inefficiencies in current irrigation methods and infrastructure, the irrigation sector remains the largest water user, managing extensive irrigation systems across the country.

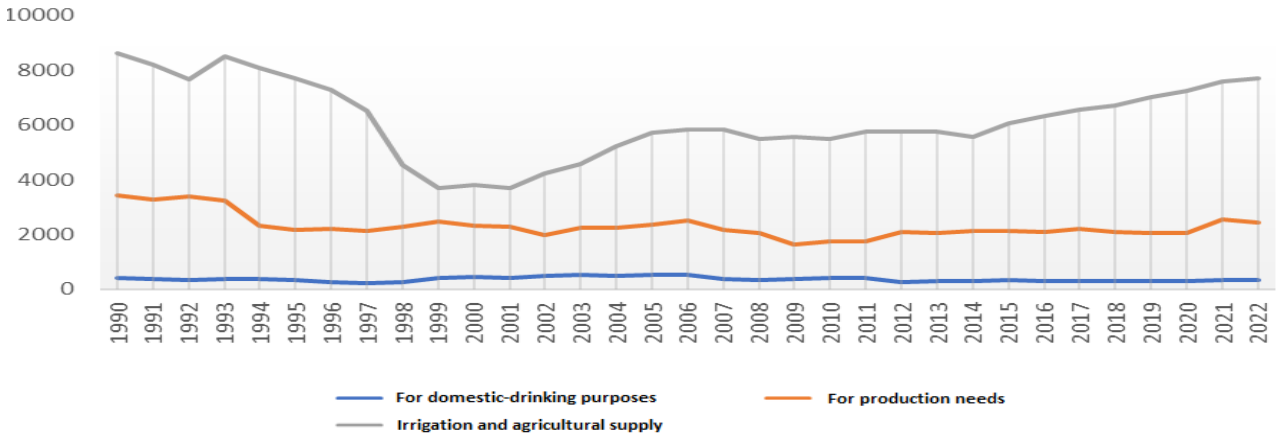


According to the annual water balance of the Republic of Azerbaijan, over 3 billion m^3 of water is lost during transportation, while approximately 9 billion m^3 is utilized. Of these, nearly 82% is used for agriculture and irrigation, 11% for household purposes, 5% for meeting the drinking water demand of the population, and 2% is used for other purposes

Water losses in agriculture are high, highlighting the need for infrastructure rehabilitation to reduce losses. Additionally, modern water use technologies must be implemented in various sectors to improve water use efficiency



Multi-year change of water consumption by sectors is provided below. Notably, the main water losses occur in the main irrigation canals built on the ground and intra-farm irrigation networks.



https://www.stat.gov.az/source/environment/

The irrigation infrastructure needs to be rehabilitated and modernized, transferred from soil-based ones to pipelines or concrete canal systems to reduce water losses due to leakage and evaporation.

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

- Uneven distribution of water resources across the country;
- Forecasted further exacerbation of water scarcity due to climate change;
- Limited access to safe drinking water for some rural residents due to inadequate water supply infrastructure;
- Uncontrolled use of water bodies;
- Pollution of rivers from human activities;
- Pollution of transboundary rivers;
- Reduced water flow from transboundary water bodies into the country;
- Higher flooding and increased silting of rivers;
- Dam safety issues;
- Lack of security/controlled access to protected sanitary areas around water bodies and irrigation systems;

- Water management deficiencies; especially at field level, low capacity of Water User Associations
- Lack of proper agrotechnical preparation method and tools, water losses continue through on-farm irrigation networks;
- Flow losses due to anthropogenic impact on river channels and environmental flow related issues.

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

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

5.3. Vulnerability of the agricultural sector to climate change

Global climate change has become a pressing environmental issue that threatens humanity's future survival and development, drawing widespread attention of government and the global academic community.

Agriculture is among the sectors most vulnerable to climate change, with even slight warming potentially impacting agricultural productivity and related activities. Since the 1990s, scientists worldwide have focused on the vulnerability of agro-ecosystems and agricultural production to climate change.

According to the IPCC assessment report, agricultural vulnerability is the expression of agricultural sensitivity and adaptive capacity to climate change, and it changes based on location, time, socio-economic and environmental conditions. Vulnerability is composed of three main components: exposure, sensitivity, and adaptive capacity.

• **Exposure** describes the extent and characteristics of a system's exposure to significant climate variability.

• **Sensitivity** refers to the degree to which climate-related factors influence a system, including both positive and negative effects.

• **Adaptive Capacity** is the system's ability to derive benefits and minimize losses in response to actual or anticipated climatic stimuli and impacts.

Climate change is already having an impact on Azerbaijani agriculture, and it will undoubtedly have a considerable impact on cropping, livestock systems, and land values in the future. It also affects the prevalence of pests and pathogens and alters production costs by shifting surface temperatures, rainfall patterns, and regional climate variability. Besides the agricultural sector, the water sector and coastal regions are the most vulnerable to climate change in Azerbaijan.

Given Azerbaijan's location in a sensitive ecological zone, assessing agricultural vulnerability to climate change is a crucial step toward developing resilience measures. It is essential to study the effects of climate change across different regions, devise effective adaptation strategies, and promote sustainable agricultural development, thereby providing a scientific basis for informed decision-making. Climate change vulnerability assessment remains a relatively new field in Azerbaijan, requiring extensive research to support adaptation efforts.

5.4. The Caspian Sea ecosystems and level fluctuations in the context of climate change

The Caspian Sea, often considered a lake due to its geographical features, is the world's largest enclosed body of water. Throughout its history, the Caspian Sea has experienced fluctuations in water levels. In 2024, the sea covers an area of approximately 371,000 km², a significant increase from around 40,000 km² in 1991. Bordered by Azerbaijan to the west, Russia to the northwest, Kazakhstan to the northeast, Turkmenistan to the east, and Iran to the south, the Caspian Sea holds substantial economic importance for these surrounding nations.

The coasts of the Caspian Sea of Azerbaijan, which is nearly 800 km long, are quite densely populated and intensively developed in terms of industry. According to the State Statistics Committee, at the

beginning of 2024, more than 5,200,000 people live in Guba-Khachmaz, Absheron-Khizi, Baku, Shirvan-Salyan and Lankaran-Astara economic regions adjacent to the Caspian Sea. More than 50% of the country's population, is directly or indirectly related to the Caspian Sea.

Climate change impact on the Caspian Sea level. The Caspian Sea has rapidly fluctuating coastlines that affect all coastal areas. These level changes occurred sharply several times during the periods of instrument observations. Stationary observations, which were carried out over the period 1830–2005, illustrate level fluctuations of the sea. The last short-term sea-level cycle started with a sea-level fall of 3 m from 1929 to 1977, and again, a sea-level rise of 3 m from 1977 onwards until a high stand was reached in 1995. Since 1995, the sea level has been falling rapidly again, currently reaching nearly -29 meters. This happened in the frame of climatic change by increase of air temperature and evaporation, reduction of precipitation and river run-off.

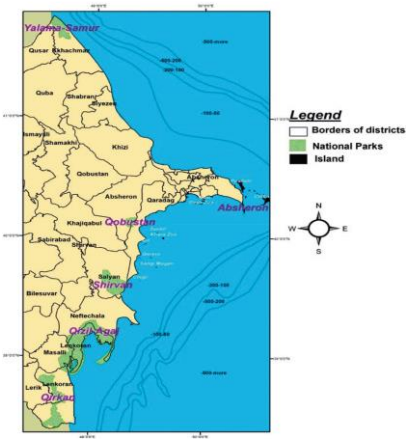
Several scientific studies predict that the level of the Caspian Sea will continue to decline due to climate change, which will increase evaporation from the sea surface.

Ecosystem services of the Caspian Sea

Provisioning Services	Regulatory Services	Cultural Services	Supporting Services
Fish, seafood, game meat from birds, sand and construction materials, table salt, washing, and drinking water	Maintenance of air quality (natural air filtration), temperature regulation	Recreation and tourism (cruising, swimming, kayaking, solar baths)	Role in nutrient cycling
Water for non-consumptive use (for navigation and washing)	Impact on air temperature	Existence values (personal satisfaction)	Predator/prey relationships and ecosystem resilience
Aquatic organisms for food and medicines	Wind power	Aesthetic viewing, sports, and leisure, sea voyages	Sheltering valuable fish and bird species, Caspian seals

The Azerbaijani shores of the Caspian Sea stretch for 825 km and include 20 large islands. These islands and beaches offer excellent potential for diverse resort activities, with notable locations such as the beaches of the Absheron Peninsula and the Nabran resort area being especially suited to tourism. The coastal areas of the Caspian Sea enjoy sunshine year-round, with fine sandy beaches that provide abundant recreational resources, making them ideal for developing resort activities.

Biodiversity and environmental problems. The Caspian Sea, along with its surrounding wetlands and lakes, is vital for the wintering and survival of migratory birds. Coastal wetlands provide rich habitats for numerous mammals and serve as an essential food source. These ecosystems, covering a total area of 200,000 hectares, host hundreds of thousands of bird species, making the Caspian wetlands a crucial biodiversity hotspot.



The Gizylagaj, Shirvan, Absheron and Samur-Yalama National Parks located on the shores of the Caspian Sea were created to protect ecosystems located on the sea coast. More information can be found at WEB site of MENR (www.eco.gov.az)

It is also necessary to emphasize the Caspian islands close to the shores of Absheron peninsula. Some islands are home to gazelles that were once released for breeding purposes.

Sea level changes affect flora and fauna and disrupt the fragile balance of local ecosystems. Changes in salinity and water levels can threaten species that rely on stable habitats. The fishing industry can be adversely affected by changes in water levels, which can alter fish

habitats and migration patterns. In addition, tourism may decrease due to damaged beaches and natural attractions. Roads, harbours and other infrastructure may be at risk of flooding and erosion, leading to costly repairs and maintenance.

As different countries bordering the Caspian Sea face different impacts from level fluctuations. Solving these issues requires comprehensive planning and cooperation among the countries surrounding the Caspian Sea to manage the common problems arising from changes in the level of the Caspian Sea.

Fluctuations in sea level are accompanied by various effects on both marine ecosystems and coastal terrestrial ecosystems

Impact of sea level reductions on biodiversity

	Main manifestations	**Main impact areas**
Costal habitat Loss	Reduction of coastal wetlands and lagoons Reduction of breeding areas for the Caspian Seals Reduction of food	Gizilagaj, Şirvan, Absheron and Samur-Yalama National parks, Yashma and Agzibirchala wetlands
Stress on Aquatic Species	Changed water temperature and increased concentration of chemicals Reduction of dissolved oxygen	All coastal areas and fish habitats
Changed Migratory patterns	Reduction of migratory bird species	All coastal areas and protected territories
Impacts on the Caspian Seals (Puza capsica)	Reduction of breeding and resting areas Reduced food Higher water temperatures	All coastal areas

The history of fish production on the Azerbaijani shores of the Caspian Sea goes back to ancient times. Until the 1960s, the Caspian Sea accounted for 90 percent of the world's sturgeon and black caviar production. Historically, the people living on the shores of the Caspian Sea have had a very stable source of income and livelihood through the production of fish and black caviar.

The warmer water temperature throughout the year, the acidic water conditions and the abundance of rivers flowing into the Caspian Sea have created river-marine ecosystems that are very suitable for fish species. The ichthyofauna of the Caspian Sea consists of 124 species. Although ichthyofauna in the Caspian Sea is somewhat weaker than in other seas, in terms of productivity, industrial fishing has always been at a very high level. Historically, the Caspian Sea has been the center of world sturgeon production, and the amount of sturgeon caught and black caviar produced here accounted for 90% of world production. Beluga or European sturgeon (Huso-Huso), Persian sturgeon (A. persicus) and Russian sturgeon (A. gueldenstaedti) are the most valuable representatives of Caspian sturgeon (Billard & Lecointre, 2001). Naturally, these species mainly migrate to rivers in March–April and October–November, spawning on rocky grounds in the areas close to outlets.

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Several factors contribute to the decline of fish stocks in the Caspian Sea, with climate change and lowering sea levels playing significant roles. As the sea level drops, fish spawning grounds have sharply diminished. Additionally, the decrease in river flows into the sea has severely impacted the sea-river ecosystems essential for fish reproduction. Valuable fish species, many of which are migratory, rely on river access for spawning. However, the reduction of water in these ecosystems has disrupted their natural migratory pathways, reducing spawning opportunities. In some cases, rivers flowing into the sea, such as the Kura River, dry up, halting fish migration entirely. Climate change further aggravates this issue by lowering water levels in smaller rivers, further limiting the spawning habitats for these critical fish species.

Impact of the reduced sea levels on the fish populations

Impact	**Main manifestations**	**Main impact areas**
Loss of sea-river linkages	Reduction of spawning grounds	All fisheries

Higher temperatures	Increased concentration of chemicals Reduction of dissolved oxygen	All fisheries
Shallow sea	Increased thermal stratification	All fisheries
Reduced food	Reduction of breeding	All fisheries

Tourism.

Azerbaijan's coastal zone, particularly in the Nabran-Yalama, Gilazi-Zarat, Absheron, and Lankaran-Astara regions, is a valuable area for health and recreation. However, fluctuating Caspian Sea levels pose a significant threat to these landscapes and their health and tourism benefits. With year-round sunshine and fine sandy beaches, the Caspian coast offers abundant resources for recreational activities, making it ideal for resort development. Yet, in the past 20 years, declining sea levels have seriously impacted tourism enterprises. In areas like Novkhani-Pirshaghi, Nabran-Yalama, and Gilazi-Zarat, the sea has receded by 500-1,000 meters from the primary coastal zones. This receding shoreline is often shallow, limiting the potential for water-based recreational activities. Consequently, many coastal recreational facilities are now far from the water, complicating tourism operations. Reconstructing tourism facilities closer to the sea is risky due to the uncertainty surrounding future sea level changes. A potential rise in sea levels could flood these reconstructed facilities, posing a threat to tourism infrastructure and activities.

Consequences of the sea level changes in the tourism infrastructure

- The appearance of saline lands along the coastal line, salinization of lands due to salt storms
- Increased sandstorms in windy weather
- Problems in coastal touristic infrastructure in Nabran-Yalama and Absheron penincula
- Problems in recreation and tourism facilities, loss of beaches
- The shallowing of the sea and the beach becoming unusable

Sea transport As the Caspian Sea serves as a major transport route for regional trade, fluctuating water levels disrupt shipping and require infrastructure adjustments.

Due to the decrease of the depth at the entrance to the ports, it became necessary to lower the loading of ships below the normal cargo carrying level. As a result, the loading on ferry-type ships has decreased by 1,000-1,500 tons, that is, a ship with a carrying capacity of 4,600 tons (or 52 wagons) can now carry 3,100 tons (or 42 wagons). The loading capacity of dry cargo ships is 600-700 tons, depending on the ports, decreasing from 5200 tons to about 4500 tons. As for tankers, while the capacity of 5,000-ton tankers does not change much, the capacity of large 13,000-12,000-ton tankers decreases to 3,000-5,000 tons in certain ports. As a result of the decrease in the depth, the decrease in the cargo carrying capacity of the ships leads to a decrease in economic efficiency as well as a decrease in the energy efficiency of the ship, which in turn leads to an increase in emissions, leading to the creation of a closed chain related to climate changes.

Dredging has become a critical component for maintaining operational access to the Bibiheybat Ship Repair Plant and the Zigh Ship Repair and Construction Plant, both of which are essential facilities under ASCO. However, dredging presents several challenges, especially in areas close to infrastructure like bridges. Here's a closer look at the implications:

Sediment collection in harbours and along navigation channels restricts access to these ship repair and construction facilities. Dredging is necessary to maintain sufficient depth, allowing ships to reach these plants for repairs and maintenance. Dredging near bridges requires careful planning, as the removal of sediment can destabilize nearby structures, potentially compromising the integrity of bridge foundations. Special techniques and reinforcements may be needed to minimize impact, which increases operational costs and project complexity. Performing dredging in sensitive areas, particularly near bridge infrastructure, requires additional engineering assessments and possibly specialized equipment to ensure safety. These precautions drive up project costs, and continual sediment management adds to ongoing expenses.

Other Economic Problems. Decreases in the sea level have hurt many infrastructure facilities. For example, the Shimal DRES thermal power plant has serious difficulties in obtaining cooling water from the Caspian Sea. The shallowness of the sea also harms the operation of ports, preventing ships from approaching ports. For example, in the ports of Alat and Zira, special canals were dug to bring ships closer to shore, and wharves were extended into the sea. Another problem with the shallow sea is the oil

industry. Thus, if the sea level continues to fall, then it may be difficult for ships and tankers to approach oil rigs.

Expansion of coastal areas due to declining levels may lead to the formation of dust and salt fortifications in the future. If the sea continues to fall, extensive saline and sandy areas will form along the coast, which will cause sandstorms in the surrounding areas.

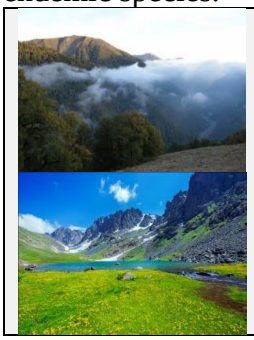
Socio-economic problems that may arise as a result of the sea level declining are shown in the table.

Social problems	Results
Loss of Livelihoods	Communities that depend on fishing, agriculture, or tourism may suffer economic hardship as changes in the sea level disrupt these industries. This can lead to increased poverty and unemployment.
Health Issues	Environmental degradation, such as pollution concentration and habitat loss, can lead to health problems for local populations, including waterborne diseases and diminished food security.
Cultural Heritage Loss	The erosion of coastal areas can threaten historical and cultural sites, impacting community identity and heritage, which can lead to a loss of cultural continuity.
Increased Migration	Economic hardships and environmental challenges may push people to migrate to urban areas or other regions, leading to urban overcrowding and associated social problems.
Community Resilience Challenges	Fluctuating sea levels can test the resilience of communities, particularly in rural areas with limited resources to adapt to environmental changes.

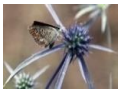
5.5. Climate Change Resilience of Mountain Ecosystem

5.5.1. Mountains of Azerbaijan and their ecosystems

Mountain ecosystems are known for their high levels of biodiversity, often harbouring unique and endemic species.



Azerbaijan's mountainous regions are distinguished by their rich biodiversity, driven largely by climatic variations with altitude. The Caucasus Mountains are located in a unique region where a wide range of climatic zones exist, and this altitudinal variation significantly influences ecosystem diversity. The most common ecosystems in the Caucasus Mountains include semi-deserts, steppes, forests, and subalpine and alpine meadows, each with distinct vegetation and fauna. This diversity makes the Caucasus Mountains one of the world's richest areas in terms of biodiversity.



Flora The country's flora includes 5,000 plant species in 176 families and 1,142 genera. In terms of the total number of species, the flora of Azerbaijan is much richer than in the other republics of the South Caucasus. Plant species found in the country account for 66% of the total number of plant species growing in the Caucasus. The Republic of Azerbaijan is rich in relict species rooting back to the tertiary period. There are over 240 endemic plant species in the country. Broad-leaved forests are spread at an altitude of 600-1800 m above sea level in the mountainous areas of the Greater and Lesser Caucasus. Coniferous forests occur locally in the Eldar plain (Eldar pine), in the mountainous regions of the Greater and Lesser Caucasus, and around Goy-Gol.

Fauna The fauna of Azerbaijan includes 100 species of mammals, 360 species of birds, 61 species of reptiles, 10 species of amphibians, 100 species of fish, and more than 15,000 insects.About 25,000 species of invertebrates were found in Azerbaijan, 90% of them belong to the type of arthropods. 90% of them are insects (Insecta).

Forests and their ecosystem services for region and local communities. The forest fund area of our republic is 14% of its total area and makes 1213.7 thousand hectares. Forest areas are 1,021,000 hectares, which covers 11.8% of the territory of the Republic.

The forests are classified for five ecological regions in Azerbaijan: The Greater Caucasus Mountains, the Lesser Caucasus Mountains, the Kura-Araz valley and floodplain, the Talish-Lankaran zone, and the Caspian Sea.

Being one of main components of environment forests play an important role in prevention of climate changes, expansion of desertification processes, biodiversity loss, violation of gas balance in the atmosphere and so on.

4,500 species of higher plants belonging to 125 families and 930 genera are distributed in Azerbaijan. Of these, 450 types of trees and shrubs belonging to 48 families and 135 genera grow in the forests of our Republic. This is 11% of the flora of the Republic. There are 70 regional endemic species in the dendroflora of Azerbaijan. This means 16% of the total tree and shrub species.

The area covered by forest is distributed according to the dominant genera approximately as follows: peanuts 32%, oak 31, 4%, walnuts 22.5%, poplar 2.7%, alder 2.1%, the remaining 9.3% and other generas have been determined. Although the composition of the forests is diverse, the broad-leaved forests are mainly formed by beech, oak and hemlock. 85.9% of the area covered by forest belongs to these three species.

Most of Azerbaijan's forests (85%) are located on mountain slopes and have soil-protecting, water-retaining and climate-purifying, sanitary-aesthetic, etc. is important.

Forests play the main role in preventing soil erosion, protect waters and provide habitat for most of the terrestrial animal species.

The subalpine zone is mainly covered with low spruce, pine, fir and beech forests, including endemic birch species, Betula medwedewii and Betula megrelica. Beside grassland, tall herbaceous vegetation can be found in this zone, which is typical for very few mountain ecosystems (Alps, Himalayas, Pamirs). In the alpine zone, from 2500 to 3000 m, grass meadows prevail, and areas of rhododendron and rock vegetation can also be found.

In the subalpine zone, mountain slopes are predominantly steep, causing rainfall and melting snow to flow over the surface and form numerous tributaries. Below, in the forest zone, these waters are absorbed by the forests and gradually seep into the ground. At lower elevations, this groundwater emerges as small springs.

Mountain steppes at lower altitudes are used for agriculture, supporting crops, vegetables, fruit trees, and fodder plants. Many wild species found here are ancestors of domesticated fruit trees, such as pear and almond. Dry scrub forests, consisting of juniper, pistachio, maple, and almond, coexist with various scrub species.

Forests play a crucial role in river flow formation. In these regions, surface runoff mainly occurs during snowmelt or periods of rainfall, and rivers often dry up in summer. Particularly in the river basins along the southern slope of the Greater Caucasus (such as the Shirvan rivers) and in Nakhchivan, forest cover is minimal, often less than 5%. As a result, these rivers have low annual runoff and frequently dry up in the summer.

The lack of forest cover in these areas exacerbates flood risks during intense rainfall or snowmelt, with maximum discharges often dozens of times higher than average values. This absence of forests also promotes soil erosion and increases susceptibility to landslides.

The mountain communities are in close contact with nature and use natural resources. Mountain pastures are used for grazing animals and storing food for animals in winter.

Rivers, Lakes and Wetlands. Many rivers of this territory have their origins in the mountain wetlands. They provide many of settlements use their water for drinking, irrigation, agriculture and etc.

With forest coverage in the Shaki-Zagatala zone reaching 27%, this region has the highest runoff coefficient in the country. The water quality is high, and the waters are fresh. Observations indicate that soil moisture in forested areas is 2.5 to 2.8 times higher than in non-forested areas. These regions also have high and stable groundwater levels, contributing to their overall hydrological stability.

20% of basins of Agstafachay, Tovuzchay and Zayamchay rivers is covered by forest. This leads to sufficient increase of their run-off.

The role of ground waters in feeding of rivers of Gobustan is low. Because of absence of forest ground waters make up 5% of total, but at the river Pircagat of neighbouring territory with higher forest areas this figure exceeds 15%.




Wetlands also take an active part in shaping the beautiful ecosystem of Greater and Lesser Caucasus mountains areas including climate of the territory.

Water resources and wetlands in the mountain areas are used as a source of water, fishing area, and has cultural, social, and spiritual values. There are plenty of lakes in mountain zones. The highest mountain lake is Tufangol Lake (3,277 m) located in Damiraparanchay River basin.

Aesthetic values are the value created by the beauty of natural landscapes, including water sources. These values include waterfalls, canyons of mountain rivers, and the appearance of lakes. The best example of aesthetic value is Goy Gol.

Mountain Pastures. Azerbaijan mountains also have summer pastures as a food basis of livestock and its productivity decreases as a result of climate change or overgrazing, and often the values based on the existence of those pastures gradually lose their significance.

The summer grassland ecosystem has favourable microclimate conditions. The abundance of oxygen here also increases the possibilities for treatment and health. From this point of view, Chukhuryurd-Avakhil direction in Shamakhi, Khan plateau area in Shaki, Fil-Fili and Khalkhal area in Oghuz, Miskinli area in Gadabay, Zuvand depression in Lerik, Batabat plateau in Shahbuz, Shahnabat plateau area in Gusar, Khoshbulag plateau in Dashkasan, etc. are some of the favourable regions for aerotherapy. It is possible to organize mountain climate resorts in Shamakhi, Ismayilli, Gabala, Shaki, Guba, Gusar, Gadabay, Lerik, Yardimli, Ordubad, and Shahbuz regions and in newly liberated regions if there are favourable conditions for the organization of mountain climate resorts.

Alpine and subalpine meadows (grasslands) of mountain areas have high value about cultural services. Generally, both ecosystems have very important functions that support tourism and recreation. Grasslands and forests are the preferred touristic attractions for local and international tourists.

Glaciers. In the territory of Azerbaijan, mountain glaciers are observed in the Gusarchay basin on the northeastern slope of the Greater Caucasus.

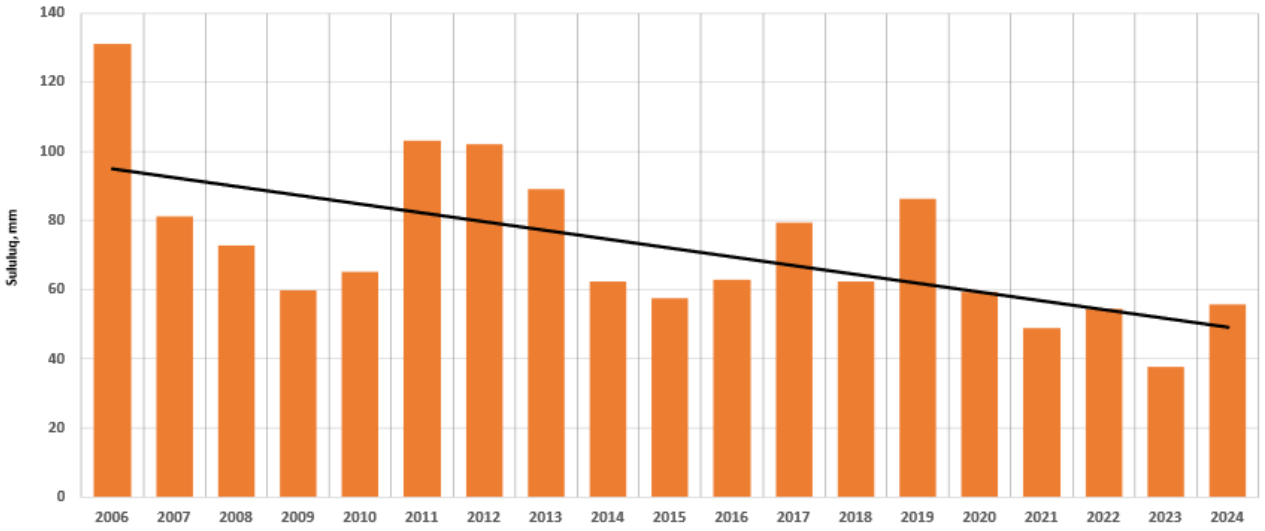
Mountain glaciers are a vital component of many mountain ecosystems. They provide a source of freshwater for rivers and streams, support diverse ecosystems, and contribute to the stability of the surrounding landscape. However, climate change is causing significant changes in mountain glaciers.

Rising temperatures accelerate melting of glaciers, resulting in reduced water availability downstream. This has serious implications for both human populations and ecosystems that depend on glacier meltwater for drinking water, agriculture, and hydropower generation. Additionally, glaciers loss disrupts the fragile balance of mountain ecosystems, affecting the plants, animals, and microorganisms that rely on glacier-fed streams and lakes.

“Snow cover duration has declined in nearly all regions, especially at lower elevations, on average by five days per decade,” the mountain chapter of the IPCC report says.

This also occurs in Greater Caucasus and Lesser Caucasus mountains in below figure.

Perennial change of water resources in snow of river basins Nakhchivan Autonomous Republic



Taken together, global warming impacts represent an existential threat to many people

“Shrinking glaciers and snow harm Indigenous Peoples and rural communities greatly.

The retreat of mountain glaciers also has implications for the tourism industry. Many people visit mountain regions to witness the beauty of glaciers and engage in activities such as skiing and mountaineering. However, as glaciers continue to shrink, these recreational opportunities may be lost, impacting local economies that rely on tourism.

In turn, climate change impacts on tourists also affect local communities. Mountain tourism has become a major source of livelihoods for mountain communities through economic benefits and direct and indirect employment (providing accommodations, renting animals, selling handicrafts, and serving as mountain guides, cooks, and drivers).

Protected areas. Protected area categories defined by the Law on Specially Protected Natural Areas and Objects (2000) include those that are international (some natural reserves), national (State reserves and national parks) and local (natural reserves, natural monuments, zoological parks, botanical gardens and dendrological parks, health resorts). Private landowners or long-term lessees can also establish local specially protected areas. National parks, natural parks, ecological parks and zoological parks have the status of nature protection and research institutions. Protected areas are established for protection, research, monitoring, training and tourism purposes. Banned activities are listed for each protection category.

According to the Ministry of Ecology and Natural Resources, there are currently 892,546.49 hectares of specially protected natural areas in our country, including 10 national parks, 10 state nature reserves, and 24 state nature reserves. In general, specially protected natural areas make up 10.3 percent of the country's territory, including national parks at 4.1 percent.

5.5.2. Interaction between local communities and ecosystems in context of climate change

The interaction of people living in mountainous areas with nature include all the benefits that come from nature and interact with it. Mountain people use ecosystems, take and consume mountain products and plants in a ready-made way, and produce the products they need in their daily lives.




At the same time, natural monuments in the mountains have been sanctified in many mountainous areas of Azerbaijan. Belief in rocks, altars, plant, and animal species has given rise to spiritual values. The attitudes of the mountain population determine their attitude to nature and their direct interaction with nature and, at the same time, give grounds to say how important the mate- rial and intangible benefits of nature are in the life of the mountain communities. Also, tea, stone, and clay are taken directly from ecosystems and were used as building materials during the construction of houses. Plant products taken directly from ecosystems are used as both medicinal and food products.

The interaction between nature and people is expressed also in the culture and knowledge that belongs to a local community. Often this knowledge is more accurate than scientific knowledge because their formation is based on the experience of long-term interactions with nature.

Mountain people had a dual position about nature, and this position is still relevant today. This dual position is due to the dual impact coming from nature. We call the first line the hazard line and the second line the natural capital line. To accept the line of hazard, the community takes defensive measures and creates a buffer between nature and itself. Accepting the resource line means taking advantage of the blessings of nature. This line is broader, but also requires the creation of systematic knowledge.

Climate change impact to Mountain communities

Climate change impacts on ecosystem services that benefit local communities and tourists in high mountain through impacts on food and feed, water availability, natural hazards regulation, spirituality and cultural identity, aesthetics, and recreation. Tourism income can account several percent of GDP. National Parks in mountains receive thousands of tourists, glacier tourism can be an important economic driver. Climate change impacts on infrastructure and accessibility also affect ecosystem services. There is an urgent need to increase attention to southern regions which are characterized by hot dry climate . The diversity and magnitude of climate change impacts highlights the need to keep in mind ecosystem services in high mountain areas and to increase the adaptation options for local communities and tourists.

Climate change also leads to increasing of floods and mudflows in the mountain areas Greater Caucasus, which result with damage to communities and infrastructure, soil erosion. Also droughts have negative impacts on water supply in result of drying of springs and reducing flow of rivers, also introduce serious damages to forests and pastures, destroy grass cover, increase soil erosion.

Lastly, indigenous communities living in mountain regions are particularly vulnerable to the impacts of climate change. These communities often have deep cultural and spiritual connections to the land and rely on its resources for their livelihoods. The loss of glaciers and changes in water availability can have severe consequences for their traditional practices, such as agriculture, herding, and medicinal plant collection.

Furthermore, the loss of biodiversity can also affect indigenous communities who depend on these species for food, medicine, and cultural practices. The disruption of ecosystems can lead to the loss of traditional knowledge and practices that have been passed down through generations.

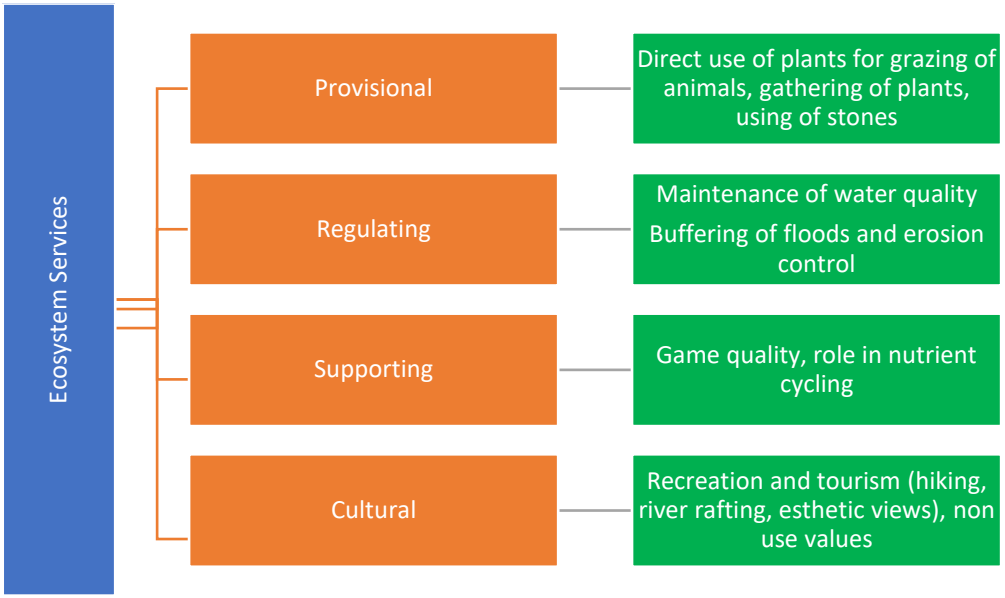
Therefore, climate change poses significant threats to mountain ecosystems, including the melting of glaciers, loss of biodiversity, and impacts on indigenous communities. It is crucial that we take immediate action to mitigate the causes of climate change and implement adaptation strategies to protect these fragile ecosystems and the communities that depend on them.

Climate change impact on mountain ecosystems

According to Natural Ecosystem Assessment (NEA) report ecosystems provide below services for communities:

- Provisioning services are the goods that can be obtained from ecosystems. Historically, livelihoods in Azerbaijan have always depended on environmentally friendly products. Water, plants, fruits and berries, clay, soil, medicinal plants, and wild honey are the main products taken from the surrounding areas. These products formed the traditional lifestyle in the country and at the same time became a notable part of the economic life of the local people.
- Regulatory services include the benefits obtained from ecosystem processes, e.g. natural purification considerably improves the quality of water in rivers and streams. It affects the quality of water within filter layers and in the subsurface through filtration, sedimentation, precipitation, oxidation-reduction, and sorption-desorption etc. Buffering of floods, erosion control through water and land interactions, and flood control infrastructure are also considered as regulatory services. Forests have a vital role to maintain regulatory ecosystem services at the watershed level. Forest vegetation makes soil more porous, which may help store large amount of water. In order words, forests are the natural regulators of stream flows and considerably reduce flow peaks that may result in flash floods. It is recognized that forests increase infiltration and interception, considerably storing a larger percent of incoming precipitation in the basin.
- Cultural benefits of ecosystems include a board palette of values. It would be very hard to imagine most recreational activities without the contribution of alpine ecosystems. Generally, alpine ecosystems have important functions that support tourism and recreation. Walking, hiking, and camping are key activities that mountain ecosystems support. Cultural services are becoming increasingly important as population incomes and leisure time increase. River-rafting, kayaking, hiking, swimming and fishing are key activities are supported by freshwater ecosystems
- Supporting services support ecosystems and are necessary to produce all ecosystem services. The impact of supporting services on people occurs over the long time. For example, forests have direct and non-direct impacts on the climate that supports the health of people in the long-term.

In the mountainous regions of Azerbaijan, ecosystem services penetrate all spheres of life and leave indelible marks on people's lives. The following diagram in NEA report describes these services .



Ecosystem Services of mountain areas of Azerbaijan

As temperatures rise, many species are forced to move to higher altitudes in search of suitable habitats. This upward shift in species distribution can lead to the loss of lower altitude species and disrupt the fragile balance of mountain ecosystems. Additionally, the fragmentation of habitats due to human activities further exacerbates the challenges faced by mountain species.

Furthermore, climate change can also impact the timing of ecological events, such as flowering and migration patterns. These changes can have cascading effects on the interactions between species, affecting pollination, seed dispersal, and predator-prey relationships.

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The Great Caucasus region is the most vulnerable area in terms of droughts As noted, the 2014 drought has most strongly affected the Shamakhi, Agsu, and Ismailli districts. Crops have been damaged beyond recovery in some parts of the country, and vegetation of the summer pastures died out, impacting tens of thousands of livestock. Small rivers (Pirsaatchay and Agsuchay) in this region went completely dry during July and August. The river flow in the Girdimanchay River decreased significantly and people residing near basins of these rivers are seriously affected by the drought. Vegetation of summer pastures in the Guba–Gusar region has significantly reduced and caused damage to livestock and increased risk for degradation of plan cover, which, in turn, increased risks for landslides.

One of the most significant threats to mountain biodiversity is the upward shift of plant and animal species. As temperatures increase, many species are forced to migrate to higher elevations in search of suitable habitats. However, the availability of suitable habitats may be limited, especially in mountain regions where the topography restricts the available land area. This can lead to overcrowding and competition for resources, ultimately resulting in the decline or extinction of certain species.

Additionally, the loss of glaciers and changes in precipitation patterns can disrupt the fragile balance of mountain ecosystems. Many plant species rely on the predictable meltwater from glaciers and snowpack for their water supply. Changes in the timing and availability of water can disrupt the reproductive cycles of these plants, leading to reduced seed production and ultimately impacting the entire food web.

The increase in the number of harmful insects, the increase in forest fires, and the spread of invasive species over larger areas are the results of climate change. Prolonged droughts in particular lead to weakening of trees and, as a result, to serious negative effects of pest insects.

Climate changes have a serious impact on forest biodiversity - phenological characteristics of trees, species composition, distribution of the main forest-forming genera in altitude zones, their areas, natural regeneration is weakened, thus the productivity of forests decreases by changing their quantitative and qualitative indicators.

Consequences of climate change can be expressed in followings:

- Desertification and land degradation;
- Landslides, erosion and washing of the upper fertile layer of the soil;
- Warming of the top layer of the soil, intensification of evaporation;
- Lack of drinking water;
- Decrease in amount of precipitation;
- Increase in temperature, increase in the number of hot days;
- Wind, storm, rain-flood-water erosion frequency and amplitude increase;

Negative impact to the forests health, viability and productivity in the future may have the following significant consequences for people living in the region:

- A general decrease in the volume of wood and non-wood forest products (for example, mushrooms, berries and nuts) from existing forest species in the region;
- A general decrease in the value of ecological services provided by forests in the regions, including regulation of water quality and water flow, prevention of erosion, landslides;
- Change in particular values of biodiversity and specially protected areas of the region
- Changes in visual landscapes

Impact of climate change to the type components of species are as follows:

- Habitat loss and fragmentation of species. Rising temperatures and changes in precipitation are adversely affecting vegetation distribution and causing habitat loss and fragmentation and declining of species populations. It creates conditions for violations regularities in these ecosystems, and for species to face competition for limited resources in the wild nature.
- Acceleration of species extinction rate. Climate change may increase existing threats to species, increasing their risk of extinction. Species with specific habitat requirements or restricted to certain geographic ranges may face high risks due to habitat degradation and loss.
- Disruption of food chains in ecosystems: Changes in temperature and habitat change the availability and distribution of food sources, the balance of food chains in ecosystems is disturbed.
- Increase in parasites and diseases: Increase in temperature and environmental change can lead to increase in disease vectors and parasites. This could pose a huge threat to wildlife health and lead to population declines.
- Extreme weather events: Climate change is increasing the frequency and intensity of extreme weather events such as hurricanes, droughts, floods, and wildfires. These events can have devastating effects on wildlife and their habitats.
- Human-Wildlife Conflicts: As widespread wildlife populations change and by adapting of wildlife to changing conditions, conflicts between them and humans may increase. Animals can invade human settlements in search of food and water, potentially causing harm to both wildlife and humans.
- Changes in behaviour and phenology in the flora and fauna: Changes in temperature and weather conditions affect the behaviour of the fauna, including reproduction, migration and hibernation periods, and changes in the length of the vegetation period of plants. Rare and endangered species are particularly vulnerable to the effects of climate change

Climate change poses a significant threat to the biodiversity of mountain ecosystems. The impacts of rising temperatures, habitat fragmentation, and changes in ecological events can have far-reaching

consequences for species survival and ecosystem functioning. Conservation efforts need to address these challenges by preserving habitat connectivity, protecting water resources, and involving local communities in sustainable management practices.

Conservation efforts in mountain ecosystems must consider the impacts of climate change and develop strategies to mitigate these effects. Key actions may include establishing protected areas, restoring degraded habitats, and promoting sustainable land-use practices.

One important aspect of conservation in mountain ecosystems is the preservation of corridors that connect different habitats. These corridors allow species to move and adapt to changing conditions, reducing the risk of population isolation and genetic bottlenecks. They also facilitate the exchange of individuals between populations, promoting genetic diversity and resilience.

In addition to habitat connectivity, addressing climate change impacts on water resources in mountain ecosystems is essential. Often called “water towers,” mountains store and release water to downstream areas. However, rising temperatures are accelerating the melt of glaciers and snowpacks, impacting water availability for both human and natural systems.

Engaging local communities and indigenous peoples in conservation efforts is also vital for the long-term success of biodiversity preservation in mountain ecosystems. Their traditional knowledge and practices offer valuable insights into sustainable resource management, fostering a sense of stewardship and commitment to conservation among local populations.

Under current legislation, rare and endangered species of animals and plants in their natural habitat within the country are under special protection and are included in the Red Book of the Republic of Azerbaijan. As an official document, the Red Book of the Republic of Azerbaijan contains information on the status, distribution, and protection of animal and plant species (subspecies, populations) throughout the territory of the Republic of Azerbaijan, including the Caspian Sea area within Azerbaijani jusirdiction.

First Red Book was published in 1989. 140 species of flora and 108 species of fauna of Azerbaijan are included by scholars in this list of species requiring protection.

In total, in the last edition of the "Red Book" (2023) 241 rare and endangered fauna: 152 vertebrates, 89 invertebrates and 460 flora: 383 algae, 15 spores, 6 mosses, 14 sibias, 5 algae; 37 types of fungi have

been reflected. Also, 51 species of plants, 49 of which are higher and 2 of which are primitive, were included in the pink list compiled for the first time.

MENR relevant structures ensures protection of the forest ecosystem on the territory of the state forest fund, reforestation and afforestation, cultivation of planting material, supply of seeds of forest tree and shrub species, creation and maintenance of the state forest cadastre of the forest fund, and other forestry activities, as well as targeted and effective management of secondary agricultural lands and alternate land use.

Forestry measures focus on soil protection, water conservation, ecological purification, and sanitation, along with other beneficial functions of forests. To safeguard these areas, MENR regularly identifies sources of forest fires, pests, and diseases within forest fund territories and conducts monitoring to prevent their spread.

In recent years, efforts have been made to landscape non-forest lands, restore vegetation, and establish planting sites, including along highways and in arid regions. Large-scale agroforestry projects covering thousands of hectares have also been launched.

Azerbaijan is one of the few countries that has managed to prevent deforestation and increase the area of forested areas. Afforestation activities have increased many times, and millions of trees have been planted over the last years. Thousands of hectares of forested area were planted in Azerbaijan as part of urgent measures following the adoption of the Paris Agreement.

The development of modern agroforestry areas in Azerbaijan supports the diversification of the national economy and helps reduce carbon emissions. Azerbaijan's rich forests are currently managed solely for conservation, with no industrial usage permitted.

To enhance forest protection, cameras have been installed to monitor forest areas for fires, control entry and exit points, and ensure effective management, incorporating both global and national best practices.

Desertification is a critical issue for Azerbaijan due to its arid climate. In response, Azerbaijan has joined the UN Convention to Combat Desertification and supports global initiatives aimed at achieving land degradation neutrality. These actions align with national interests, prioritizing ecological improvement and the sustainable use of natural resources.

The reduction of biodiversity and the extinction of rare species are closely linked to global climate change. The current rate of biodiversity loss worldwide is 100 times higher than historical levels and is projected to increase further in the coming years. The decline—or, in some cases, extinction—of various animal and plant species is driven by a combination of climate change and human activities.

A key priority in mitigating the effects of climate change is the protection of forest resources through reforestation and the establishment of new green spaces. Maintaining rich genetic diversity across landscapes should be a global conservation priority, particularly in biodiversity hotspots.

5.6. Human health

Disease indicators of the population in Azerbaijan.

Human capital is a top priority in all development plans in Azerbaijan, with comprehensive measures in place to reform the healthcare system to align with global standards. Significant efforts in recent years have led to the complete eradication of certain infectious diseases, such as poliomyelitis and malaria.

Data analysis reveals that respiratory system diseases are the most common, followed by circulatory system diseases and infectious diseases. Over the past 30 years, circulatory system diseases have steadily increased among Azerbaijan's population. Since 2012, there has been a rise in both the total number of diseases and the incidence of many specific diseases.

Diseases categories in the Republic of Azerbaijan (per 10,000 people)

Years	All illnesses	Diseases of the circulatory system	Diseases of respiratory organs	Infectious and parasitic diseases
1992	2184,1	93,9	878,9	246,6
1994	2108,4	95,5	911,8	204,6
1996	1997,0	98,9	911,9	212,8
1998	1787,5	100,5	812,0	180,5
2000	1703,5	122,8	765,1	190,5
2002	1669,6	126,1	761,0	158,3
2004	1748,3	133,3	795,5	145,9
2006	1737,5	137,5	758,3	154,9
2008	1831,5	127,2	785,6	154,1
2010	1796,0	127,3	770,5	144,9
2012	1838,4	132,9	789,4	128,6
2014	1968,0	149,2	787,2	131,1
2016	1937,2	147,6	777,6	121,2
2018	1930,7	147,4	776,8	122,2
2019	1950,1	150,4	776,9	120,0
2020	1800,8	148,5	677,3	168,3
2021	2209,3	166,5	888,5	207,1
2022	2237,7	171,9	806,3	169,4
2023	2577,0	209,0	949,0	202,7

Starting from 2012, the data of medical institutions under other ministries, committees and organizations were also included.

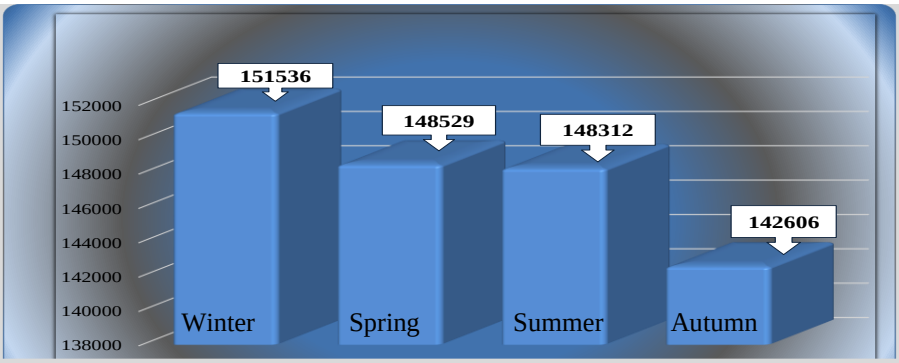
Effects of climate changes on the health of the urban population in the example of the city of Baku

Baku, the largest city in Azerbaijan, was selected as a case study to assess the impact of climate change on urban health. The city hosts approximately 3 million residents, both permanent and temporary. While the national population density is 118 people per km², Baku's density is significantly higher, at 1,117 people per km².

Located in the dry subtropical zone on the Absheron Peninsula, Baku's climate is classified as semi-desert and dry desert, making it particularly sensitive to climate change impacts.

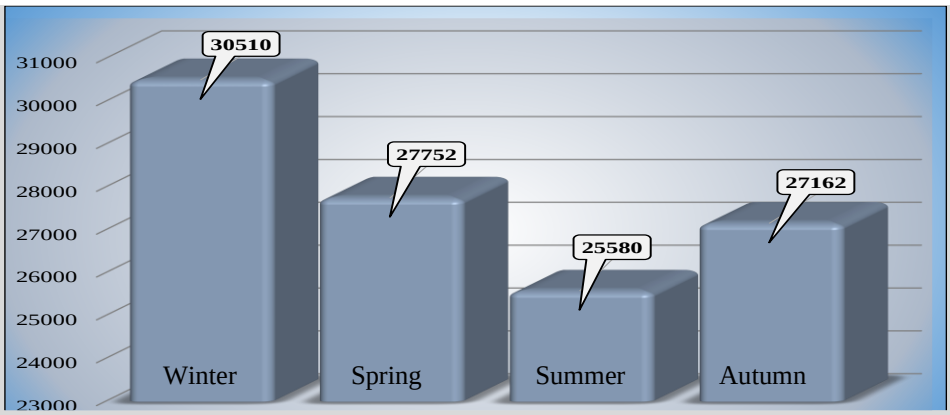
In recent years, the climate on the Absheron Peninsula, where Baku is located, has warmed, mirroring trends seen across Azerbaijan. Since the 2000s, Baku has expanded rapidly, with new housing developments rising in previously vacant areas. Skyscrapers now dot the cityscape, and building density has increased significantly in central districts, impacting the city's microclimate. Regional climate changes contribute to this effect, and many researchers view this densely populated area as a zone of ecometeorological stress. Without preventive measures, this stress may intensify, exacerbated by ongoing climate changes.

To examine the annual and seasonal trends of diseases, data on all emergency and urgent medical calls for specific conditions, including circulatory system diseases, in Baku were analyzed. The analysis of multi-year data reveals that the highest average monthly number of all-cause emergency calls in Baku occurs in winter, likely due to colder weather conditions. For circulatory system diseases specifically, emergency calls are also highest in winter, with the lowest call volume in summer. Although there is an increase in calls for certain cardiovascular diseases during abnormally hot summers, the summer peak does not exceed the winter maximum.



The average seasonal trend of all-cause emergency and urgent medical care requests in Baku city (2010-2023).

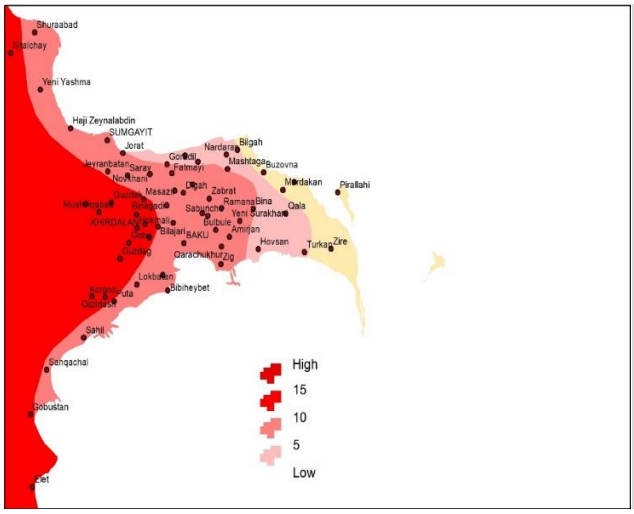
Average seasonal trend of requests to the emergency and emergency medical aid station for diseases of the circulatory system in Baku (2010-2023 years).



Impact of strong hot periods on the health of the population in Baku and the Absheron Peninsula.

One of the most visible effects of climate change is the increased frequency and duration of intense hot days and heat waves. High air temperatures have a pronounced impact on human health, particularly for urban populations during the peak summer months.

As in many parts of Azerbaijan, the Absheron Peninsula and Baku are experiencing warming trends linked to climate change. During summer, temperatures in Baku and the Absheron Peninsula frequently exceed long-term climatic norms. In some years, positive temperature anomalies have reached 3°C or more, making extreme heat a regular occurrence.



In the period up to the 90s of the last century, the average multi-year number of days with a maximum air temperature of 35ºC and higher was up to 5 days in the east and south of Absheron,

5-10 days in the north, west and central areas, the number of such days increased in 2001-2020,

up to 5 days in the coastal areas in the east of the peninsula,

10-15 days in the northern, southern and central parts,

and 15 days or more in the western and southwestern areas.

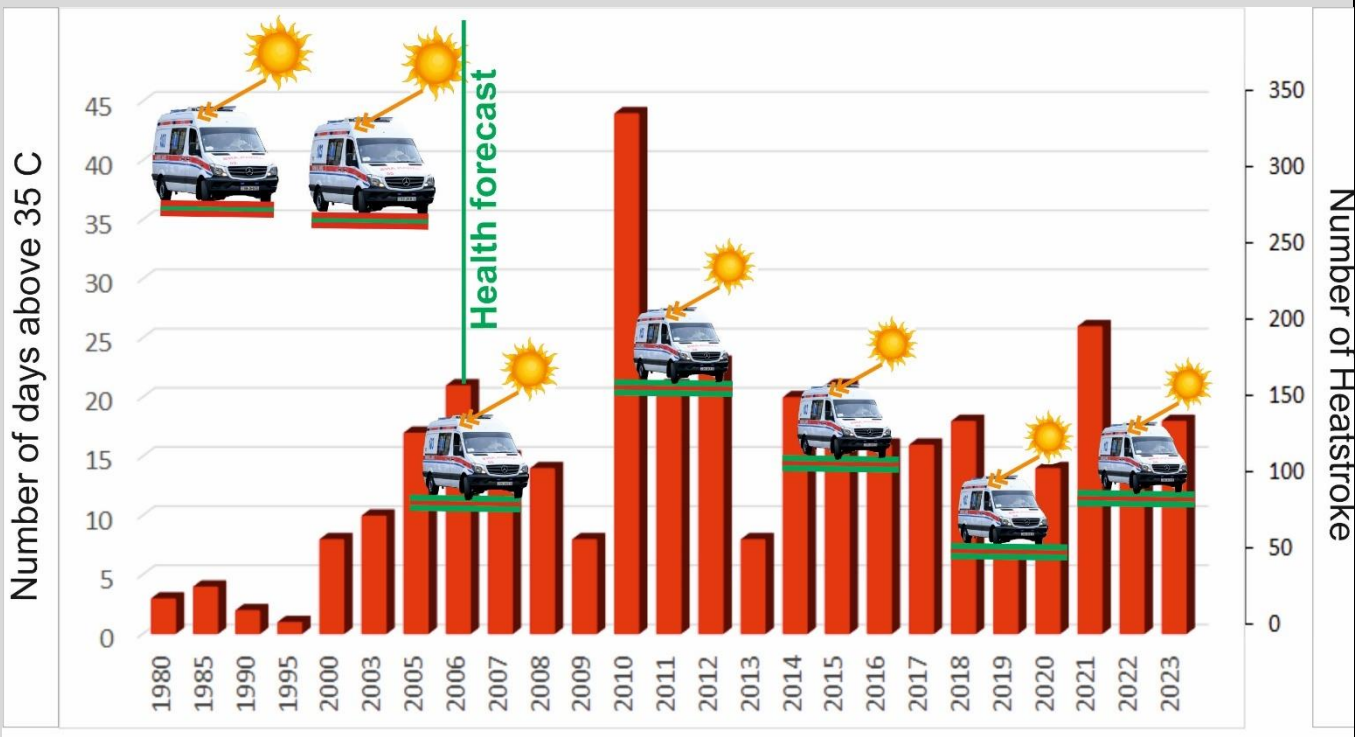
The hottest summer on record for the Absheron Peninsula, including Baku, occurred in 2010, with a temperature anomaly of 3.1°C above average. Known for its long, hot summers and sharp temperature fluctuations, the region poses unique adaptation challenges for its residents. Local adaptation to the heat is evident in reduced physical activity and physiological adjustments to high temperatures.

During anomalously hot summer months, especially in July and August, the average daily air temperature ranges from 30–31°C, with maximum temperatures reaching up to 40°C or higher. While the local population has developed resilience to the summer heat, intense and prolonged heat waves can exceed these adaptation limits, leading to health complications.

A comparison of morbidity rates during extreme heat using the difference method shows a marked increase in all-cause emergency calls. Calls for circulatory system diseases, strokes, and respiratory conditions also rise significantly during periods of intense heat.

Best Practice on Successful Adaptation Measure

Strong summer heat has a direct impact on the population. One of the direct effects is sunstroke.



Number of days with air temperature of 35ºC and higher and number of emergency calls for sunstroke in summer in Baku city.

Since 2006, the Hydrometeorological Forecasting Office of the Ministry of Ecology and Natural Resources, in collaboration with the Institute of Geography at the National Academy of Sciences, has implemented a "Methodical Tool for the Preparation of Medical-Meteorological Forecasts," tailored for the public and relevant organizations.

Before medical-meteorological warnings about abnormal heat on the Absheron Peninsula and in Baku were provided, the number of emergency calls for heatstroke during summer was high, even when the number of extremely hot days was relatively low.

Since 2006, with the introduction of medical-meteorological forecasts and 24-72-hour advance warnings to the public, the incidence of heatstroke has decreased significantly, despite an increase in the number of anomalously hot days.

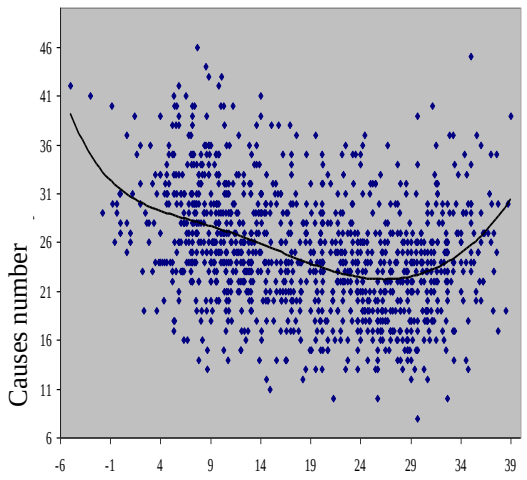
The effect of strong hot periods on the mortality of the population in Baku and the Absheron Peninsula. Compared to European countries, the increase in deaths during intense summer heat in Baku and the Absheron Peninsula is relatively small. This can be attributed to the region's arid climate, which has fostered a greater adaptation to long, hot summers.

In cities with varying climatic conditions, the "comfort temperature"—the temperature associated with the minimum mortality rate due to climate-related causes—differs. The relationship between air temperature and mortality is often non-linear, with studies in European cities revealing V- or U-shaped curves that depict the connection between daily mean or maximum air temperature and mortality rates. At a certain point on this curve, known as the temperature comfort level, the lowest mortality is observed.

To examine the relationship between air temperature and mortality in Baku, a curve was established showing the correlation between daily maximum air temperature and daily all-cause mortality. Mortality statistics from the emergency medical aid station were used for this analysis.

To investigate the relationship between air temperature and mortality in Baku, a curve was created to depict the correlation between daily maximum air temperature and the daily number of all-cause deaths. For this analysis, mortality statistics from the emergency medical aid station were utilized.

Correlation between maximum air temperature and all-cause mortality in Baku city



In Baku, the temperature-mortality curve for all-cause deaths follows a U-shaped pattern similar to that observed in many European cities. From the relationship curve between maximum daily temperature and mortality, the comfort temperature range appears to be between 24–28°C. Mortality rates increase at both higher and lower temperatures outside this range, but there is an asymmetry in the curve's slope. The right arm of the curve, which represents higher temperatures, rises more steeply, especially when the maximum air temperature exceeds 33°C, and shows a sharp increase beyond 36°C. Conversely, the left arm of the curve rises more gradually as temperatures decrease, with a notable sharp increase in mortality only when the daily maximum temperature falls below 20°C.

Climate warming and malaria in Azerbaijan. Malaria has existed in Azerbaijan since ancient times Until the 60s of the 20th century, 3 forms of malaria were widely observed in Azerbaijan: P. vivax (the causative agent of three-day malaria), P. malaria, P. falciparum. Fighting malaria has always been one of the most difficult problems in endemic countries. Azerbaijan, which is historically one of the countries where malaria is widespread, has gone through a long period in the fight against malaria.

Fighting against malaria in Azerbaijan

Several stages can be distinguished in the history of this fight:

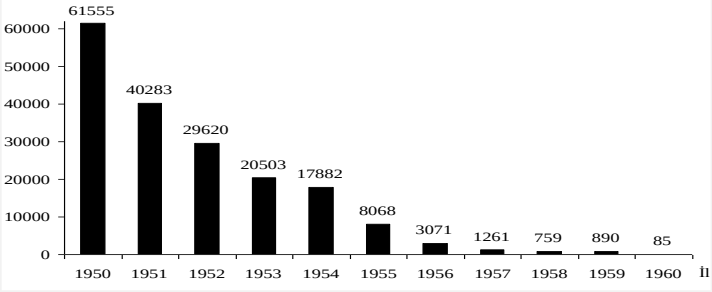
- period of spontaneous struggle
- period of purposeful struggle
- period of organized struggle
- era of elimination of malaria
- period of epidemics after cancellation
- era of complete eradication of malaria

A period of spontaneous struggle. Until 1918-20 years of the 20th century, there was no purposefully organized fight against this disease in Azerbaijan.

A period of purposeful struggle. Attention to this field began in 1918 with the establishment of the Azerbaijan Democratic Republic. Many young people were sent to foreign countries for medical education, many of them made great contributions to the medical field of Azerbaijan, including the fight against malaria. The first tropical stations were organized in Ganja, Goychay and Salyan in 1923-1924.

The period of organized struggle. From the 30s of the last century, an organized fight against malaria began. In 1932, 57 anti-malaria institutions, including 10 tropical stations, 15 malaria dispensaries, and 32 malaria stations were operating in the regions of the Republic.

Eradication of malaria. In the post-war period, during the recovery of the country's economy, the issue of sanitation was also raised. As with WHO's malaria eradication campaign, the fight against malaria in Azerbaijan, was based on the use of insecticides (DDT) and the introduction of new drugs for treatment. Thus, a large-scale fight against malaria began in 1951-1960. As a result of the measures taken, the malaria disease decreased year by year and was eliminated as a mass disease in the mid-50s, and from the mass elimination of malaria, its practical elimination began.

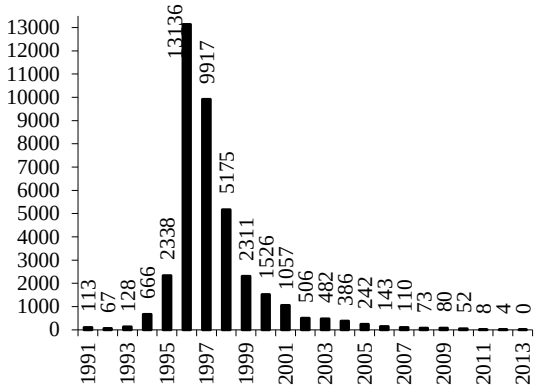


The number of malaria patients registered in Azerbaijan in 1950-1960.

As a result of the continuous fight against this disease, there were no local cases of tropical and four-day malaria in 1960. In the same year, it was announced that malaria was virtually eliminated in the country. However, in reality, the complete elimination of malaria did not happen, residual foci of three-day malaria remained, and in the following years, in some cases, these foci were even activated.

Following the elimination of malaria, control efforts became incomplete and unsustainable, as the urgency of malaria prevention diminished in the minds of health authorities and the general population in Azerbaijan. This led to a resurgence in cases, with worsening epidemiological situations occurring in 1969-1971 and again in 1980-1981.

The number of malaria patients

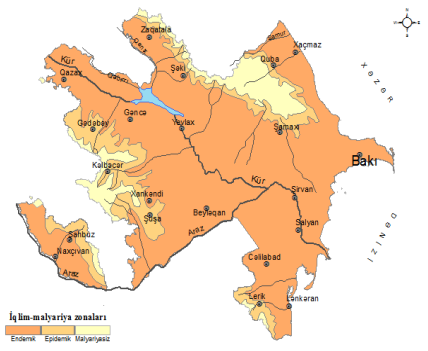


At the beginning of the 90s of the last century, the involvement of the Republic of Azerbaijan in a military conflict, the mass chaotic migration of more than 1 million refugees and internally displaced people within the country, as well as the extremely weak implementation of epidemiological control over malaria and the necessary measures as a result, the epidemiological situation in the country began to deteriorate sharply, in 1995-1997, an epidemic occurred that covered almost all regions. The highest number of malaria patients registered for the first time reached 13,135 in 1996. In accordance with the recommendations of the World Health Organization (WHO) regarding the epidemiological situation, the National Program for the fight against malaria for the years 1999-2004 was developed.

A modern malarial situation. In December 2005, Azerbaijan joined the Tashkent Declaration "Moving forward from the fight against malaria to its elimination" in the European Region and once again expressed its political support and support for the fight against malaria by approving the National Strategy for the Elimination of Malaria in the Republic of Azerbaijan for 2008-2013. As a result of the implementation of the complex measures provided for in the National Strategy, no case of local infection with malaria has been recorded in Azerbaijan since 2013. **In 2023, the World Health Organization (WHO) certified Azerbaijan as a "malaria-free" country.**

However, 80% of the territory of the Republic of Azerbaijan remains endemic due to malaria. At the same time, there is a great possibility of the expansion of this area due to climate changes occurring in the country.

Climate-malaria risk zones



There are 3 climate-malarial zones in the country:

Endemic malaria zone covers the areas starting from the shores of the Caspian Sea up to 1000-1200 meters above sea level, and in Nakhchivan MR from the shores of the Araz River up to 1500-1700 meters above sea level.

Epidemic malaria zone includes areas with altitudes from 1000-1200 meters to 1500-1600 meters, in Nakhchivan MR from 1500-1700 meters to 2000 meters. Due to the temperature conditions, it is impossible for malaria to exist in the form of long-term and stable outbreaks.

Malaria-free zone includes areas higher in the mountains, the temperature of the air is not sufficient for the completion of development period of malaria plasmodia, therefore malaria disease is possible in this zone only in imported form.

INITIAL NATIONAL ADAPTATION PLAN

CLİMATE SCENARIOS

AZERBAIJAN 2024

6. CLIMATE SCENARIOS

The study utilized climate scenarios from several models, including the HadGEM3 model developed by the Hadley Centre for Climate Prediction and Research of the UK Met Office, the MPI-ESM1-2-HR model from the Max Planck Institute for Meteorology in Germany, and the SSP2-4.5 scenarios based on the GFDL-ESM2M model developed by the NOAA-GFD laboratory in the USA, along with the SSP5-8.5 scenarios. These scenarios feature a spatial resolution of 9 km.

Three different global climate models were employed and analyzed in this research. The seasonal variations of the model outputs and their ability to simulate the climate conditions in Azerbaijan were assessed. Among the three models, the RegCM4 model, with a 9 km resolution generated by the MPI-ESM-MR (Max Planck Earth System Model), was found to best represent the prevailing climate system in Azerbaijan. The MR model for the reporting period is an integrated Earth system model comprising atmosphere, surface, and ocean submodules developed by the Max Planck Institute in Germany (MPI, 2017). Despite exhibiting a negative bias, it is regarded as the most effective model for Azerbaijan, as it accurately reflects the distribution of temperature and precipitation. This conclusion was drawn from validating the simulations produced by the climate models against observational data, allowing for a statistical transformation of the model results based on these observations.

The objectives of the study are to:

- Determine the climate hazards and risks Azerbaijan faces due to climate change with the highest accuracy
- Provide a robust and reliable scientific foundation for the vulnerability and risk assessments to be conducted.
- Supply data to relevant stakeholders in climate change.

The study will guide the policies to be determined at the national level and the actions to be implemented at the local level. A summary of the technical details of the study is provided below.

1. Using the selected models, projections have been dynamically downscaled to 9 kilometers by using Regional Climate Model (WRF) under two scenarios: optimistic (SSP 2-4.5) and pessimistic (SSP 5-8.5). These scenarios are aligned with the Shared Socioeconomic Pathways (SSPs) updated in accordance with the IPCC Sixth Assessment Report.
2. The models have been run for reference term (1950-2015) and future term (2015-2100). Bias correction of the results have been performed by using both the re-analyses of ERA-5 Land data and observation data obtained.
3. The climate indices (hazards) have been calculated by using the outputs of the climate projections and accordingly, vulnerability and risk analyses have been conducted for eight regions classified under the National Hydrometeorology Service.

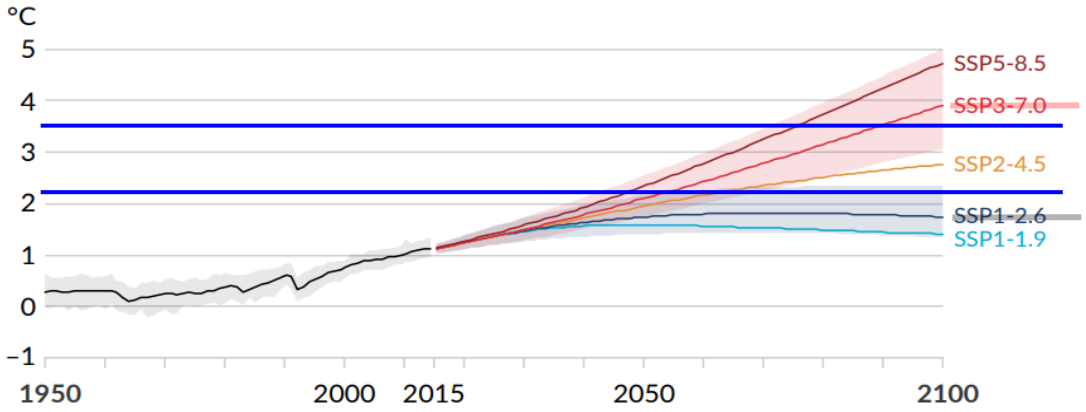
The outputs of this study will provide a scientific foundation for local climate change action plans, enabling the consideration of climate change-related risks and hazards in national-level policy documents and investment programs.

Since the beginning of the study:

- Six Global Circulation Models (GCMs) that represent the domain have been selected.
- The runs for MPI-ESM1-2-HR under SSP2-4.5 and SSP5-8.5 have been completed, along with the bias correction of the models based on ERA-5 Land data and observational data.

GCMs (Country)	Historical	SSP2-4.5	SSP5-8.5
CMCC-ESM2 (Italy)	**Hist**	**SSP2-4.5**	**SSP5-8.5**
EC-Earth3-Veg (Europe)	**Hist**	**SSP2-4.5**	**SSP5-8.5**
HadGEM3 (UK)	**Hist**	**SSP2-4.5**	**SSP5-8.5**
MPI-ESM1-2-HR (Germany)	**Hist**	**SSP2-4.5**	**SSP5-8.5**
MRI-ESM2-0 (Japan)	**Hist**	**SSP2-4.5**	**SSP5-8.5**
NorESM2-MM (Norway)	**Hist**	**SSP2-4.5**	**SSP5-8.5**
TOPLAM	**12**	**6**	**6**

Given that the study implemented dynamic downscaling at a 9-kilometer scale for the first time in Azerbaijan, utilize six Global Climate Models, and update emission scenarios in accordance with the Sixth Assessment Report, a high-performance computing resource is required for this project.



List of the climate indices

- Standardized Precipitation Evapotranspiration Index (SPEI) Index 3, 6, 12, and 24 (SPEI3, SPEI6, SPEI12, and SPEI24)
- Annual total precipitation from daily precipitation > 95th percentile (R95P)
- Heat Wave Frequency (HWF)
- Fire Weather Index (FWI)
- Cold Wave Frequency (CWF)
- Extreme wind speed index (W98)
- Consecutive Dry Days (CDD)
- Consecutive Wet Days (CWD)
- Number of heavy rain days (R10mm)
- Number of very heavy rain days (R20mm)
- Mean daily maximum temperature (TXm)
- Mean daily minimum temperature (TNm)
- Total annual PR from very heavy rain days (R99p)
- Coldest daily minimum temperature (TNn)
- Warmest daily minimum temperature (TNx)

- Heat Wave Frequency (HWF)
- Fire Weather Index (FWI)
- Cold Wave Frequency (CWF)
- Extreme wind speed index (W98)
- Consecutive Dry Days (CDD)
- Consecutive Wet Days (CWD)
- Number of heavy rain days (R10mm)
- Number of very heavy rain days (R20mm)
- Mean daily maximum temperature (TXm)
- Mean daily minimum temperature (TNm)
- Total annual PR from very heavy rain days (R99p)
- Coldest daily minimum temperature (TNn)
- Warmest daily minimum temperature (TNx)

- Standardized Precipitation Evapotranspiration Index (SPEI) Index 3, 6, 12, and 24 (SPEI3, SPEI6, SPEI12, and SPEI24)
- Annual total precipitation from daily precipitation > 95th percentile (R95P)

List of the outputs of climate models

- 2m air temperature
- Precipitation
- 10m and 100m horizontal wind components (U and V)
- Surface specific humidity
- Surface pressure
- Incoming solar radiation
- Incoming direct solar radiation
- Incoming longwave radiation
- Soil temperature (at 4 depths)
- Soil moisture (at 4 depths)
- Albedo
- Skin temperature
- Cloud fraction
- Snow water depth
- Snow water equivalent, and actual evapotranspiration
- Wind-u (850 hPa, 500 hPa, 250 hPa)
- Wind-v (850 hPa, 500 hPa, 250 hPa)
- Air temperature (850 hPa, 500 hPa, 250 hPa)
- Specific humidity (850 hPa, 500 hPa, 250 hPa)
- Sea surface temperature
- Surface runoff, subsurface flow
- Geopotential height (850 hPa, 500 hPa, 250 hPa)
- Specific humidity (850 hPa, 500 hPa, 250 hPa)
- Cloud water mixing ratio (1000 Hpa, 850 Hpa, 700 Hpa, 500 Hpa)
- Rain water mixing ratio (1000 Hpa, 850 Hpa, 700 Hpa, 500 Hpa)

The climate forecasts of models will cover the following parameters.

The circulation models developed for Azerbaijan were established based on different emission scenarios, by support of the Directorate of Climate Change of the Ministry of Environment, Urbanization and Climate Change of Republic of Turkiye and the National Hydrometeorological Service of MENR of Republic of Azerbaijan in line with the recommendations of the IPCC. The calculations were conducted for four distinct periods, spanning from 1970 to 2100, utilizing the RCP4.5 and RCP8.5 scenarios from all three models:

- **The first period covers 1985-2014 and serves as the baseline climate**
- **The second period is a scenario period, covering 2015-2040**
- **The third period encompasses 2041-2070**
- **The fourth period extends from 2071 to 2100**

As a result of these calculations, findings were obtained that provide an overview of both past and future climate conditions. The IPCC emission scenarios are primarily influenced by factors related to demographics, economic development, technology, energy, and agriculture.

Climate of the Baseline Years 1971-2000 and Model Verification

Model verification was conducted based on data from 1971 to 2000. During this period, all three models accurately calculated the temperature distribution across the country. In the Greater Caucasus, Lesser Caucasus, and Talysh Mountains, temperature decreases with altitude. Average annual temperatures in the highlands range from -2°C to 0°C, while flat areas experience temperatures between +12°C and +16°C, which closely align with actual observations.

The precipitation distribution aligns roughly with the MPI model; however, this model is associated with several uncertainties, resulting in no significant patterns being identified.

6.1. Climate Scenarios for Azerbaijan

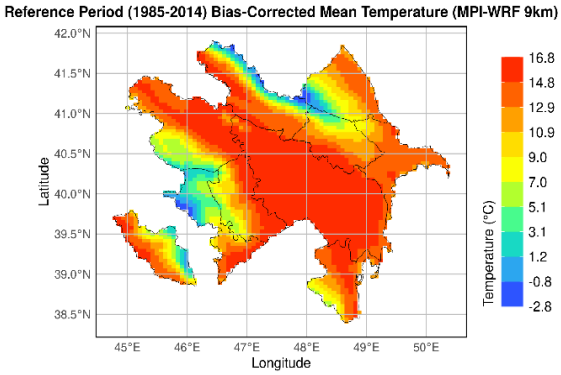
In the vulnerability and risk analysis, air temperature, heavy rainfall, and strong winds were identified as key hazard components. The hazard analysis utilized ERA5-Land network observation data for the current period from 1990 to 2019. For further analysis, climate projections from the regional climate model MPI-ESM-MR, selected for the project, were employed. The investigation focused on the differences between the periods of 2015-2100 according to the emission scenarios RCP4.5 and RCP8.5.

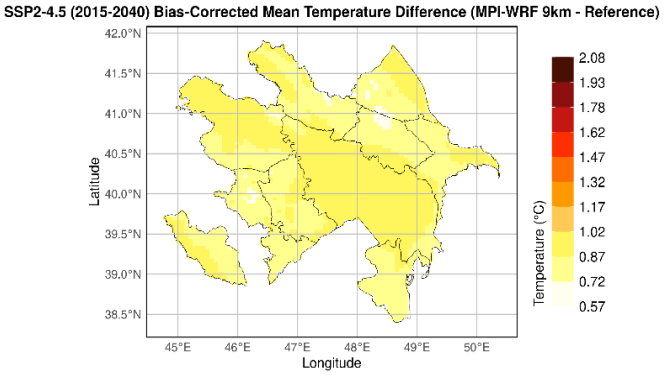
Temperature. The anticipated future impacts of climate change in Azerbaijan were examined for the period 2015-2100, following the emission scenarios RCP4.5 and RCP8.5. Changes in average

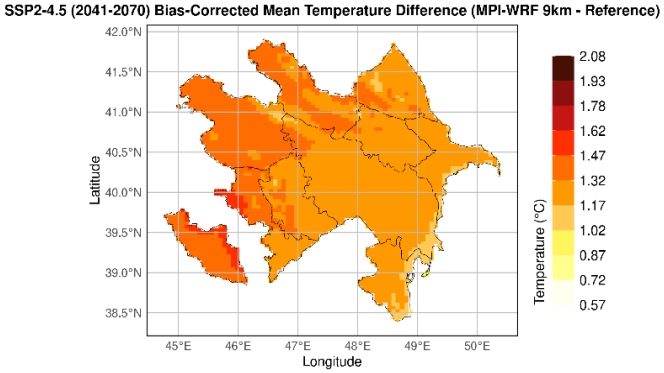
temperature and precipitation were analyzed in three distinct periods (2015-2040, 2041-2070, and 2071-2100) relative to the base period of 1985-2014.

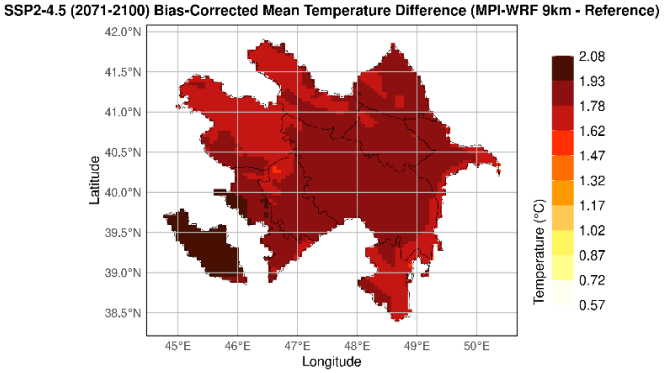
For the upcoming periods, both scenarios project an increasing trend in average temperatures by the end of the century, although the extent of this increase differs between the two emission scenarios. Specifically, an average temperature rise of approximately 1-1.5°C is expected across Azerbaijan for the period 2015-2040 under both scenarios.

Under the RCP4.5 scenario, characterized as the **optimistic scenario**, the anticipated temperature change **for the period 2041-2070** average temperature rise of approximately **1.5-1.75°C** and for the period 2071-2100 is projected to be no more than 2.0°C, with an increasing gradient from the southwest to the east of Azerbaijan. Conversely, under the RCP8.5 scenario, defined as the **pessimistic scenario**, average temperatures are expected to reach **3.0°C by 2070 and 4.0°C by the end of the century**, also showing an increasing spread from the southwest to the east.

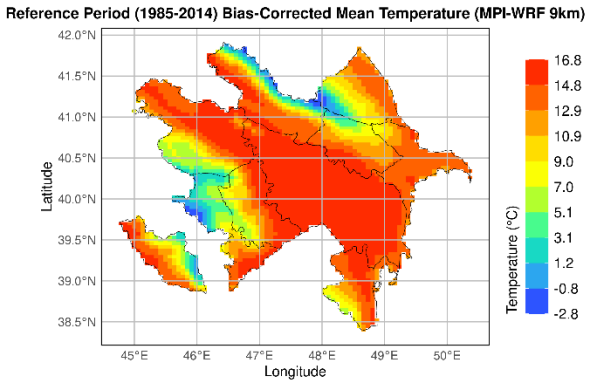


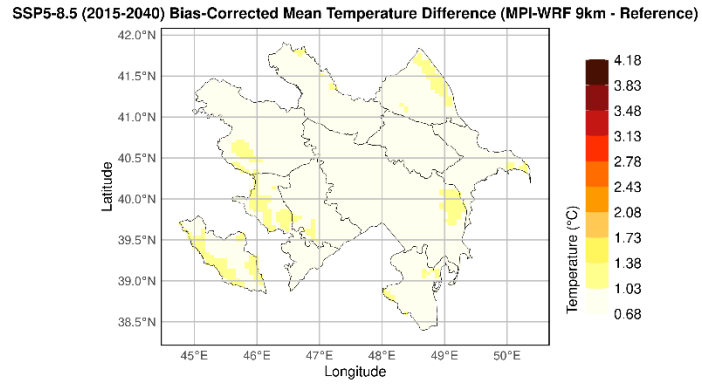


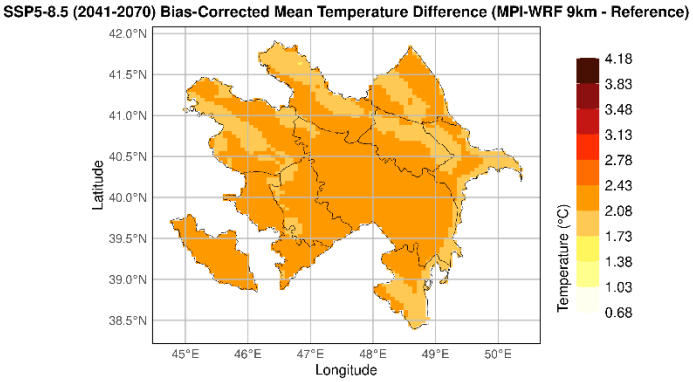


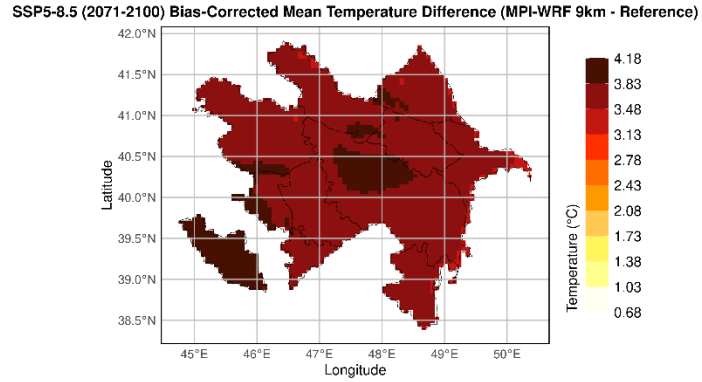


Expected change in average temperature under RCP4.5 scenarios









Expected change in average temperature under RCP8.5 scenarios

Precipitation. RCP4.5 and RCP8.5 Great Caucasus. In the RCP4.5 scenario, an increase is observed in the highlands of the Great Caucasus in 2015-2040 (increase from 10 mm to 105 mm). In other parts, a partial increase and decrease is observed. The largest decrease is observed in the territory of Gakh, Zaqatal and Balakan regions (50-65 mm decrease).

In the RCP4.5 scenario, an increase is observed in the highest mountain areas of the Great Caucasus in 2041-2070 (0 mm to 35 mm increase). A decrease is observed in other parts. The largest decrease is observed in the territory of Gakh, Zagatala and Balakan regions (55-90 mm decrease).

In the RCP4.5 scenario, growth is observed in all areas of the Great Caucasus in 2071-2100. The greatest increase is observed in the highlands (increase from 70 mm to 105 mm).

Reduction (up to-40 mm) in Shaki, Gakh, Zagatala and Balakan regions in 2015-2040 in the RCP8.5 scenario. In other areas, an increase is observed (up to 80 mm).

Reduction (up to-40 mm) in Shaki, Gakh, Zagatala and Balakan regions in 2041-2070 in the RCP8.5 scenario. In other areas, an increase is observed (up to 80 mm).

Increase in highlands (up to 150 mm) in 2071-2100 in the RCP8.5 scenario. In other areas, a decrease is observed (up to -55 mm).

RCP4.5 and RCP8.5 Lesser Caucasus. 50-70 mm increase in highlands of Kalbajar district in 2015-2040 in RCP4.5 scenario. In other areas, the increase and decrease of precipitation is unevenly distributed (from -30 mm decrease to 50 mm increase).

In the RCP4.5 scenario, a decrease is observed in all areas of the Lesser Caucasus in 2041-2070. The greatest decrease is expected in mountainous areas (from -30mm to -55mm). In other areas, from -15mm to -30mm.

In the RCP4.5 scenario, a decrease (from -10mm to -55mm) in mountainous areas of the Lesser Caucasus and an increase (from 10mm to 30mm) in other areas in 2071-2100.

In the RCP8.5 scenario, a decrease is observed in all areas of the Lesser Caucasus in 2015-2040 (from -5mm to -40mm).

In the RCP8.5 scenario, a decrease is observed in all areas of the Lesser Caucasus in 2041-2070. The greatest decrease is expected in the southeast direction of the Lesser Caucasus (from -20mm to -45mm). In other areas, reduction from -5mm to -20-mm.

In the RCP8.5 scenario, a decrease is observed in all areas of the Lesser Caucasus in 2071-2100. The greatest decrease is expected in the southeast direction of the Lesser Caucasus (from -20mm to -55mm). In other areas, reduction from -5mm to -20-mm.

RCP4.5 and RCP8.5 Southern regions. In the RCP4.5 and RCP 8.5 scenarios, a decrease of -20 -55 mm is observed in the Southern region in 2015-2040. The greatest decline is expected to occur in mountainous areas.

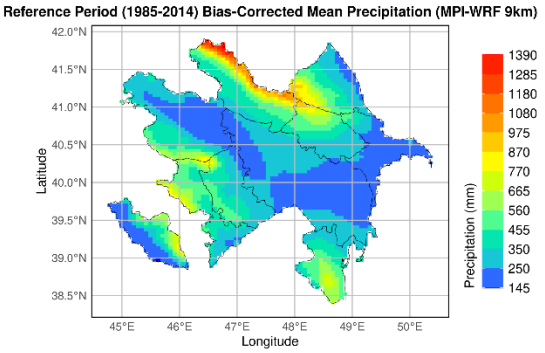
Reduction of up to -40 mm in highlands in 2041-2070 under RCP4.5 and RCP 8.5 scenario. An increase of 25 mm is expected in coastal areas.

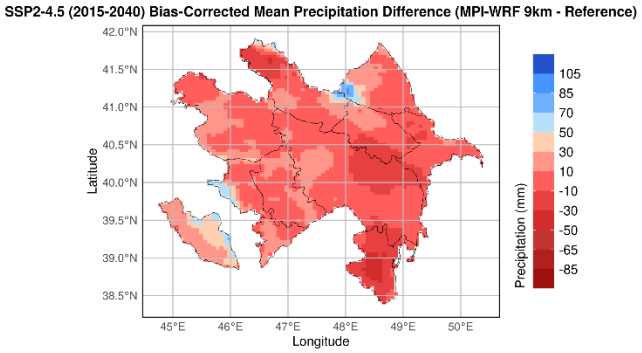
In the RCP4.5 and RCP 8.5 scenarios, a decrease of -10 -55 mm is observed in the Southern region in 2071-2100. The greatest decline is expected to occur in mountainous areas.

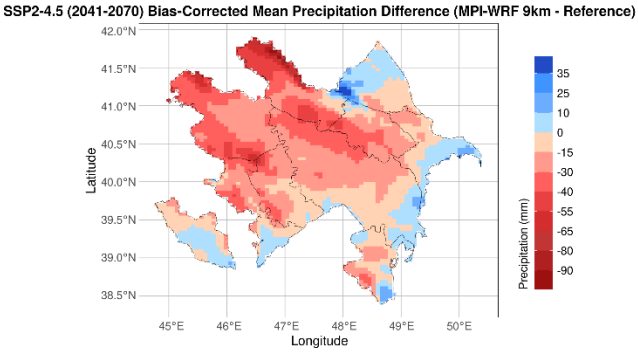
RCP4.5 and RCP8.5 Aran region. In the RCP4.5 and RCP 8.5 scenario, a decrease is mainly observed in the Aran region in 2015-2040. The reduction is expected to be -5 -30 mm.

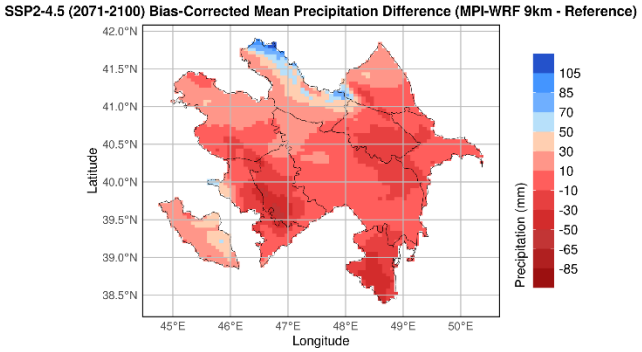
In the RCP4.5 scenario, an increase of up to 25 mm is observed in coastal areas and a decrease of up to -30 mm in other areas in 2041-2070. In the RCP 8.5 scenario, a decrease of up to -20 mm is expected in the entire Aran area in 2041-2070.

In the scenario RCP4.5 and RCP 8.5, a decrease of -5 -30 mm is observed in the Aran region in 2071-2100.

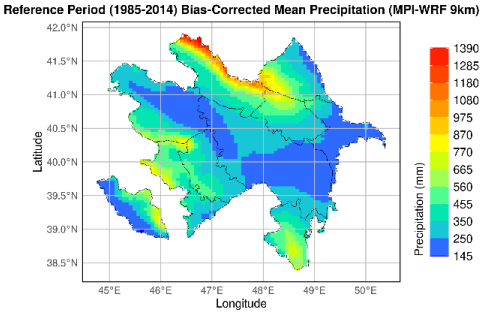


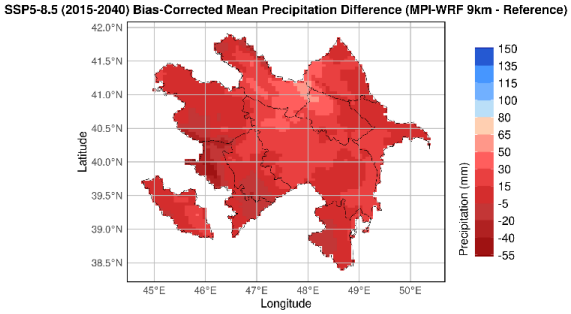


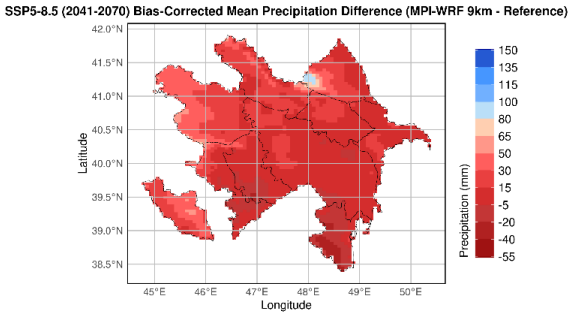


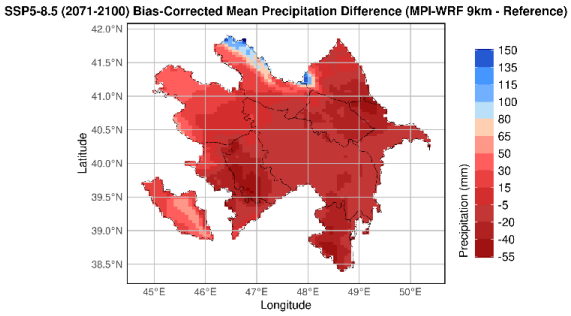


Expected change in Total Annual Precipitation under RCP4.5 scenarios (mm)









Expected change in Total Annual Precipitation under RCP8.5 scenarios (mm)

6.2. Expected impact of climate changes on water resources by scenarios

Studies indicate a decline in the water resources of Azerbaijan's major rivers, with decreasing winter and spring precipitation and reduced snow water reserves in river basins. This trend has led to a reduction in both surface and underground water resources.

The expected impact of climate changes on water resources is evaluated below based on the obtained relationship equations between flow and meteorological elements and the Model scenario.

According to the RCP4.5 and RCP8.5 scenarios, the expected water level in the rivers until 2040.

According to the assessment based on the RCP4.5 scenario, water resources in the high-elevation river basins of Azerbaijan are expected to remain relatively stable, with conditions similar to the current situation, up until 2040. However, in the basins of the Ganikh River, as well as in the moderate-elevation basins of the Greater and Lesser Caucasus, and in the rivers of the Nakhchivan Autonomous Republic and the Lankaran natural region, water content is projected to decrease by 10% compared to current levels due to rising temperatures and reduced precipitation.

According to the RCP8.5 scenario, during the same period, water resources in the Ganikh River basin, the rivers of the Lesser Caucasus, Nakhchivan AR, and the Lankaran natural region are expected to decrease by 10-15% compared to current levels. In contrast, in the rivers of other regions of the Greater Caucasus, such as the Mountainous Shirvan and Guba-Khachmaz zones, where temperatures and precipitation are projected to increase, water resources are anticipated to be 5-10% lower than current levels.

Expected water content in rivers until 2070 according to RCP4.5 and RCP8.5 scenarios. According to the assessment carried out according to the RCP4.5 scenario, in the period until 2070, due to the temperature and precipitations increase in the high elevation river basins of the Greater Caucasus, the water resources are expected to be close and 5-10% less than their current values. In the rivers of Ganikh River basin, the Greater and the Lesser Caucasus with moderate basin elevations and in the rivers of the Lankaran natural region, the water resources are expected to be 12.5-17.5% less than the current one, due to the increase in temperature and the expected decrease in precipitation.

According to the RCP8.5 scenario, during this period, water resources in the Ganikh River basin, the rivers of the Lesser Caucasus, Nakhchivan AR, and the Lankaran natural region are expected to decrease by 15-20% compared to current levels. In contrast, in the rivers of other regions of the Greater Caucasus (Mountainous Shirvan, Guba-Khachmaz zones), where temperatures and precipitation are projected to increase, water resources are anticipated to be approximately 5-10% lower than their current levels.

According to the RCP4.5 and RCP8.5 scenarios, the expected water content in the rivers of the republic until 2100. According to the assessment carried out according to the RCP4.5 scenario, in the period up to 2100, due to the increase in temperature and precipitation in the basin of the rivers of the Greater Caucasus, the expected amounts of water resources will be close to the actual situation, and in the basin of the Lesser Caucasus, in the rivers of Nakhchivan MR and Lankaran natural region, 10- It is expected to be 15% less than their current values.

According to the RCP8.5 scenario, river flow in the basins of the Greater Caucasus is expected to remain close to current levels, with a decrease of 5-10%. In contrast, water content in the rivers of the Nakhchivan AR and the Lankaran natural region, as well as in the Small Caucasus rivers, is anticipated to decrease by 20-25% compared to current levels.

6.3. The impact of climate changes on the health of the urban population according to the scenarios

According to the RCP4.5 and RCP8.5 scenarios, average air temperatures in Azerbaijan, including the Absheron Peninsula, are expected to rise in the upcoming three periods (2015-2040, 2041-2070, and 2071-2100), compared to the base period of 1985-2014.

The dynamics of heat waves are projected to occur annually during 2040-2070 under both scenarios. Currently, heat waves typically occur between June and August, but in the future, it is expected that they will extend across the months of May to September. **Based on these projections, a significant increase in climate-related health risks, particularly during the summer months, can be anticipated.**

As a result of the expected warming of the climate, the frequency and duration of strong heat and heat waves in the hot season are expected to increase. This will likely lead to a rise in various health issues, including diseases of the circulatory system, respiratory organs, and additional deaths among the population, especially in big cities. It is expected that the number of cases of sunstroke and heatstroke will increase as a result of the direct negative effect of strong heat.

In addition to the likelihood that the number and duration of strong hot days in the summer months will increase, as well as the frequency, intensity and duration of heat waves, the factors influencing this include:

- The possibility of an increase in the number of the elderly population, which is considered a risk group. At present, the elderly population, who are considered to be a risk group over 65 years of age, make up 9.1% of the total population in Azerbaijan. According to forecasts, this number will reach 23.1% by 2070 and 27.9% by 2100.
- Existence of "heat islands" in cities, which exacerbate the negative effect of strong heat.

Despite the predominantly arid climate and the population's better adaptation to summer heat, if adequate adaptation measures are not implemented to mitigate the negative effects of extreme heat, the expected climate warming will lead to more frequent and prolonged periods of intense heat and heat waves, particularly in large cities. This is likely to result in an increase in health issues, including circulatory and respiratory diseases, as well as a rise in mortality rates.

In the absence of preventive measures, it is expected that the number of cases of sunstroke and heatstroke will increase as a result of the direct negative effect of strong heat.

Possible impact of expected climate changes on the malaria season. According to the RCP4.5 and RCP8.5 climate scenarios, the average annual air temperature in the country is expected to increase by the end of the century, which may lead to an increase in the duration of the epidemic season (including the effective mosquito transmission season and the malaria transmission season), especially in the foothills and mountainous zones. As a result, the likelihood of malaria reintroduction and the emergence of new malaria foci increases.

In areas where Anopheles mosquitoes are present but malaria is not, an increase in temperature poses an even greater risk. As a result, the negative impacts of climate warming in Azerbaijan are expected to be more pronounced in mountainous areas. It is predicted that the upper boundaries of both endemic and epidemic malaria zones will shift toward higher altitudes, and the duration of the epidemic season will significantly increase, particularly in mountainous regions.

Forecasts indicate that while precipitation in Azerbaijan is expected to rise, the frequency of floods will also increase. In lakes, ponds, and swampy areas formed by river overflow during floods, as well as in drought-affected areas—especially in the foothills, where small rivers may dry up—favorable conditions will develop for the growth of Anopheles mosquitoes.

INITIAL NATIONAL ADAPTATION PLAN

CLİMATE CHANGE ADAPTATION

AZERBAIJAN 2024

7. CLIMATE CHANGE ADAPTATION

7.1. Practical case

The National Adaptation Plan (NAP) Support Project, financed by the Green Climate Fund (GCF) and implemented by UNDP, assists Azerbaijan in the development of its Initial National Adaptation Plan (INAP) and enhances climate change adaptation (CCA) efforts in priority sectors identified through stakeholder consultations, including water, agriculture, coastal areas, and others. The objective of the NAP readiness support is to build capacity for climate resilience and adaptation in these sectors by implementing actions and activities that address and remove barriers to effective adaptation at both the national and local levels.

Some of the barriers identified during the stocktaking exercise include:

a) Limited data access and sharing by stakeholders in Azerbaijan.

b) Insufficient institutional and technical capacity on climate change adaptation (CCA) at managerial, expert/practitioners and community levels.

c) Limited mainstreaming of CCA considerations into national, regional, local, and sectoral planning, budgeting and regulatory framework.

d) Limited institutional coordination.

e) Limited monitoring, evaluation and analysis of past and current programs on CCA.

To address the identified barriers, focus was on improving the CCA planning process in Azerbaijan in three main areas:

- Improved data availability, access and sharing for decision making. The support project will establish mechanisms and data solutions to facilitate increased access and sharing of climate and weather information in Azerbaijan, as well as improve the coordination among institutions.

- Enhanced institutional and technical capacity for CCA in water, agriculture, and coastal areas. The lack of enhanced institutional and technical capacity hinders both the integration of climate change adaptation (CCA) into planning processes and the effective implementation of adaptation actions at the national, regional, and local levels. To address this, a national, gender-sensitive CCA capacity-building program will be developed to bridge knowledge and capacity gaps among key stakeholders at all levels, including government decision-makers, technical personnel, local communities, and the private sector.

- Increased mainstreaming of CCA considerations into planning at national, regional, local levels in the priority sectors. An Adaptation Working Group (AWG) established at the national level, a body that coordinate the development of a NAP document. Further planned activities to advance mainstreaming include the development and application of tools (manuals, guidelines) for the inclusion of CCA considerations into sectoral planning, the improvement of the legal framework for adaptation in priority sectors (water, coastal areas, agriculture), the screening, appraisal and accounting of adaptation in public and private investments and the development and implementation of a monitoring and evaluation (M&E) system for adaptation that is compatible with the Strategic Development Road Maps (SDRM) of Azerbaijan.

Key achievements within the Initial NAP process

- Conducted a comprehensive legal review of climate change adaptation policies in Azerbaijan. International and local experts identified the necessary updates and new legal frameworks (regulations, legal documents, and laws) to be reflected in the National Policy.
- Initiated the preparation of several legal acts, including:
  - Legal document on irrigation norms for agricultural plants under climate change conditions.
  - Regulation for modern irrigation systems standards to prevent water wastage in irrigated agricultural lands.
  - Action Plan for “before, during, and after a hazardous climatic event,” coordinating with relevant institutions.
  - Amendments to the Water Code of the Republic of Azerbaijan and other normative legal acts for defining coastal zones, hydrological basins, and basin boundaries.
  - Updating the "Regulation on classification, criteria, and warnings of hydrometeorological events that can cause dangerous natural disasters."
  - Necessary actions for adopting the Presidential Decree on amending the Decree "On measures to ensure the fulfilment of obligations accepted by the Republic of Azerbaijan in accordance with the United Nations Framework Convention on Climate Change" (No. 560 of April 30, 1997).

Training session conducted by an international climate expert with the academic support of ADA University, attended by 28 government officials, enhanced their understanding of climate change fundamentals on water and coastal areas. This training significantly boosted their capacity to address climate challenges, fostering a more informed approach to policymaking and implementation

Extensive training sessions were conducted in vulnerable regions, actively engaging local communities, including 175 farmers, in climate adaptation and resilience-building practices. These sessions have been instrumental in raising awareness about the impacts of climate change and have fostered community-level participation in adaptation measures.

The Adaptation Working Group, formed under the National Adaptation Plan Project, has been integrated into The State Commission on Climate Change. This inclusion represents a significant step in aligning focused adaptation efforts with national climate policy, enhancing effectiveness and coordination at the national level.

- Vulnerability assessment of priority sectors (water, agriculture and coastal zones) in Azerbaijan
- Conducted a thorough assessment and mapping of current and future agroclimatic resources, including an analysis of historical changes and future scenarios for agricultural and land development. This data has been pivotal in formulating an adaptation strategy, guiding sustainable development and enhancing resilience to climate change.
- According to the results of assessment of long-range hydrometeorological data conducted Climate Change Risks Mapping for Azerbaijan
- Identified the most 20 vulnerable regions of country to climate change.
- Caspian Sea Fluctuation and Climate Adaptation Event: Enhanced regional understanding and preparedness for climate-related changes in the Caspian Sea, leading to improved cooperation in managing these impacts among coastal communities and policymakers.

- Turkic World Climate Adaptation Forum: Fostered a substantial increase in shared knowledge and collaborative efforts among Turkic region countries, directly contributing to more effective regional climate adaptation strategies.
- Developed training materials and conducting training sessions for technical staff of different government agencies on Climate Change Adaptation in collaboration with ADA university
- Identified existing statistics relevant to gender and climate, as well as statistical gaps. Distributed recommendations for improvement to project stakeholders.
- Prepared policy briefs on climate change adaptation for coastal areas, water, and agriculture for decision-makers and technical personnel.
- Launched the development of a Climate Web Portal to collect, store, analyze, and share information related to climate change and weather in Azerbaijan. The portal will also include a digital repository of relevant literature and integrated data analysis tools.
- Assessed existing agricultural policy, its institutional and regulatory framework, and strategic plans adopted by the Azerbaijan Government. Recommended new policies to stakeholders.
- Developed a Climate Change Vulnerability Index for Azerbaijan and its regions, based on best international practices, to design future adaptation strategies addressing high climate change risks in vulnerable regions.
- Conducted a hydrogeological assessment of the Kura River in Salyan and Neftchala districts. Determined adaptation measures against salinization and its impact on water supply, population health, and the environment. Identified alternative water provision methods for periods of increased river salinization.
- Analyzed the role of the private sector in climate change adaptation (CCA) and identified integration options. Developed a Project Workplan on Private Sector Engagement, including surveys and a strategy note to encourage private sector involvement in CCA.
- Developed a Financing Strategy for Climate Change Adaptation, including guidelines for appraising adaptation options for investments and tools for assessing fiscal impacts of climate change on public investments in agriculture, water resources management, and coastal zones.
- Prepared Manual for Appraising Adaptation Options Using Economic and Financial Data
- Collected list of adaptation priority measures from government agencies and institutions
- Conducted a comprehensive analysis of existing guidelines and practices for assessing the fiscal impacts of climate change as part of state and private investments. Developed a report with recommendations for improvement.
- Conducted feasibility studies on the national curriculum related to Climate Change and Environmental Management.
- Drafted a curriculum for an executive-level course on climate change adaptation.
- Held events and workshops to raise awareness about climate change, including a World Environment Day event with over 230 participants and an International Scientific Workshop on Caspian Sea level fluctuations.
- Delivered numerous training sessions on climate change adaptation (efficient use of water in agriculture and modern irrigation systems, breeding of drought and salinity resistant grain varieties, Gender and

Water, drought resistant rice varieties, measures against freezing in citrus and tea plants and other adaptation measures) to local communities across various regions such as Nefchala, Salyan, Shirvan, Guba, Khacmaz, Lankaran, Imishli, Nakhchivan and etc.

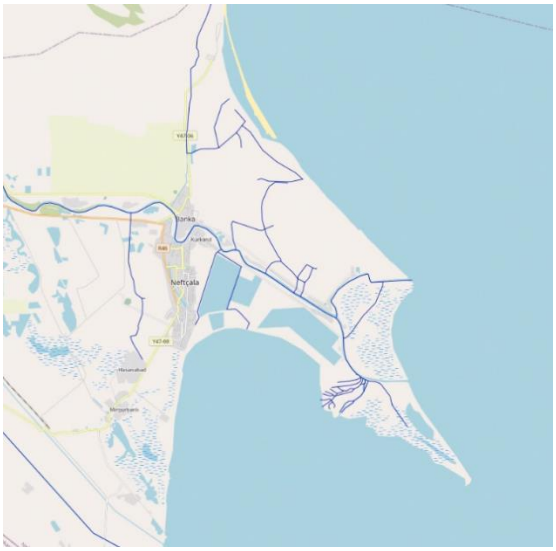
- Organized local study tours for key decision-makers from relevant government structures.
- Developed executive-level courses on climate change adaptation in partnership with the Academy of Public Administration under the President of Azerbaijan. Integrated climate adaptation modules into master's courses, with the first admissions launching in September.
- Hosted a forum in partnership with the COP29 Presidency and High-Level Champion, with over 300 local businesses participating.
- Purchased equipment to support the Ministry of Ecology and Natural Resources in data digitalization and collection.

7.2. Study: How to bring back nature in Kura delta?

The following presents the results of one of the aforementioned studies on the restoration of the Kura River delta, aimed at addressing the movement of saline Caspian Sea waters along the river for distances of 40-50 km. As a result, residents living along the river are unable to use Kura water due to the increase in salinity, which rises from 0.5 g/l to as much as 10 g/l, making the water unsuitable for consumption.

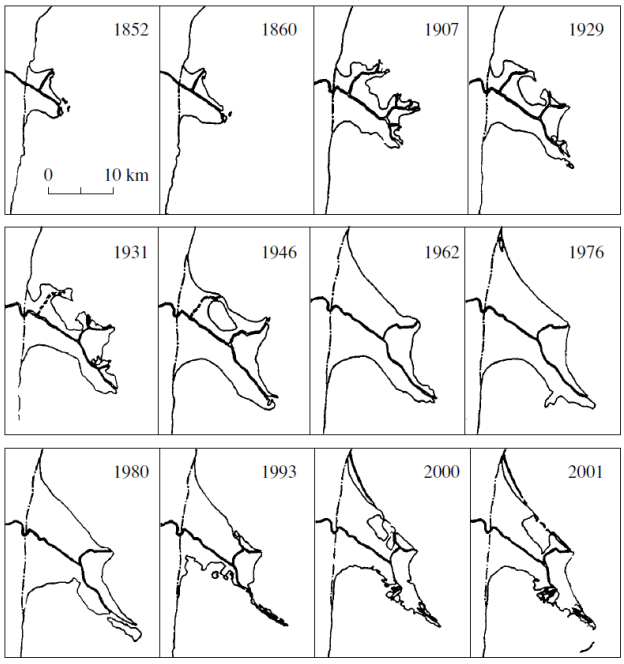
The Kura Delta is located downstream of the Kura transboundary basin, just before it flows into the Caspian Sea. Over the years, this area has undergone significant changes primarily due to human activities, including upstream interventions such as water abstractions, dredging, and dam constructions, as well as variations in sea level.

The Kura River area of the Caspian Sea serves as a vital habitat for foraging, wintering, spawning migrations, and reproduction for all species of Caspian sturgeon, except for the sterlet. This area is particularly important for the Persian sturgeon and the pinch, as it is closely linked to the Kura River. Additionally, the region is home to extensive wetlands with dense reed vegetation, a network of dams, and a large island that serves as a crucial wintering and nesting site for various bird species. It is especially significant as a temporary resting point for a large number of migratory birds. During migration periods, the number of waterbirds recorded in the area can reach up to 75,000 individuals. The site has also been noted for hosting many species of curly and pink pelicans, small cormorants, spoonbills, sultan birds, and other rare species.

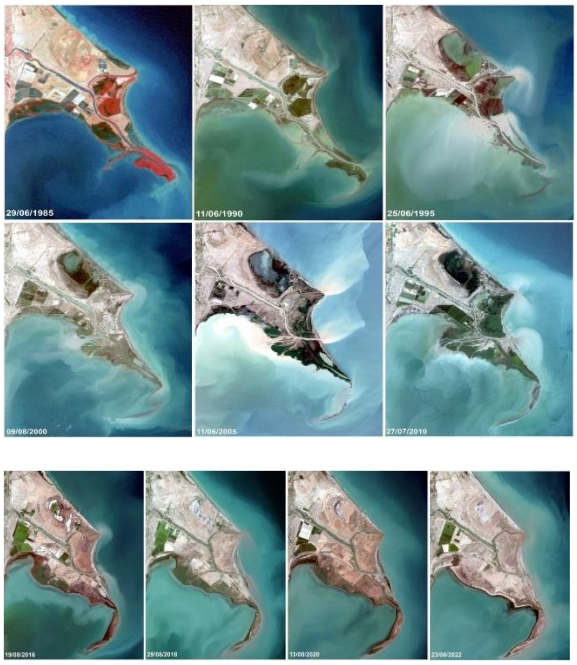


Concerned area near Neftchala

This area is dynamic with many and fast evolution through the time

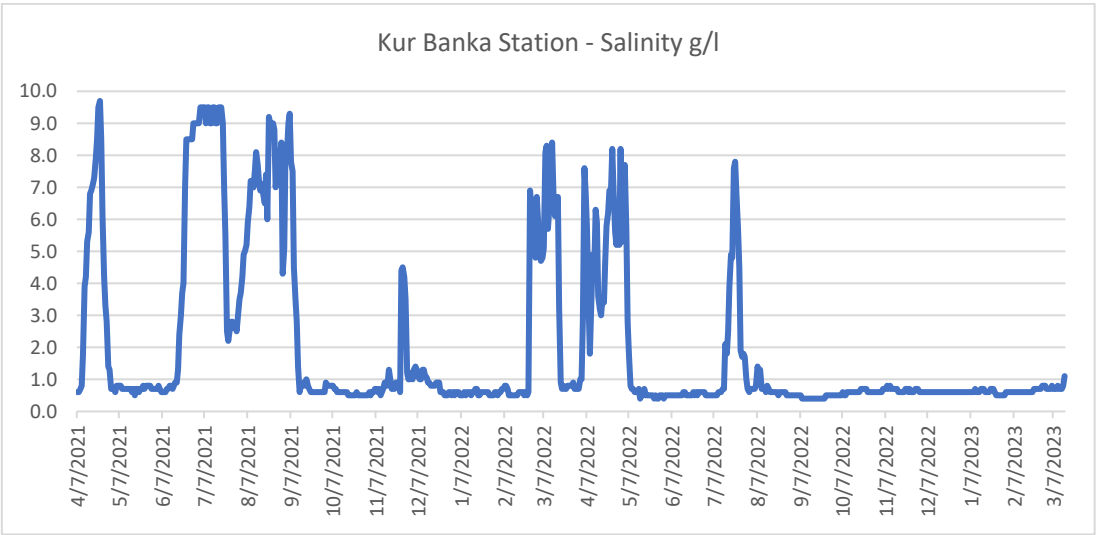


Dynamic of the Kura Delta over the period of 1852-2001



Demonstration of the recent dynamic of the area with satellite images

The key issues include the salinity from the Caspian Sea, which affects water supply upstream and irrigation, the low valorization of biodiversity potential, unorganized land use, artificial hydraulic functioning, and the alteration of wetlands. In some years, high salinity has been detected more than 50 km upstream. These findings indicate that the long-term decline in the Kura River's discharge has reached a temporary critical point, after which the river no longer serves as a natural barrier to significant seawater intrusion.



Evolution of salinity of the Kura at Neftchala (daily data: Hydromet). Issues beyond 1 g/l

The main objective is to restore the natural functioning of the Kura River delta, benefiting both communities and ecosystems through Nature-based Solutions (NbS). This project could serve as a model for NbS implementation in Azerbaijan and the wider region, given the strategic importance of the Kura delta.

The potential benefits for communities include reduced salinity in tap water, improved access to drinking freshwater, flood mitigation, sustainable land use to prevent conflicts, high-value agriculture, and enhanced landscape aesthetics.

Key indicators to track progress may include: the percentage of the population with a reliable drinking water supply, the area of wetlands restored, the length of natural watercourses restored, income trends for farmers and fishermen, biodiversity evolution (such as bird and fish species), and the reduction in flood damages.

Baseline data and targets will be established during the initial phase of the project in collaboration with local communities.

Consistency with policy

The measure aims to climate change adaptation considering the severe drought situation Azerbaijan will face (and higher salinity of water) in the coming years through the management of sea level, restoration of wetlands, etc.

Concerning the Green Deal, the project concerns mainly the output “Preserving and restoring ecosystems and biodiversity”.

Other International Commitments

The main SDG concerned are mentioned below.

Technical studies

Preliminary studies are essential for preparing such a large-scale project, and they will include the identification of relevant tasks such as topography, hydrology, land use, biodiversity inventory, land ownership (including executive power, municipalities, private landholders, and long-term leases to farmers), water quality, and water usage, among others. These studies may involve specific monitoring campaigns or censuses.

The studies will focus on characterizing the Kura Delta and propose restoration actions aimed at returning the area to its natural conditions. These proposed actions will be discussed, reviewed, and potentially re-oriented under Component 3 of the project.

Courses of technical actions - mainly Nature based Solutions - could be:

- Rehabilitation of Mother Kura in its previous bed, instead of the 2010 canal, in order to restore natural conditions,

- Rehabilitation of the wetlands and associated hydrographic system,
- Forestry with adapted species (e.g. olive tree, halophyte plants, willow, etc.),
- Manage ecological continuity (Daughter Kura, Mother Kura, Canal),
- Monitoring of the technical results (water quality, flood, land use, etc.),
- Other actions.

It is important to note that while this project cannot address all the challenges related to the Kura River, it should be closely linked to the development of a River Basin Management Plan and local Water Allocation Quantitative Management Plans for the entire Kura basin to address quantitative water issues. Activities concerning the broader Kura basin will not be covered within the scope of this project.

The expected outcomes will include technical reports that characterize the Kura delta, provide a diagnostic analysis, and propose technical actions. These reports will be reviewed in the context of the results from other components of the project.

The socio-economic diagnostic will serve as the foundation for developing a participatory socio-economic plan for the Kura delta, which will be discussed and reviewed during the project. The proposals may include:

- Land management to organise the activities inside the Delta (agriculture, urbanisation, infrastructures, etc.),
- Action with farmers to adapt their practices to a new context and to high added values perspectives i.e. organic farming development (training, equipment, seeds, etc.),
- Delineation of Protected areas with specific uses,
- Management of fishermen, proposal of fishing quota, poaching reduction,
- Green tourism development,
- Valorisation of forestry (e.g. olive oil production),
- Improvement of waste water and sludge management,
- Improvement of drinking water supply
- Reduction of floods risk,
- Implementation of a socio-economic monitoring to be shared in the communities,
- Production of clean energy (wind, solar),
- Sustainable local Committee for the Kura Delta,
- Etc.

Cost Benefit Analysis will be developed including evaluation of restored ecosystem services during 2025-2026.

7.3. Water sector

Water Management Institutions

On 30 March 2023, the State Water Resources Agency (ASWRA) was established by a decree from the President of the Republic of Azerbaijan, based on the Emergency Ministry's State Water Reserves Agency. The assets of Azersu and the Azerbaijan Melioration and Water Management joint-stock companies have been transferred to the new agency.

One of the agency's primary goals will be to enhance the efficiency of water management through the application of Integrated Water Resources Management (IWRM) principles.

In considering watersheds, it will be essential to establish local basin authorities that can coordinate management efforts under unified rules, and develop the functions and activities of relevant organizations.

The creation of this new agency is a significant step towards addressing existing institutional challenges, including:

- Lack of delineated basin districts and river basin management plans according to basin approach;
- Lack of national level structures and watershed authorities / watershed council with the established roles and responsibilities to ensure integrated management of watershed resources at river basin level;
- Organizational capacity needs in the water sector to act according to IWRM principles
- Inefficiency use of water resources from technological, methodological and management point of view.

Water Legislation

The regulation of water resources of Azerbaijan is carried out in accordance with the requirements of the laws of the Republic of Azerbaijan and the normative legal documents adopted on their basis. Water legislation consists of the Water Code of the Republic of Azerbaijan, laws "On water supply and discharge," "On land reclamation and irrigation," "On hydrometeorological activities," "On subsoil," "On municipal water resources management," "On hydro-technical structures' safety," and other normative legal acts.

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

Water strategy

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

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

The Republic of Azerbaijan faces several key water management challenges, including the lack of an integrated approach to water resource management, uneven and limited water resource distribution, pollution of transboundary rivers, and threats to water security.

Currently, the river basin approach to water resources management has not been clearly defined in Azerbaijan. It is crucial to establish a single state authority responsible for the integrated water supply across all sectors, including population, agriculture, and other areas, as well as for implementing measures to improve the condition of all water bodies (rivers, lakes, reservoirs, etc.).

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

Urgent priorities have been identified in the National Water Strategy, adopted on October 10, 2024, to address existing issues in water use and the protection of water resources. These priorities are critical for the sustainable socio-economic development of the country. Continued implementation of measures in this area is essential, with particular attention to addressing the country's water deficit and ensuring access to drinking water. In recent years, numerous projects have been funded by the state budget to develop the water sector, and this work is ongoing. Large-scale measures are being implemented to ensure efficient use and equitable access to water for all consumers, including protecting water resources, reducing losses, applying water-saving technologies, and preventing waste.

The key policy principles outlined in the National Water Strategy focus on the increased and efficient use of water resources and the improvement of water quality. Addressing existing water-related issues and applying the relevant principles of water policy are major priorities of the National Strategy.

The strategy emphasizes the development of a water balance that takes into account the needs and shares of all water users, prioritizing based on factors such as climate conditions, water resources, water quality, demand for agricultural products, and other relevant considerations. Additionally, it highlights the creation of new water sources and the development of transport infrastructure to support the efficient and integrated use of water resources.

The main priorities of the National Strategy are as follows:

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

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

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

priority in order to preserve the health and social well-being of the population.

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

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

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

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

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

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

Due to the impact of climate changes, the flow of Kura and Aras rivers, which are the main water arteries of the republic, has decreased sharply in recent years, and some of the internal rivers often dry up. In such conditions, it becomes difficult to supply agricultural plants with water during the hot months of the year. These effects are expected to increase even more in our country in the future, especially in lowland areas with arid climate zone, where approximately half of country territory is located and highwater consuming agriculture is widely developed. Therefore, for our republic, water security, provision of safe and sustainable drinking water for the population and various sectors of the economy, protection of rivers and ecosystems can be considered to be very important.

Since our republic is located in a drought zone, there is a great need for efficient use of water resources, and their protection.

Adaptation measures on Water Sector resilience to Climate Change

Since its establishment, the newly formed Azerbaijan State Water Resources Agency (ASWRA) has been actively working on policies to ensure a reliable water supply across the Republic. The agency has been focusing on fostering integrated water resources management (IWRM) to address the country's water challenges. ASWRA has implemented several key policies and analyses to achieve effective IWRM. Some of the main policies and initiatives include:

- **Institutional Reform**: This initiative involves the establishment of the Azerbaijan State Water Resources Agency (ASWRA) and the strengthening of existing joint-stock companies into Public-Legal Entities under the Agency to promote collaboration among various water operators. Efforts are ongoing to enhance institutional capacity at the national, regional, and local levels for effective water resource management. This includes the establishment of dedicated local water management operators, the creation of water user associations, and improved coordination among key water users, such as agriculture, industry, and households.
- **National Water Strategy**: The National Water Strategy was adopted in October 2024, with the goal of ensuring the efficient, equitable, and sustainable use of water resources. The strategy adopts an integrated approach to water and climate policies, aligning with the Sustainable Development Goals (SDGs) and the principles set by the EU Water Framework Directive. It serves as a comprehensive roadmap, outlining long-term goals and priorities for effective water management in Azerbaijan.
- **Modernization of Infrastructure and Efficient Allocation of Water Resources**: Significant investments are being made in water infrastructure projects to enhance water supply, distribution, and sanitation systems. These projects include the construction of dams, reservoirs, irrigation systems, and wastewater treatment plants. Additionally, an Action Plan for the Efficient Use of Water Resources has been approved by the President of the Republic of Azerbaijan. The plan includes the development of an annual water balance, the organization of accounting for paid water use, and strengthening cooperation to improve water use efficiency. It also outlines the adoption and implementation of the Water Strategy for short, medium, and long-term objectives.
- **Adaptation to Climate Change**: With climate change posing a significant threat to water availability, Azerbaijan is exploring strategies to effectively manage water resources in response to changing conditions. This includes developing adaptive measures to ensure sustainable water supply and addressing the impacts of climate variability on water systems.

By implementing these policies and analyses, Azerbaijan aims to achieve sustainable and equitable management of its water resources, ensuring their availability for current and future generations while safeguarding the environment.

Some of the results that Azerbaijan aims for by implementing these measures are:

- Sustainable Management of Water Resources: The NWR analyses promotes the sustainable use and conservation of water resources, which is crucial for a country like Azerbaijan that faces water scarcity issues.
- Enhanced Agricultural Productivity: Agriculture is a significant sector in Azerbaijan, heavily reliant on water for irrigation. The NWR analyses supports the development of efficient irrigation systems and water management practices, leading to increased agricultural productivity and food security.
- Economic Growth: Efficient and sustainable water management can support various sectors of the economy, including agriculture, industry, and energy production, thereby contributing to economic growth.

- Climate Change Adaptation: The analyses can help in developing strategies to adapt to the impacts of climate change on water resources, as well as improving Azerbaijan's ability to cope with extreme weather events like droughts and floods, which are becoming more common due to climate change.
- Environmental protection: A holistic approach to water management can help protect water quality and aquatic ecosystems.

Overall, the NWR analyses seems to hold promise for Azerbaijan to achieve a more balanced and sustainable water management system. To minimize the effects of climate change on water resources, 3 priority directions have been identified:

1. Reduction of existing water losses - in this direction, reconstruction of the Shirvan and Garabagh irrigation canals should be mentioned significantly.

* The Shirvan canal served more than 112,000 hectares of cultivated land in 10 districts for nearly 65 years.

* The Garabagh canal, in turn, served a total of 115,000 hectares of land in 9 regions since 1958.

* Over the years, deepening and widening of the soil channel, the disuse of a number of facilities on it, and the increase of water losses were observed in both canals.

* On the basis of the relevant Orders, the feasibility analysis and the working project on the reconstruction of the Shirvan canal were prepared by order of the Agency. In the project, the infeasibility analysis consumption of the canal will be increased to 180 m3/second and its length will be increased to 204.3 km, reconstruction in accordance with modern requirements and improvement of irrigation, drinking and domestic water supply of a total of 228 thousand hectares of land (116 thousand hectares of which will be newly irrigated land) designed.

* According to the project, the reconstruction and construction works are planned to be carried out in 4 stages for a period of 3 years.

* About 346 million m^3 of water loss is planned to be prevented thanks to the works to be done.

* The Agency has started to take appropriate measures related to the preparation of feasibility analysis and project-estimate documents for the reconstruction of the Garabagh irrigation channel.

* In addition to these two strategic projects, a total of 20 main irrigation canals are planned to be reconstructed in the country. In 2023, the repair and restoration of 6 of these canals was started, works on 4 canals are already in the final stage. At present, the feasibility analysis and project documents of 2 more channels have been prepared, and the relevant preparatory works for 12 channels are being rapidly continued. As a result of these measures, it is planned to improve the water supply of 300,000 hectares by reconstructing 700 km long irrigation canals.

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The 2nd direction is the increase of water resources in the country.

The operation of the Sarsang reservoir has been restored, the repair and restoration work of Sugovushan, Khachinchay and Kondalanchay-1, Kondalanchay-2 and Ashaghi Kondalanchay reservoirs, including the Tartarchay left bank canal, have been completed.

Sugovushan reservoir 2024

In addition to the ongoing construction of the Zabukhchay reservoir located in Lachin region, preparations for the construction of the Hakarichay and Bargushadchay reservoirs and the canals feeding from them are being carried out.

In addition to these projects, a total of 10 new water reservoirs are planned to be built in different areas of our country.

The construction of Yengica and Alijanchay reservoirs has been started, and feasibility analysis documents of Vilashchay, Agsuchay and Zayamchay reservoirs have been prepared. Preparations for 5 more water reservoirs are ongoing.

The third direction is the assessment of the country's alternative water resources and determination of possible directions of use.

For Azerbaijan, which has limited water resources and is heavily dependent on transboundary rivers, it is very important to form the practice of using alternative water sources, thereby reducing the demand for fresh water in industry and agriculture.

In this direction, the implementation of the relevant Decrees of the President of the Republic of Azerbaijan on the implementation of pilot projects related to the production of drinking water by desalination of sea water and the treatment and reuse of wastewater discharged from the Hovsan aeration plant into the Caspian Sea has been started.

Also, the potential of collector-drainage water that can be used in agriculture in the country has been determined, relevant proposals have been prepared and submitted to Cabinet of Ministers.

In general, as a result of effective use of water resources, more than 6 billion cubic meters of water were collected in the country's main reservoirs compared to 2020, and 4 billion cubic meters more than last year alone.

These indicators give reason to make more optimistic forecasts for reliable water supply for the country in the current and next years.

However, the formation of sustainable agriculture requires a collective effort.

In addition to the repair and construction projects implemented by the state, it is very important to bring innovative technologies to the country by the private sector, study foreign experience, expand the application of modern irrigation methods by farmers, and implement proper agrotechnical measures.

At the beginning of the mentioned period, in 2020, a number of international research organizations listed Azerbaijan in the riskiest group (Extremely high, >80%) in the list of countries that are likely to face serious water shortage. With the implemented infrastructure projects, institutional reforms, restoration of the use of the water potential of Garabagh and Eastern Zangazur, after only 4 years, Azerbaijan has moved up 2 levels in the same indicators (Medium, 20-40%) and is listed in the medium risk group. Compared to 2020, more than 6 billion additional water reserves have been collected in the country's main water reservoirs, besides this, projects have been launched to create new alternative water resources with modern applications such as seawater desalination and wastewater reprocessing. The goal is to establish a climate-resilient and risk-free water management for the country by 2050.

Future development directions of water industry under 5 main headings can be summarized as:

1) Building a climate-resilient water management system – Shifting to an efficient water use model is important to minimize the effects of climate change.

a) Application of drought-resistant crops and climate-smart agricultural practices (Modern irrigation methods, use of soil moisture sensors, water resource management, etc.) can optimize water consumption. As a result, they are better prepared for possible drought periods due to climate change.

b) Integrated Water Resources Management – All aspects of water resources (surface and underground water, atmospheric precipitation, glaciers, alternative water sources, infrastructure projects to be implemented for water collection and their interactions) to ensure sustainable water use, not just cyclical. and developing a long-term water resource assessment plan that takes into account all stakeholders (public and private organizations, NGOs and water user associations)

2) Data collection and monitoring: Improving data collection and analysis on water resources assessment, metering, agricultural water use measurement and climate variables. These steps are important for making informed decisions.

3) Transboundary agreements – regional cooperation on water management is also important to ensure long-term water security in the South Caucasus.

4) Infrastructure investments, reduction of water losses in the collection and distribution of water resources. In addition to the renewal of the existing infrastructure, during long-term planning, the growth of the country's population and the potential development directions of the economy, as well as the application of modern technologies, are particularly important.

5) Education and awareness programs - Modernization of training programs for training young specialists in the field, involvement of communities and rural households in water protection and sustainable water management processes, informing the public about the real value of water.

Irrigation

Irrigation is widely practiced in Azerbaijan, with more than 80% of the country’s water abstracted for irrigation and agricultural purposes. The remaining water is used for industrial production and domestic (farm) drinking water needs.

Azerbaijan’s internal rivers are unevenly distributed across regions, with the majority of river flow occurring during the spring period. However, this water is not fully utilized due to flooding, and the growing season

coincides with the hot summer months when water resources are scarce. This creates a significant need to capture the flow of internal rivers during the flood season and store it for irrigation purposes during the summer. To mitigate the harmful effects of floods during periods of intense rainfall and ensure water availability for irrigation in the summer, the construction of water-regulating reservoirs is essential.

In line with this need, the Decree of the President of the Republic of Azerbaijan approved the "Action Plan on Ensuring the Efficient Use of Water Resources for 2020-2022," which includes the creation of 10 reservoirs. These efforts aim to secure additional water resources.

In the context of global climate change, more efficient use of existing water resources and preventing water losses are crucial. About 70% of the country's irrigation networks are earth-based, leading to significant water losses. To reduce these losses, it is necessary to reconstruct the irrigation networks in accordance with modern standards, modernize existing infrastructure, and expand the application of advanced, water-saving irrigation technologies.

As part of these efforts, reconstruction work on 20 irrigation canals, outlined in the Action Plan, is underway. These measures are expected to lead to significant reductions in water losses. Currently, extensive work is being done to implement these initiatives.

Additionally, the use of alternative water sources, such as treated wastewater, collector-drainage water, and seawater, is becoming an urgent issue in light of climate change. The Azerbaijan State Water Resources Agency (ASWRA) recognizes that collector-drainage water reserves, depending on their mineralization levels, can be used for irrigation. Proposals have been prepared to explore the potential use of water from the Main Mil-Mugan collector for irrigation purposes.

Agrotechnical measures also play a vital role in mitigating the impacts of climate change. It is essential to implement all necessary agrotechnical practices to ensure the efficient use of water, with a particular emphasis on cultivating drought-resistant and low-water-demand crops.

Furthermore, to minimize the expected negative impacts of climate change on water resources and ensure their efficient use, improvements in water accounting and regulation are needed. This should include the application of economic instruments to stimulate water efficiency, educating water users, and implementing other necessary measures.

Drinking water supply and sanitation

As it is known, one of the most sensitive areas to global climate changes occurring in recent times is the water supply and wastewater disposal systems. From this point of view, it is of great importance to prepare a concept document on measures for adaptation of water supply and wastewater disposal systems to climate changes.

Strategic goals for measures to adapt water supply and wastewater disposal systems to climate change include bellow measures.

1. Reducing losses and ensuring efficiency water supply

Modernization of the existing infrastructure to supply consumers with uninterrupted and quality water makes it possible to prevent losses during water transportation. Although, in 2021 compared to 2011, the level of losses during the delivery of water taken from the source to the final consumer decreased by 39.9

percent and further decreased in following years there is still need to further improve this indicator by taking of relevant measures of adaptation.

Activity. Effective use of water taken from drinking water sources through modernization of the existing infrastructure, effective management of the water supply system and reduction of the level of losses during the delivery of water taken from the source to the final consumer.

* In order to improve the water supply in different regions of the republic, the location of 373 subartesian wells has been determined and excavation work is planned to be carried out in 4 stages. In addition, in order to improve the supply of drinking water to the population, 780 km of drinking water and 171 km of waste water lines were built in 2023 alone, 2 drinking water reservoirs and 480 springs were built and made available to the population. The level of metering of subscribers has increased to 90.2 percent, 81.7% of Baku city and 78.2% of subscribers in the country are provided with uninterrupted water.

2. Research and prediction of riverbed washing off processes in river valleys where irrigation facilities are located.

The water supply for several cities and regional centers in Azerbaijan, particularly those in the foothill regions, is primarily sourced from underground waters of rivers. However, numerous sand and gravel quarries are operating in the valleys of most rivers. The extraction activities in these quarries have led to intensive riverbed washing, which poses a dual threat. On one hand, this washing process threatens existing drainage infrastructure, and on the other, it reduces the thickness of the aquifer layer, disrupting the natural conditions necessary for groundwater formation.

To address these challenges, it is crucial to study and predict the riverbed washing processes occurring in the protection zones of irrigation facilities in river valleys. Based on these studies, appropriate measures should be implemented to mitigate the risks.

3. Reuse of waste (activated sludge residues) formed in wastewater treatment plants

After composting, the solids (activated sludge residues) produced during the water treatment process in wastewater treatment plants can be used as fertilizer in the agriculture. From this point of view, it is important to carry out works aimed at using the waste (activated sludge) formed in the waste water treatment plants.

Activity:Measure on composting and use as a fertilizer in agriculture of the waste (activated sludge) formed in the wastewater treatment facilities.

4. Expanding the possibilities of conducting of environmental monitoring in water supply and waste water removal systems

Ensuring resilience to environmental risks associated with climate change requires a comprehensive approach to the security of water supply systems. This approach should focus on maintaining water ecosystems, safeguarding water quality, ensuring safety, preparing for natural disasters, and promoting good management practices and public health.

Activity: Conducting environmental monitoring and data analysis, taking climate change into account, to build sustainable water and sanitation systems. This includes expanding the infrastructure of water supply and sanitation systems based on the insights derived from such monitoring.

5. Expanding opportunities for recycling and use in other purposes of waste waters generated during processing work in water supply and waste water disposal facility complexes.

Intake reservoirs and pumping stations have been created in water treatment facility complexes to collect and remove industrial wastewater, including washing and drainage water, which is combined with sludge. The filter washer generates characteristic wastes, such as medium-dispersed particles from filters and solutions formed as small dispersed sediments during coagulant hydrolysis.

This process creates a problem, as the filter washing water and settled sediment need to be managed properly. On average, the volume of washing water accounts for 7-10% of the daily water consumption in the facility.

Recycling washing water offers several benefits: it helps prevent environmental pollution (by protecting surface and groundwater), conserves water reservoirs, reduces water consumption at water treatment plants, and decreases the need for untreated drinking water.

Activity: To optimize both economically and ecologically, it is crucial to reuse washing water in water supply and wastewater treatment facilities. This involves integrating the recycling of this water into the system, contributing to more sustainable water management practices.

6. Efficient use of drinking water in production areas and elimination of water shortage

Water used in drinking water supply systems is often utilized in various technological processes in certain production areas. After being used in heating and cooling systems, this water is typically discharged into the general sewage system. Collecting and reusing this water in reservoirs can be both cost-effective and an efficient measure to prevent water scarcity. By cleaning the water from mechanical pollutants, it can be made suitable for reuse in industrial washing processes. Additionally, in some production areas, this water can be repurposed for agricultural use after neutralizing any additives mixed with it.

Activity: To promote water conservation in production areas, meet water demand profitably, and prevent water shortages, it is essential to collect drinking water discharged into the general sewage system from heating and cooling systems. The water should be stored in reservoirs, cleaned of mechanical pollutants, and then reused for industrial and agricultural purposes.

Adaptation measures on the impact of Caspian Sea level changes on the operating mode of Wastewater Treatment Plants and water quality in coastal zones

Due to declining of the Caspian Sea it is necessary to optimize the operation of the treatment facilities of waste waters, to study the operating mode of the sewage disposal facilities to the sea, to make forecasts for future projects and to normalize the water quality indicators in the coastal zones due to the drop in the level. This may improve the quality of water in coastal areas in condition of climate change.

The preparation of a concept document for adapting water supply and wastewater disposal systems to climate change could include the following actions:

1. Implement measures on increasing of water use efficiency through reducing of losses, Improvement of state of water supply systems , management of water demand through water consumption and tariff system;

2. Desalination of sea water to meet local water demand , conservation of groundwater through artificial recharging

3. Research and prediction of leaching processes in river valleys where irrigation facilities are located

4. Reuse of waste (activated sludge residues) formed in wastewater treatment plants

5. Environmental monitoring and creation of a warning system in water supply and waste water disposal systems

6. Expanding opportunities for recycling and other purposes of waste water generated during processing processes in water supply and waste water disposal facility complexes

7. Efficient use of drinking water in production areas and elimination of water shortage

8. Study of the impact of Caspian Sea level changes on the operating mode of Wastewater Treatment Plants and water quality in coast

Proposed for consideration during identification of the priority measures, to be identified by thorough cost benefit, socio-economic and environmental feasibility assessment in the full scale NAP document preparation phase (2025-2026) some initial list of measures in the area of resilience of water sector to climate change are given in table below.

7.4. Towards Integrated coastal management and adaptation to the Sea Level fluctuations

Coastal management and adaptation to rapid changes in the coastline should be implemented at both the national and local levels. A combination of judicial and administrative actions is necessary to support adaptation efforts and improve the management systems for coastline changes. The measures taken should address both structural and non-structural vulnerabilities, while also reducing the risks associated with sea-level fluctuations and related disasters.

Legal measures include the development of a law on coastline management. This law must be based on considering changes in sea level during construction on the coast. Institutional measures include strengthening the capacity of national and local coastal management organizations.

Improvements at the local and regional levels include, first and foremost, the regulation of onshore construction permits. Thus, in some cases, local municipalities create conditions for arbitrary construction.

To reduce the impact of sea-level fluctuations on tourism facilities and coastal structures, it is necessary to regulate development in coastal areas.

Where rivers flow into the sea, it is essential to create canals that facilitate fish migration. These canals should ensure the uninterrupted passage of migrating fish between the sea and the river, promoting biodiversity and maintaining healthy aquatic ecosystems. Additionally, all rivers that flow into the sea must be monitored to ensure proper environmental flow management in line with modern standards.

It is also important to plant trees in areas where the coastline is more exposed, helping to stabilize the land and reduce the impact of erosion. The declining sea level provides an opportunity to implement clean-up projects in recently exposed areas, including oil-contaminated zones. These efforts can mitigate the negative effects of pollution and support environmental recovery.

Furthermore, relocating utility infrastructure, such as treatment plants and pump stations, to higher elevations will reduce the risk of coastal flooding and minimize exposure to damage from coastal erosion or wetland loss.

To optimize the benefits of these measures, it is crucial to assess potential economic advantages and develop methodologies to estimate these benefits. This can be achieved through a comprehensive evaluation of all water-related investments in the region and their interconnected impacts within the Caspian Sea Environmental and Coastal Management Strategy.

Potential Economic Benefits of integrated solutions

Outcomes	Economic Benefits
Prevention of wastewater discharges	• Improved fish stocks • Improved recreational activities • Increase in black caviar production • Reduction of risk of waterborne diseases • Improved public health • Improved ecosystems • Protection of Caspian Seals
Improved Coastal Management	• Improved recreational activities • Improved ecosystems • Increase in property values • New services for recreational activities
Improved wastewater serves	• Improved water supply for parks and gardens • Improved water supply for suburban agriculture

To mitigate these impacts, coastal protection measures such as seawalls, dune restoration, and sustainable shoreline management could help safeguard these important zones. Additionally, preserving natural barriers like wetlands can protect against flooding while supporting biodiversity and tourism. Monitoring Caspian Sea level changes will be essential for future planning and the protection of these economically and recreationally valuable landscapes. The overall adaptation measures given in the table below.

Given the fluctuations in the Caspian Sea level, it is important to develop Caspian Sea level scenarios according to agreed climate change scenarios for the entire Caspian Basin. Then can be developed adaptation plans to be implemented in the basin by countries.

One of examples for the regional adaptation plan can be coastal zone management plan for below zones:

a) The **first zone** should encompass underwater areas from -29.0 meters to the current coastline.

b) The **second zone** includes areas vulnerable to short-term subsidence and persistent rises in groundwater levels due to wind effects, extending up to -26.0 meters from the current coastline.

c) The **third zone** consists of areas that may be flooded and where the groundwater level is expected to rise if the sea level reaches -25.0 meters.

For each of zone can be developed action plans for each country.

Proposed for consideration during identification of the priority measures, to be identified by thorough cost benefit, socio- economic and environmental feasibility assessment in the full scale NAP document preparation phase (2025-2026) some initial list of measures in the area of resilience of Caspian sea coastal zone to climate change are given in annex below.

7.5. Vulnerability of the agricultural sector to climate change

Azerbaijan is located in a sensitive ecological zone, strengthening the evaluation of agricultural vulnerability to climate change is necessary. Therefore, it is important to research the effects of climate change in different regions, develop effective adaptation measures, and ensure sustainable agricultural development, as well as to provide a scientific basis for decision-making. Climate change vulnerability assessment is still a relatively new field of study in Azerbaijan, and it needs extensive research.

In the agricultural sector of Azerbaijan, there are some constraints or barriers to implementing climate change adaptation actions.

These constraints or barriers include:

- Lack of knowledge about the extent of the risks and vulnerabilities,
- Lack of supportive policies, standards, regulations,
- Existing legal or regulatory restrictions,
- Lack of availability or restricted access to appropriate technologies,
- Limited budget and lack of access to international funds,
- Lack of researchers in the field of climate change assessment on agriculture,
- Lack of agrometeorological database, etc.

Implementing climate adaptation actions make benefits for producers and consumers.

These benefits include:

- Reducing the risks from climate variability and change,
- Reducing the additional costs related to climate change effects,
- Providing benefits to farmers,
- Providing sustainable or increased agricultural production,
- Increasing the resilience of systems,
- Protection from extreme weather events by early warning systems,
- Conservation of water resources and clean water,
- Enhancing agricultural services,
- Supporting the use of new technologies, changes in management, policy regulation, etc.

Followings can be summarized in conclusions:

- In most developing countries, population growth and rising incomes increase demand for food and other agricultural products. On the other hand, climate change poses an increasing threat to agricultural production.
- Therefore, agricultural production systems must undergo significant changes to meet interrelated challenges, such as ensuring food security, achieving sustainability, and adapting to climate change.

For effective management of the effects of climate change, changes must be made at all levels, including environmental, economic, and social.

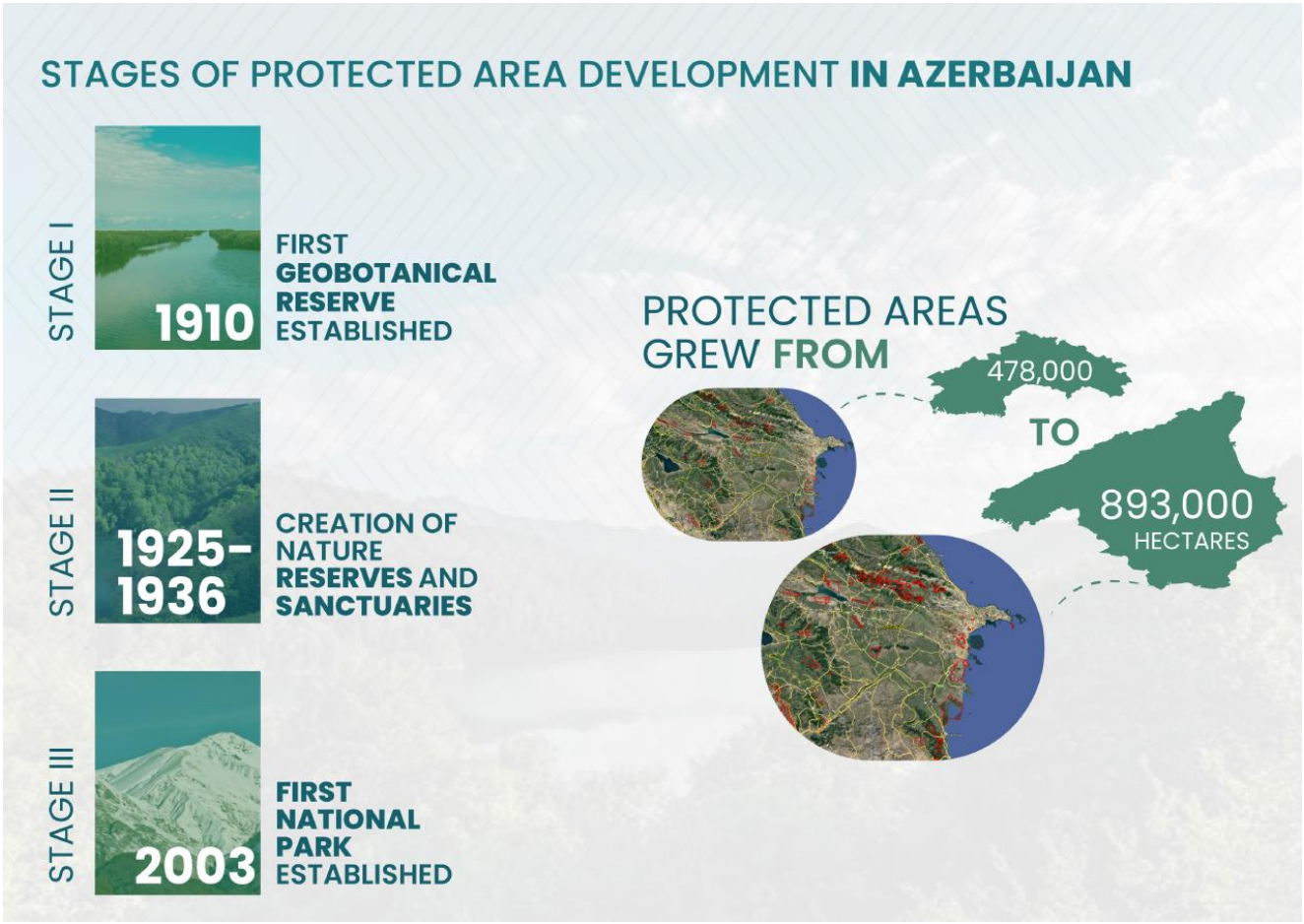
- Urgent measures must be taken to prepare the agricultural sector for the rapidly changing environmental conditions. Also, the agricultural sector is partly contributing to the accumulation of greenhouse gases in the atmosphere therefore it is important to mitigate agricultural emissions and increase resource efficiency.
- New climate-smart agricultural practices address the challenges of climate change. For implementing these practices farmers need financial support from the government. Therefore, agricultural policy should be linked with support for farmers. Besides policies, research and the development of agrometeorological databases are critical to effectively address climate change impacts.
- Agriculture is one of the main sectors in Azerbaijan that is vulnerable to climate change. Therefore, the transition to climate-resilient agriculture is necessary and the experience of other countries should be used.
- New adaptation and mitigation strategies are being developed in Azerbaijan's agricultural sector to combat current climate change impacts. To implement these strategies, it is necessary to eliminate the barriers mentioned in this report, define new political state programs or change the existing ones, provide state support to farmers, etc.

Proposed for consideration during identification of the priority measures, to be identified by thorough cost benefit, socio- economic and environmental feasibility assessment in the full scale NAP document preparation phase (2025-2026) some initial list of measures in the area of agriculture sector climate change adaptation are given in table below.

7.6. Climate change and biodiversity Nexus.

In the sphere of climate change and its impact on biological diversity as part of Azerbaijan country strategy in the field of combating, mitigating the effects of climate change the following conventions have been ratified:

As a contribution to solving the problem of global climate changes and mitigating its negative consequences, Azerbaijan pays great attention to the protection of the environment, especially biodiversity.



The following activities are carried out (intended to be carried out) in the field of combating climate changes, the impact of climate changes on biological diversity, mitigating the effects of climate changes in Azerbaijan and adapting to these effects:

- Development and Implementation of appropriate measures on creation of new specially protected natural areas, expansion of existing specially protected natural areas;
- Making changes to existing legislation to strengthen public and community-based management, implementing incentive solutions to expand community-based forest management taking into account current and future climate change
- Mainstreaming biodiversity into development plans for industries like mining, tourism, forestry, fisheries, and agriculture, including measures on climate change adaptation.
- Encouraging sustainable integrated planning and management of landscapes in the context of climate change adaptation
- Encouraging the use of sustainable farming methods, such as agroecology, multifunctional landscape planning, and cross-sectoral integrated management.
- Utilizing genetic resources sustainably in agriculture includes protecting species, landraces, breeds, cultivars, varieties, and gene diversity.
- Promoting the application of climate change adaptation oriented biodiversity-friendly management techniques in the production of crops and livestock, forestry, fisheries, and aquaculture, including

the application of customary management techniques connected to local communities and indigenous peoples when appropriate.

- Promoting natural or semi-natural habitat areas inside and outside of intensively managed production systems, as well as repairing or reuniting damaged or fragmented habitats as needed, taking into account climate change.
- Supporting multifunctional, multiuse, and multi-stakeholder approaches as well as strengthening community-based approaches to forest governance and management are crucial for achieving sustainable forest management in the conditions of climate change.
- Mainstreaming climate changes into the development planning both at the national and regional levels
- Maintaining environmental flow needs of river ecosystems through application of EU directives or other available approaches
- Promoting environmentally friendly land use activities in agricultural sectors
- Application of grazing norms, tax exemptions to prevent overgrazing in summer and winter pastures
- Establishing a nature-based management mechanisms to reduce negative changes in forests due to climate change and other human-induced impacts
- Reducing the negative effects of unsustainable logging by combating illegal logging and improving and implementing sustainable forest management
- Implementation of reintroduction projects in order to increase the rare and endangered species and return them to the areas where they were distributed historically;
- Launching educational campaigns, awareness programs, and interactive trainings to educate the general public, school students, and community members about the importance of biodiversity conservation, climate change impacts;
- Integrating water resource management and landscape planning, including through increased protection and connectivity of freshwater ecosystems,
- Supporting collaborative water management and to foster equity between water users (while maintaining a minimum ecological flow for the aquatic ecosystems), and engaging stakeholders and using transparency to minimize environmental, economic and social conflicts
- Developing and promoting incentive structures to protect biodiversity (e.g., removing harmful incentives).
- Supporting community-based participatory water management schemes that take into consideration community interests and interests of marginalized groups.
- Supporting community-based disaster management schemes that take into consideration community interests and interests of marginalized groups.
- Institutionalizing the use Indigenous and local knowledge (ILK) and promoting the use of this knowledge through different management approaches
- Protection of ILK through protection of traditional lifestyle of indigenous and local communities in mountainous regions
- Incorporating biodiversity considerations into sectorial development plans and strategies
- Strengthen community-based approaches to forest governance through the creation of participatory decision-making processes.

- Develop and implement programs for the conservation and restoration of natural habitats within and outside production systems.
- Facilitate the sharing of data and technologies to enhance transboundary water cooperation and address shared challenges.
- Ensure that marginalized groups and indigenous communities actively participate in the development and implementation of climate change adaptation actions

Proposed for consideration during identification of the priority measures, to be identified by thorough cost benefit, socio- economic and environmental feasibility assessment in the full scale NAP document preparation phase (2025-2026) some initial list of measures in the area of **Mountain Ecosystems Resilience to** climate change are given in Table below.

7.7. Human health

7.7.1. Impact of expected climate changes on the health of urban population and adaptation measures

In the absence of preventive measures, it is expected that the number of cases of sunstroke and heatstroke will increase as a result of the direct negative effect of strong heat.

Taking this into account, the following adaptation measures are recommended:

- Improving the medical-meteorological warning system on the expectation of intense heat and heat waves.
- Increasing awareness and capacity of the health sector on adaptation to extreme heat.
- Organization and improvement of coordinated action between sectors in the health care system during extreme heat and heat waves.
- Consideration of expected climate changes during construction design.
- Consideration of climate changes and "heat islands" effect in urban planning during the construction of residential and public buildings.
- Rapid greening of cities and construction of green areas around the city.
- Installation of air-cooling systems in buildings.
- Construction of air-cooling systems in intra-city and inter-city transport.
- Consideration of strong summer heat when constructing bus stops within the city,
- Publication of recommendations on measures to prevent the effects of extreme heat on human
- health and first aid in the health care system.
- Organization of speeches by individual specialists in the mass media about the lifestyle of the
- population suitable for strong heat (for example, daily routine, activity level, nutrition, clothing,
- etc.).
- Educating the population about first aid in cases of drowning and sunburn.
- Strengthening surveillance and management of climate-sensitive infectious diseases.

7.7.2. Malaria

Although much of Azerbaijan's territory has historically been at risk for malaria, it is possible to sustain the major achievement of disease elimination despite the increased vulnerability due to expected climate changes, particularly in mountainous areas. To address these challenges and protect public health, the following adaptation measures are recommended:

- ✓ Improvement of the system of malaria control measures and the monitoring, prevention and control programs that operate continuously;
- ✓ Ensuring early detection of malaria patients;
- ✓ Promptly involving persons suspected of malaria for laboratory examination;
- ✓ Forecasting cases of possible outbreaks and improving the early notification system in cases of epidemics;
- ✓ To continue the implementation of effective control measures against Anopheles mosquitoes, which are disease carriers;
- ✓ Conducting monitoring in permanent and temporary water stagnations where mosquitoes breed;
- ✓ Continuing the planting of eucalyptus trees in order to eliminate permanent and temporary water stagnations or reduce their area;
- ✓ Continuing the implementation of hydrotechnical measures in order to eliminate or reduce the area of permanent and temporary water stagnations;
- ✓ Strengthening of epidemiological control (including early diagnosis and timely treatment) of imported malaria cases.
- ✓ Implementation of measures aimed at preventing cases of malaria brought into the country;
- ✓ Coordinating preventive measures against malaria with bordering states and exchanging information.

Timely response to the threat of dangerous climate events that occur more often allows to significantly reduce the costs of eliminating their consequences, and most importantly, to prevent numerous human losses.

7.8. Forest fire

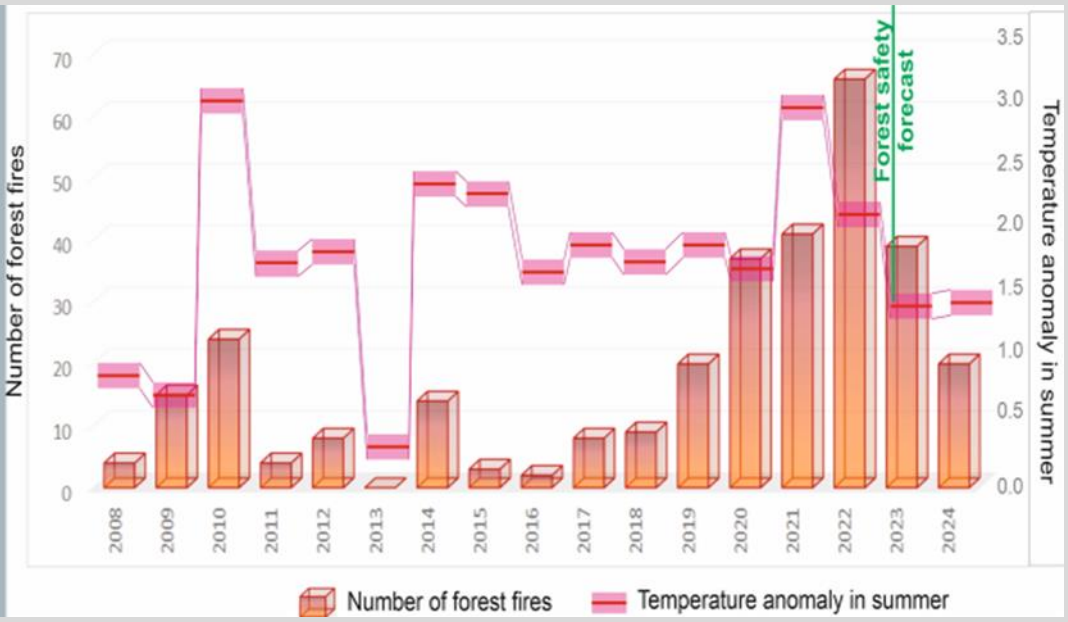
To avoid forest fires, it is important to take preventive adaptation measures in this area. To do this, the following measures should be taken:

- Strengthening the early warning system for potential forest fire threats.
- Organizing and enhancing coordinated actions among relevant agencies when a forest fire threat arises.
- Conducting educational events for the public, farmers, and tourists visiting the region to promote fire safety in forests.
- Constructing fire-fighting mineral strips in forested areas and increasing the number of checkpoints.
- Establishing volunteer teams capable of combating forest fires in the regions.

Best practice on successful adaptation measure

Over the past 20 years, there has been an increase in both the number of fire incidents and the area affected by fires on the country's forest lands. The highest number of fires was recorded in 2022, with 66 incidents resulting in damage to approximately 870 hectares of land.

In response, the Bureau of Hydrometeorological Forecasts of the National Hydrometeorological Service under the Ministry of Ecology and Natural Resources, has been issuing warnings about the risk of forest fires during the summer months since 2023. These warnings are disseminated to relevant organizations and the public through various media channels. Since that year, forest fire occurrences have significantly decreased in our country due to improved forecasting, coordinated actions among relevant departments, educational outreach to villagers and farmers for fire safety, and joint consultations and trainings in the regions with the Ministry of Emergency Situations (MES). Additional measures, such as the installation of mineral firebreaks and an increase in control posts, have also contributed to this reduction. In 2023, a total of 33 forest fires were recorded, with 25 hectares of forest area affected.



7.9. EARLY WARNING SYSTEM

History of Hydrometeorological observation

Azerbaijan is notable among countries worldwide for its distinctive history in conducting instrumental observations related to the atmosphere, which spans three centuries. The initial instrumental measurements of the Caspian Sea level began in 1830 in Baku bay (Bayil).

Meteorological observations in Azerbaijan commenced in Nakhchivan in 1843, followed by Lankaran in 1847. Aerological observations began in 1953, while Shamakhi saw its first meteorological readings in 1848, and Shusha followed in 1849. Baku initiated its observations in 1847, with Ganja starting agrometeorological observations in 1871, and the first agrometeorological measurements took place in 1882.

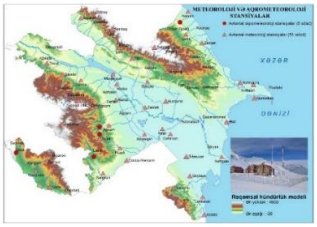
The flood station in Shaki and meteorological observations in Zagatala were established in 1872. The first meteorological readings in Goytapa were recorded in 1879, while observations in Ismayilli started in 1881, and Goygol in 1886. The first hydrological observations of river waters were conducted in Salyan at the Kur-Salyan station in 1861, with meteorological observations following in 1890. Further observations began in Sabirabad, Goychay, and Ordubad in 1891, Kurdamir, Altiaghaj, and Alat in 1892, Agstafa and Gadabay in 1893, Guba in 1894, and Astara and Gazimammad in 1897.

The Khankandi and Mashtaga aerological stations began their first meteorological observations in 1898, operating until 1992. In Julfa, meteorological observations started in 1912, followed by Maraza, Aghdam, and Tovuz in 1913, and Gabala and Tartar in 1915. The Mingachevir Lake station-initiated observations in 1914, while Barda began in 1916, and Jafarkhan in 1908.

As Azerbaijan expanded its observation network to meet the growing informational needs of the national economy, the Hydrometeorological Service Department was established in Baku in 1920. By 1929, this department included 64 stations and 12 additional observation points. In 1950, wave measuring stations built on iron foundations were introduced in the Caspian Sea, and in 1952, the first marine hydrometeorological station, "Oil rocks" was established in open waters. For the first time in the republic, observations of atmospheric air pollution commenced in 1969 in Baku and Sumgait, followed by Ganja and Mingachevir in 1972.

Meteorological and Agrometeorological observations

A key feature of global ground-based meteorological observation systems is the dense distribution of observation points. Due to Azerbaijan’s complex terrain and varying elevations, a tailored approach to the observation network’s density is essential to overcome challenges in developing ground-based meteorological systems. Optimizing existing stations to meet the minimum required number, in accordance with World Meteorological Organization recommendations, is crucial.



Azerbaijan currently operates 51 automatic weather stations and 66 traditional weather stations, with plans to install an additional 7 automatic stations by 2024. Research indicates that the agricultural sector is highly vulnerable to climate change. Currently, there are 5 automatic and 8 traditional agrometeorological stations in operation.

Stations located in the high mountainous area

Due to Azerbaijan's unique topography, meteorological observations are conducted in the country's high-altitude climatic zones. The highest stations include Tufandag at 4,172 meters, Kabash at 3,500 meters, Shahdag at 2,700 meters, Khaltan at 2,301.1 meters, Agdara (Nakhchivan HMS) at 2,217.7 meters, Giriz at 2,006.2 meters, Saribash HMS at 1,680 meters, Dashkasan HMS at 1,654.7 meters, Kalvaz HMS at 1,567.2 meters, and Alibay HMS at 1,540 meters.

Shahdagh Hydrometeorological Study Center

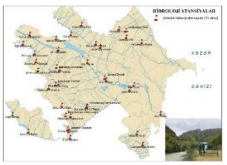
To implement the Decree of the President of the Republic of Azerbaijan dated 2008, “On Measures for Complex Hydrometeorological and Ecological Study of the Bazarduz-Shahdag-Tufandag Ecosystem of the Greater Caucasus,” the Complex Hydrometeorological and Ecological Research Scientific Center was established. The center focuses on studying climate and meteorological conditions, glacier research, background air pollution, and the monitoring of flora and fauna. Its main base is located at an altitude of 2,700 meters in Shahduzu, nestled between Bazarduzu to the west, Shahdag to the north, and Tufandag to the south.

Meteorological stations located below sea level

Astara - 28.0 m, Pirallahy-25.8 m, Neftchala – 25.2 m, Shirvan -22.0 m, Salyan - 21.5, Sumgayit -20.5 m, Neft dashlary -17.3 m, Alat -17.1 m, Chilov-17.0 m, Sabirabad -16.5 m, Nabran -16.0 m, Jafarkhan -14.5 m, Gazymammad -6.0 m, Zardab -5.1 m, Agghol -9 m

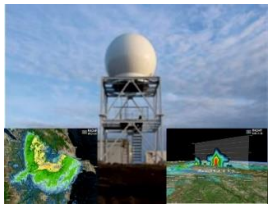
Automatization of Hydrological observations

Currently, 40 automatic stations and 44 traditional hydrological stations are operational. The extensive river network in Azerbaijan, particularly for hydrological observations, highlights the importance of these stations and the critical role they play in monitoring water resources.



Modernizing this network will enhance the database and improve the quality of hydrological forecasts. It will also enable more accurate calculations of water resources, providing precise results for assessing the water consumption of Azerbaijan's major rivers and the water balance of its reservoirs.

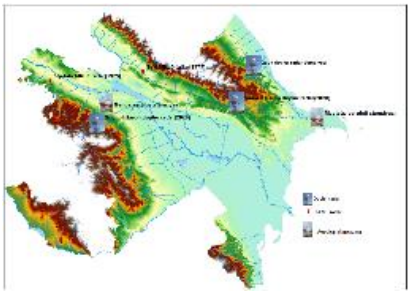
Radiometeorological Observation Systems



In 2019, two sets of Doppler radar systems were purchased and installed in Shamakhi and Goygol as part of state investment projects in Azerbaijan. In 2024, an additional radar system was installed in Quba, bringing the total to three Doppler radar systems currently operating in the country. Organizing radar observations remains a priority and is a crucial component of the early warning system. Plans are in place to install additional meteorological operational radar systems to enhance forecasting capabilities.

Comparing the data generated by these systems with information from the ground observation network will significantly enhance the quality of short-term forecasts for hazardous natural phenomena.

Aerological observations began in Baku in 1926, with a key focus on ensuring atmospheric layer probing twice daily. This initiative supports aviation safety, meets defence sector requirements, and provides critical data for forecasting hazardous weather events and environmental monitoring. Currently, two aerological stations are operational, one in the Mashtaga settlement of Baku and another in Ganja city.



Environmental pollution monitoring system

Since 1938, the country has been monitoring the chemical composition of surface waters, with pollution monitoring starting in 1966 and environmental radioactivity observations beginning in 1965. Air pollution observations in the atmosphere started in 1969 in Baku and Sumgayit, and expanded to Ganja and Mingachevir in 1972. Monitoring of rainwater pollution began in 1980.

Soil monitoring

The first instrumental agrometeorological studies in the republic began in the city of Ganja. Extension of agrometeorological observations is considered as a priority direction. The creation of a single complex monitoring network is planned to be created to meet demands of agricultural complex

Environmental radioactivity monitoring

Activities to protect the environment from radioactive pollution are carried out under the laws of the Republic of Azerbaijan, including the "On Environmental Safety," "On Radiation Safety of the Population," and "On Environmental Protection," as well as the Regulation "On the Rules for Monitoring the Environment and Natural Resources" (approved by the Cabinet of Ministers on July 1, 2004, No. 90). These measures are aligned with the implementation of these laws.

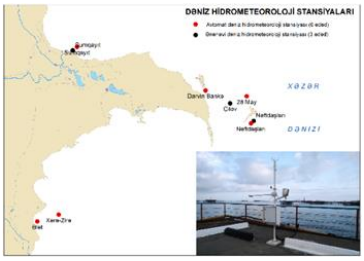
As part of the project "Development of Infrastructure in the Field of Radioactivity Monitoring in the Republic of Azerbaijan," organized by the UN AEBA and in collaboration with the Ministry of Ecology and Natural Resources, fully automated online radiological early warning monitoring systems have been installed in Aghstafa, Sadarak (Nakhchivan MR), Beylagan, Astara, Guba districts—areas located near countries that use nuclear technologies—and on Pirallahi Island. These systems monitor radiation levels in real-time.

Air quality monitoring network

Within the State Investment Project, five stations operating in automatic mode and one mobile laboratory were purchased and 3 automatic stations were installed in Baku, Sumgait - 1 and Ganja - 1.

The location of the monitoring stations is determined based on existing national legislation, the "Atmospheric Air Quality and Clean Air for Europe" directive (2008/50/EU), and the document "Modernization of Air Quality." As part of a state investment project, a mobile laboratory was purchased to conduct automatic monitoring of air quality in various areas. The mobile laboratory is equipped with modern devices and equipment that meet international standards. This facility allows for on-site assessments of air quality, providing analytical research on air quality indicators directly in the field.

Sea Observations System



In 1952, the first hydrometeorological station, "Oil Rocks," was established in the open sea.

In 2020, within the State Investment Project, four sets of automatic marine stations manufactured by the Finnish company "Vaisala" were delivered and installed at the Caspian marine hydrometeorological stations: "Oil Rocks" IDHMS, "Hare-Zira," "Darwin-Bank", "28 May", "Sumqayit" and "Alat".

In order to study the environmental problems in the Caspian Sea, to keep its pollution status and dynamics under control, monitoring works are carried out by taking samples of water and bottom sediments, benthos and zooplankton at the mouths of natural streams in the part of the sea belonging to the Republic of Azerbaijan.

These works are carried out at hydrometeorological stations and by means of the scientific research ship "Alif Hajiyev" 4 times a year in all seasons.

Development of Early Warning System in Azerbaijan

Azerbaijan, one of the regions most prone to hazardous hydrometeorological events, is becoming increasingly vulnerable to the impacts of climate change and climate-related hazards. The country has seen a rise in water stress, floods, and heat waves in recent years. These climate-related risks expose populations, agricultural sectors, and infrastructure to severe damage. Key sectors such as agriculture, tourism, and health are facing heightened climate threats, leading to reduced crop yields, damage to tourism infrastructure, and an increase in heat-related health issues. Mountainous and coastal communities, in particular, are highly susceptible to flooding. To effectively adapt to the impacts of climate change and address these climate risks, Azerbaijan urgently needs accurate, timely, and effective weather, climate, and human-centered early warning systems.

SITUATION CENTER

was established in 2022 within the framework of the State Investment Program

Doppler Weather Radars	- 2 units
Automatic Hydrological stations	– 40 units
Automatic Meteorological stations	– 51 units
Automatic marine stations	– 4 units
Automatic air quality stations	– 5 units
Automatic aqromet stations	– 4 units
Aərological station	- 1 unit

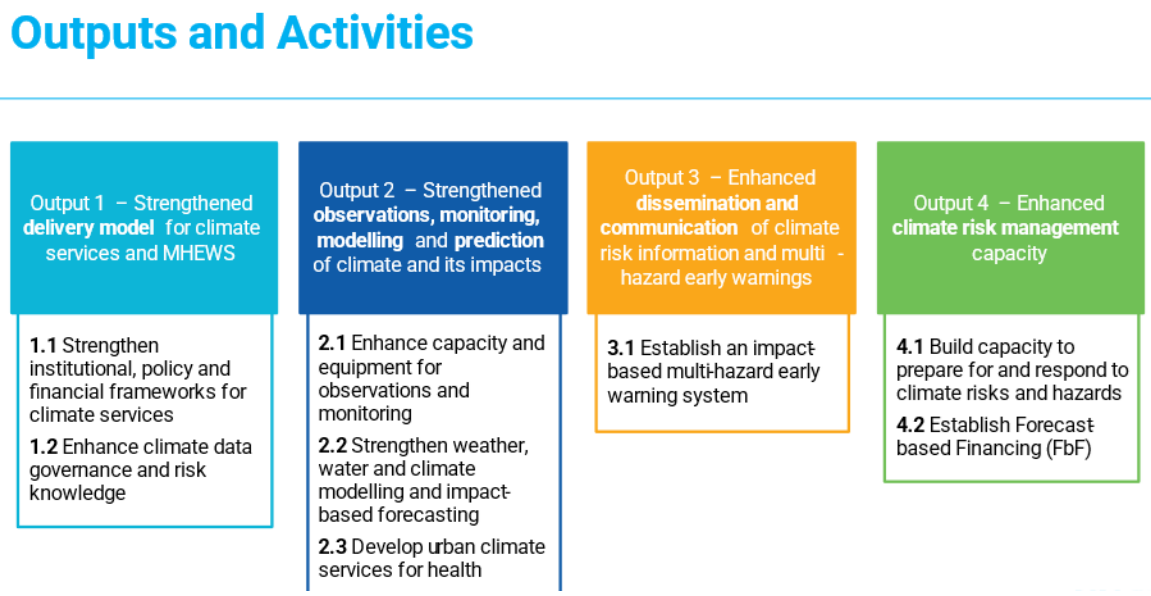
The current hydrometeorological network in Azerbaijan is insufficient to meet the country's needs, as it lacks the necessary coverage and automation to provide timely hydrometeorological warnings. The radar network is underdeveloped, and there is no continuous maintenance program in place. Additionally, crucial tools like the National Weather Forecasting Model, Operational Impact-Based Flood Forecasting Model, and Surface Water Modelling software packages are not available. As a result, Azerbaijan's weather forecast production process is inadequate for the efficient and timely dissemination of information, limiting disaster preparedness and response capacity, and hindering the protection of lives, infrastructure, and assets.

To address this gap, the government of Azerbaijan has prioritized the modernization of the National Hydrometeorological Service (MHS) within the Ministry of Ecology and Natural Resources. Azerbaijan has submitted a project concept to the Green Climate Fund titled "Strengthening Climate Information and Multi-Hazard Early Warning Systems for Increased Resilience in Azerbaijan."

Intended Impact

- This $35M project aims to increase the resilience and reduce the vulnerability of up to **5.7 million direct beneficiaries** at high risk from climate-related hazards and extreme events, with an additional **3.6 million indirect beneficiaries**
- The project will directly contribute towards achieving **Early Warnings for All**, as well as the attainment of selected targets and indicators in the Paris Agreement, Sustainable Development Goals, and the Sendai Framework

Main outputs are described in figure below.



Role of UN Environment Programme (UNEP)

- UNEP as the **Accredited Entity (AE)** is responsible for overseeing project implementation, financial management, evaluation, reporting and closure. UNEP shall monitor and supervise project execution and ensure proper management and application of GCF Grant Proceeds.
- UNEP Regional Office for Europe as the **Executing Entity (EE)** will:
  - → Be **accountable for project execution at the national level**, and will contract international and local consultants and Technical Partners as needed to undertake relevant activities
  - → Facilitate **cooperation and coordination** among partners, stakeholders, and project-hired consultants
  - → Administer the **Project Management Unit** in Baku, and **monitor and report** to UNEP as AE on progress in project implementation

UN environment programme

Role of UNICEF

UNICEF will support delivery of activities related to c**hild-centred, multi-hazard risk and vulnerability assessments,** targeted **climate analytics and decision support tools for health ,s**trengthen **public broadcasting and reporting mechanisms** to ensure that risk information is disseminated to vulnerable groups, engagement of children, adolescents and youth through formal education channels and practical, community-based initiatives and f**orecast-based Financing (FbF)** using **climate shock-responsive social protection** as an enabler

Role of Azerbaijan's National Designated Authority (NDA)

- As the GCF NDA for Azerbaijan, the **Ministry of Ecology and Natural Resources** (MENR) provides broad strategic oversight of the GCF's activities in Azerbaijan and communicates its priorities for financing low-emission and climate-resilient development
- **MENR and UNEP will co-chair the Project Steering Committee**, providing high-level oversight and guidance towards achieving the project's objectives
- **National Hydrometeorological Service** (NHMS), under MENR, will be the main national partner for the project

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The GCF project will support the Government to significantly develop and strengthen climate information services and establish a sound, effective and sustainable multi-sectoral early warning system (EWS). Taking preventive action at the community and national level will significantly increase the resilience of the most vulnerable people and communities to climate-related hazards, thereby contributing to improved well-being, human health, and food and water security. This can be achieved through the following components:

This project fully corresponds to the needs and priorities, including: "Azerbaijan-2020: Looking to the Future" national development strategy states that "regions where emergency situations are expected as a result of floods will be identified and forecasts will be made that will be regularly used by relevant organizations." The strategy, also called "The development of an early warning system to reduce the damage caused by climate change-related hydrometeorological events" is important

The third report of Azerbaijan on the UN ICRC states that there is a need to "develop an early warning system to reduce the damage caused by hydrometeorological events related to climate change."

Certain works are being done in this field in the country. The situation center was created to analyse all data from automatic stations, radars , satelites and other sources to develop effective forecasts and early warning

To ensure sustainable development of the field of hydrometeorology in Azerbaijan for effectively serving to EWS , the development of the Development Strategy of Hydrometeorology, which includes medium and long-term goals, is one of the tasks before us. Strategy covering the 2025-2030 period, ensuring the provision of information in protecting the population from hydrometeorological emergencies, monitoring the natural environment, planning the activities of weather-related areas of the economy (water management complex, agricultural sector, transport, energy and other areas) and implementing measures to increase their effectiveness should be prepared for the purpose.

The strategy should determine the main directions of development of activity in the field of hydrometeorology (meteorology, climatology, agrometeorology, hydrology, environmental monitoring, including providing information on the state of the environment and dangerous natural phenomena).

In making decisions on ensuring hydrometeorological safety, timely and correctly provided information about the actual and predicted state of the environment is considered fundamental.

Highly scientific activity in the field of hydrometeorology requires that all types of observation and other work carried out by employees of the hydrometeorology service are always carried out with scientific and methodological support.

The operation of surveillance systems is based on the following principles:

- continuity of observations;
- uniformity and comparability of methods of observations, collection, processing, storage and dissemination of information;
- ensuring accuracy, accessibility and effectiveness in the use of information about the state of the environment;
- compliance in matters of public health protection, environmental protection, ecological and hydrometeorological safety.

INITIAL NATIONAL ADAPTATION PLAN

GENDER, INDIGENOUS PEOPLE KNOWLEDGE, CHILDREN AND YOUTH CONSIDERATION IN NAP

AZERBAIJAN 2024

8. GENDER, INDIGENOUS PEOPLE KNOWLEDGE, CHILDREN AND YOUTH CONSIDERATION IN NAP

Gender problems in adaptation:

The Constitution of the Republic of Azerbaijan guarantees equal rights for women and men, the right of everyone to freely choose their type of activity, profession, occupation and place of work on the basis of their ability to work. This is the legal basis for women's participation in building a democratic society. The 21-article Law of the Republic of Azerbaijan On State Guarantees of Equal Rights for Women and Men, adopted in 2006, aims to eliminate all forms of gender-based discrimination and ensure gender equality in the political, economic, social and cultural spheres.

National Action Plan on Gender Equality (2019-2023): This plan outlines strategies to improve gender equality, focusing on education, healthcare, economic empowerment, and reducing domestic violence. The main objectives of the National Action Plan are as follows:

- Prevent conflicts, as well as all forms of structural and physical violence against women and girls.
- Include women's and girls' interests and increase their participation in processes aimed at prevention.
- management and resolution of conflicts.
- Protect the human rights of conflict-affected women and girls and ensure their physical, psychological, social and economic security.
- Consider the special needs of women and girls during conflict and in post-conflict period.

Toolkit for a Gender-Responsive Process to Formulate and Implement National Adaptation Plans (NAPs) is developed within UNFCCC to provide supplementary guidance to its Technical Guidelines for the NAP Process, developed by the LEG (UNFCCC, 2012). The focus of this guidance is on integrating gender-responsive approaches throughout the different stages of the NAP process.

Main principles of this toolkit will be followed during all stages of NAP process in Azerbaijan. Mainly in areas to integrate gender into the enabling activities that occur throughout the process, for example, in the engagement of stakeholders and capacity development.

In 2025-2026 will be developed stakeholder engagement plan for the NAP process, where gender will be considered as one of main components of NAP.

Gender participation in NAP Process for Azerbaijan considers including gender equality considerations undertaken so far by different sectors and activities implemented within different national and international projects, including those in National Communications to UNFCCC, selected Nationally Determined Contribution (NDC) priority Areas and other reports. For all priority sectors of water, coastal areas, health, agriculture, forests & biodiversity will further as well be analyzed and in adaptation actions issues on addressing of impacts of Climate change on gender will be paid higher attention and will be provided recommendations for addressing these impacts.

In 2025-2026, while developing the stakeholder engagement plan for the NAP process, the role of gender will be clearly defined, and proposals will be prepared to integrate gender considerations into national policies, plans, and strategies. The final NAP document will include detailed gender considerations, as well as traditional and local knowledge, and will identify methods for their integration into the NAP's adaptation priorities and needs.

In the M&E process for the NAP, the aim will be to ensure that adaptation activities take into account the varying levels of knowledge, capacity, and needs of women benefiting from these implementations. Gender-disaggregated data will be collected for monitoring and reporting purposes.

Indigenous knowledge. National Adaptation Plans give the opportunity to mobilize different knowledge systems.

A dialogue platform for different knowledge systems is important part of NAP process. Ecosystems-based adaptation based on the capacities, techniques and knowledge of local populations who have a close relationship with nature. The mobilization of the best available knowledge, facilitated through the interaction between different knowledge systems, may improve climate resilience and effective adaptation.

Adaptation, both natural and human, happens at this local scale as a response to climate change impacts. It is an exceptional resource for monitoring climate impacts and guiding adaptation. The synergies between science and local and indigenous knowledge will be provided through relevant national policy support in the NAP process in Azerbaijan to ensure effective adaptation policy planning, information flow, accurate data and decision making.

Children and youth

Children face heightened and specific risks due to climate change, that these impacts are already occurring, and that the most disadvantaged and marginalized children bear the heaviest burden.

Youth engagement in climate action and environmental stewardship is being actively fostered through comprehensive education and empowerment initiatives, including in the NAP processes. The Ministry of Ecology and Natural Resources and the Ministry of Youth and Sports, in collaboration with UNICEF, have introduced youth-centered climate education programs, such as the "Youth Climate Envoys" initiative. Launched in 2023, this program trains young climate leaders to develop sustainable solutions and green energy initiatives, fostering their participation in both national and global climate dialogues. Additionally, the "Climate Weeks Initiative" empowers young people to engage in climate action and raises-awareness across ten regions in the country. Through these initiatives, UNICEF collaborates with the Ministry of Science and Education and other stakeholders to integrate climate change and environmental education into the school curriculum and community outreach programs, engaging youth in environmental stewardship and decision-making processes.

Azerbaijan has joined the Declaration on Children, Youth and Climate Action - a pledge drafted by children and youth and aligned to by champion governments willing to uphold priorities identified by children and youth throughout the world.

In accordance to this Declaration during the NAP implementation relevant measures will be realized to increase resilience and engage youth and children in climate change adaptation processes.

9. EXISTING BARYERS AND GAPS

The capacity development of diverse actors is key element to implementing adaptation actions. Increasing capacity and knowledge at the individual, institutional, and systematic levels is a priority in strengthening resilience at governance levels.

Climate change adaptation is knowledge intensive and based on science and needs multilateral approach as different actors do not always have the skills and capacities necessary to tackle the challenges climate adaptation presents.

Current barriers and gaps can be described as follow:

- ✓ Data and knowledge gaps
- ✓ uncertainties in future climate scenarios
- ✓ Issues in the sphere of data access and sharing among stakeholders;
- ✓ Issues in the sphere of Institutional and technical capacity on climate change adaptation (CCA) at managerial, expert/practitioners and community levels;
- ✓ Issues in the sphere of mainstreaming of CCA considerations into national, regional, local sectoral planning, budgeting and regulatory framework;
- ✓ Institutional coordination issues; and
- ✓ Weak interrelation among science and practice
- ✓ Modern technology accessibility issues
- ✓ Financial issues
- ✓ Issues related to the framework for monitoring, evaluation and analysis of NAPs

During 2025-2026 will be identified legal institutional and capacity building measures to eliminate gaps in above spheres. In following stage of NAP implementation relevant measures will allow to minimise them. Particular attention will be given to bellow barriers elimination:

Types of barriers	Barriers
Economic/financial barriers	- **Possible issues which may create difficulties for favourable incentives (taxes, customs, etc.) for the import of necessary adaptation technologies into the country;** - **Issues on financial costs of large-scale projects;** - **Issues related to access to relevant financial sources for the import of relevant technological innovations and green technologies to reduce the climate change impacts and to adapt to impacts, the reluctance of financial institutions to provide long-term and low-interest loans**

Structural/regulatory barriers	**- Insufficient adaptation of strategic development programs of different economic sectors to climate change problems,** **- lack of financial and environmental assessment of climate risks in strategic roadmaps and other strategic documents** **- Lack of specialized structures for combating climate change and adaptation in a number of government agencies;** **- Lack of expertise in terms of the impact of projects on different sectors of the economy on climate change;**
Technological barriers	**- Challenges to implement mechanism to stimulate research, financial and technological innovations in the country to replace high-emission equipment and facilities with green technologies in the fight against climate change in relevant sectors;** **- Lack of effective early warning system to reduce the damage caused by hydrometeorological disasters related to climate change;** **- Challenges to obtain technologies for the collection and use of rainwater in small water basins in rural communities of Azerbaijan to address the problem of water shortages caused by climate change in the country;**

10.MANDATE FOR NAP

The benefits of adaptation are extensive and long-lasting. As global temperatures rise, national adaptation plans (NAPs) serve as the primary tool for countries to systematically build resilience, enhance adaptive capacity, and reduce vulnerability to climate change. The NAP process allows countries to identify and address medium- and long-term priorities for climate adaptation, while establishing the systems and capacities necessary to integrate adaptation into development planning, decision-making, and budgeting.

The NAP process was established under the United Nations Framework Convention on Climate Change (UNFCCC) in 2010. Since then, technical guidelines have been developed, extensive capacity building undertaken, dedicated funding windows opened, and various support initiatives—such as the NAP Global Network—launched.

Mandated by Decision 3/CP.26, this assessment in Bonn aims to evaluate the extent to which the NAP process has contributed to enhancing adaptive capacity, strengthening resilience, and reducing vulnerability to climate change, with countries aiming to adopt a decision on the result of this assessment at the 29th UN Climate Change Conference (COP 29) in Baku.

More specifically, it represents an opportunity to:

- recognize developing countries' adaptation efforts and their progress in achieving the objectives of their NAPs;
- consider how the NAP process contributes to the achievement of the Global Goal on Adaptation (Article 7.1 of the Paris Agreement); and
- share experiences, best practices, and lessons learned, as well as identify gaps and enhancement needs in countries' respective NAP processes.

The process to formulate and implement national adaptation plans support to identify medium- and long-term needs and develop and implement strategies and programmes to adapt to the adverse effects of climate change.

NAPs are also one of the key vehicles through which parties can communicate their adaptation needs under the United Nations Framework Convention on Climate Change (UNFCCC).

At the time of writing, six countries have formally submitted NAPs to the UNFCCC.

A national-level mandate can provide a legal and/ or political basis for the NAP process (referred to in this paper as a NAP mandate). This, in turn, can help delegate responsibility, encourage strategic thinking across ministries and levels of government, and ensure timely development and implementation of a country's NAP.

One of the mechanisms designed to support adaptation planning under the UNFCCC is the process to formulate and implement NAPs (hereafter NAP process).6 This provides a means for LDCs and other developing countries to identify medium- and long-term adaptation needs and develop and implement strategies and programmes to address those needs.

With the adoption of the Paris Agreement, the NAP process has also been solidified as one of the key vehicles through which parties can communicate their adaptation needs.

Formulating and implementing a NAP is a country driven process, so it will vary depending on national circumstances. Implementing NAPs will require substantial short-term resources and long-term investments. A national-level mandate would solidify the NAP's placement in the broad national planning process by indicating how and when it should be produced, and for implementation, how this would be affected, thereby giving it a legal as well as long-term basis beyond regular political cycles. This can help ensure that the government mobilizes adequate resources into adaptation planning and ensures strategic thinking across multiple levels and ministries to develop a comprehensive NAP that facilitates long-lasting adaptation actions

The NAPs, as strategic national plans, would provide guidance to processes at the national level and beyond. These processes would encompass not only government agencies and ministries, but also communities, the private sector, local municipalities, non-governmental organizations, and other relevant stakeholders. The NAPs would identify priority adaptation programmes and provide mechanisms by which policies can gradually be modified, to become more resilient.

Countries that have initiated a NAP-like process typically designate a government agency to lead climate change adaptation efforts. This agency often holds the mandate to coordinate the activities of various ministries and agencies, facilitating assessments and planning. Its role includes conducting outreach, building capacity, and bringing together relevant stakeholders to identify and prioritize national adaptation needs.

The Ministry of Ecology and Natural Resources (MENR) is the National Designated Authority responsible for implementing commitments under the UNFCCC. MENR has appointed a national coordinator and established a working group to increase efficiency in this area. According to Protocol 10 of the State Climate Change Commission, dated December 21, 2021, a secretariat was created at MENR to coordinate activities. Organizations are required to submit action plans on adaptation to climate change to MENR for the development of the National Adaptation Plan (NAP) and mainstreaming climate change adaptation into sectorial development plans.

Another example to integrate NAP with SDG:

- State Commission chaired by Prime Minister of Azerbaijan Republic to form Social – Economic Development Strategy and coordinate strategic planning and management in relation to Azerbaijan 2030: "National Priorities for Socio-Economic Development"
- creation of by the Decree of the President of 06 October, 2017 National Coordination Council on Sustainable Development.

The Council aims to establish national priorities aligned with global targets for Azerbaijan by 2030 and their indicators, ensure the alignment of programs and strategies across socio-economic sectors with the Sustainable Development Goals (SDGs), and prepare annual reports on the achievement of these goals. The Deputy Prime Minister of Azerbaijan is appointed as the chairman of the council, with the Minister of Economy serving as the deputy chairman.

This helps incorporate adaptation measures into the design and implementation of national development plans, poverty reduction strategies, rural development plans, and sectoral policies and strategies (e.g., water, agriculture, health) to ensure their sustainability in the face of climate change. As adaptation to climate change risks is still in its early stages, most national development plans, poverty reduction strategies, sectoral strategies, and project documents in climate-sensitive sectors tend to overlook or insufficiently address climate change. Even when it is mentioned, there is generally a lack of specific operational guidance on how to integrate climate change considerations. Adaptation should not be seen as a separate 'sector' with its own frameworks, tools, and approaches, but rather as a cross-cutting issue integrated into all sectors.

All sectors, including water, agriculture, economy, industry, human health protection, emergency management, and others, can closely participate in the NAP process to develop a coordinated document and implement it collaboratively. Therefore, the NAP can serve as an umbrella for the adaptation process, ensuring alignment with the national development context, SDGs, Sendai Framework, and other relevant frameworks.

By decision of Climate Change Commission (Protocol 10) Ministry of emergency situations was requested to develop action plan for climate change related hazardous system management within the DPR framework.

Different other sectors have also been by that protocol have been called to develop sectorial actions related to climate change impact and adaptation.

There will be needed high level political engagement through State commissions on Climate Change, Water and others. The adaptation plan considers participation of women and youth in decision-making processes by villages.

Azerbaijan NAP process will be considered to be in line with requirements of The Paris Agreement and the 2030 Agenda for Sustainable Development, specifically Sustainable Development Goal 13 (SDG 13), which calls upon UN Member States to "take urgent action to combat climate change and its impacts". One of the targets under SDG 13 is to integrate climate change measures into national policies, strategies and planning (UN, 2019).

11.INTEGRATING THE GLOBAL GOAL ON ADAPTATION

Adaptation to climate change is becoming a crucial and necessary component of planning at all levels. During its seventeenth session, the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) acknowledged that national adaptation planning enables developing and least developed country (LDC) Parties to assess vulnerabilities, mainstream climate change risks, and address adaptation. The COP also recognized that, due to their development status,

climate change risks exacerbate development challenges for LDCs and emphasized the importance of integrating adaptation planning within the broader context of sustainable development. To support this, the COP established the National Adaptation Plan (NAP) process as a framework to facilitate effective adaptation planning in LDCs and other developing countries.

The overall objectives of the national adaptation plan process are:

- To reduce vulnerability to the impacts of climate change, by building adaptive capacity and resilience;
- To facilitate the integration of climate change adaptation, in a coherent manner, into relevant new and existing policies, programmes and activities, in particular development planning processes and strategies, within all relevant sectors and at different levels, as appropriate

Azerbaijan follows the principle agreed upon by COP that adaptation planning at the national level is a continuous, progressive, and iterative process. This process is based on nationally identified priorities, including those reflected in relevant national documents, plans, and strategies, and coordinated with national sustainable development objectives, plans, policies, and programmes. Therefore, enhanced action on adaptation is planned to:

- Be undertaken in accordance with the Convention;
- Follow a country-driven, gender-sensitive, participatory and fully transparent approach, taking into consideration vulnerable groups, communities and ecosystems;
- Be based on and guided by the best available science and, as appropriate, traditional and indigenous knowledge, and by gender-sensitive approaches, with a view to integrating adaptation into relevant social, economic and environmental policies and actions, where appropriate;
- Not be prescriptive, nor result in the duplication of efforts undertaken in-country, but rather facilitate country-owned, country-driven action.

For the formulation and implementation of the national adaptation plan, we will follow the documents adopted during COPs and the NAP technical guidelines (LEG, 2012), as well as the UAE Framework for Global Climate Resilience, which includes the following thematic and dimensional targets for climate adaptation and resilience:

(a) Dimensions (iterative adaptation cycle): impact, vulnerability and risk assessment; planning; implementation; and monitoring, evaluation and learning; recognizing that support in terms of finance, capacity-building and technology transfer is a consideration in each stage of the cycle;

(b) Themes: water; food and agriculture; cities, settlements and key infrastructure; health; poverty and livelihoods; terrestrial and freshwater ecosystems; and oceans and coastal ecosystems; tangible cultural heritage; mountain regions; and biodiversity;

(c) Cross-cutting considerations: country-driven, gender-responsive, participatory and fully transparent approaches, human rights approaches, intergenerational equity and social justice, taking into consideration vulnerable groups, communities and ecosystems, and nature-based solutions, and based on and guided by the best available science including science-based indicators, metrics and targets, as appropriate, traditional knowledge, knowledge of indigenous peoples and local knowledge systems, ecosystem-based adaptation, nature-based solutions, community-based adaptation, disaster risk

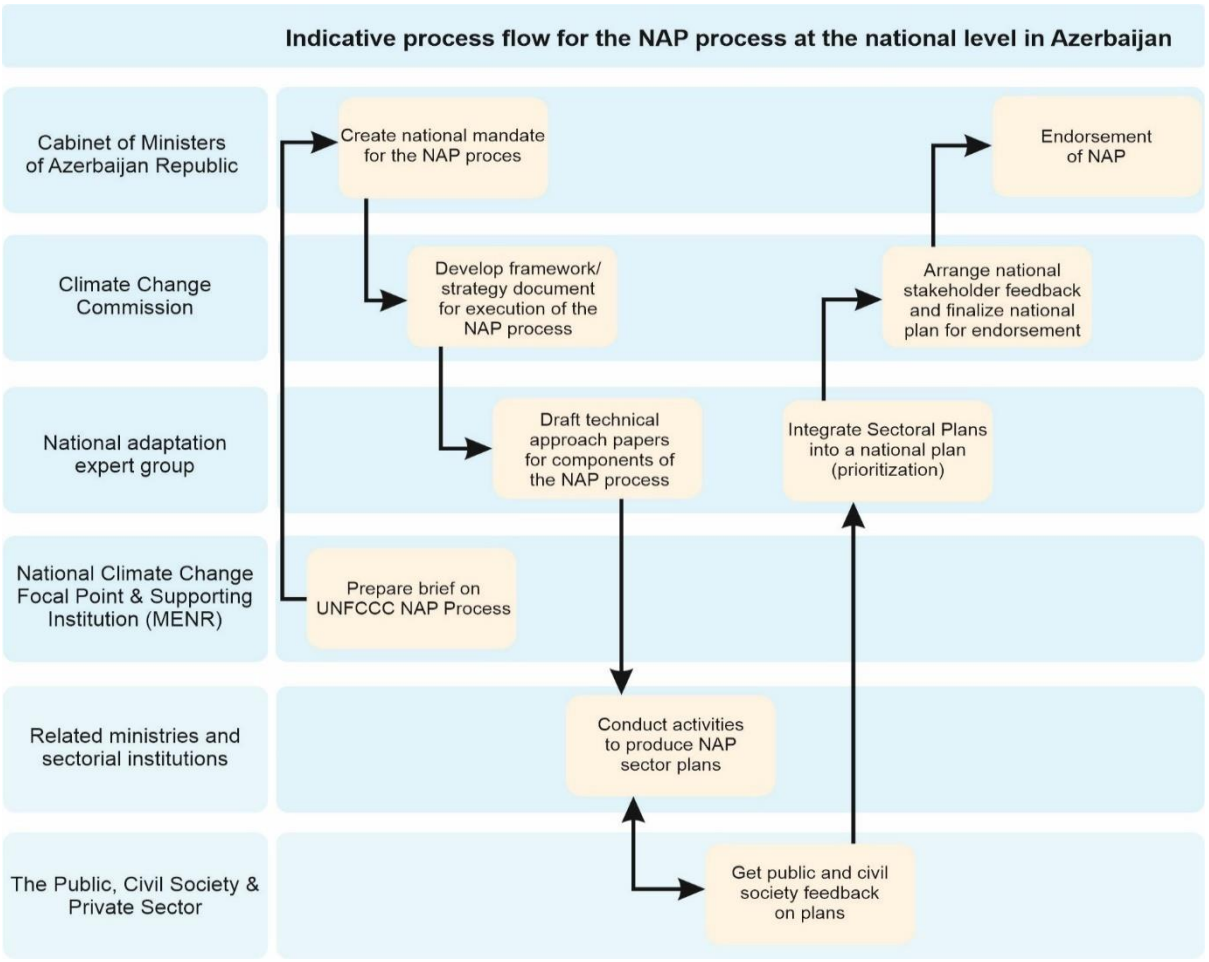
reduction and intersectional approaches with a view to integrating adaptation into relevant socioeconomic and environmental policies and actions, where appropriate;

It should be noted that Azerbaijan NAP will cover almost all targets indicted in the United Arab Emirates Framework for Global Climate Resilience following targets:

- Significantly reducing climate-induced water scarcity and enhancing climate resilience to water-related hazards towards a climate-resilient water supply, climate-resilient sanitation and towards access to safe and affordable potable water for all;
- Attaining climate-resilient food and agricultural production and supply and distribution of food, as well as increasing sustainable and regenerative production and equitable access to adequate food and nutrition for all;
- Attaining resilience against climate change related health impacts, promoting climate-resilient health services, and significantly reducing climate-related morbidity and mortality, particularly in the most vulnerable communities;
- Reducing climate impacts on ecosystems and biodiversity, and accelerating the use of ecosystem-based adaptation and nature-based solutions, including through their management, enhancement, restoration and conservation and the protection of terrestrial, inland water, mountain, marine and coastal ecosystems;
- Increasing the resilience of infrastructure and human settlements to climate change impacts to ensure basic and continuous essential services for all, and minimizing climate-related impacts on infrastructure and human settlements;
- Substantially reducing the adverse effects of climate change on poverty eradication and livelihoods, in particular by promoting the use of adaptive social protection measures for all;
- Protecting cultural heritage from the impacts of climate-related risks by developing adaptive strategies for preserving cultural practices and heritage sites and by designing climate-resilient infrastructure, guided by traditional knowledge, Indigenous Peoples' knowledge and local knowledge systems;

NAP will bridge requirements of GGA, SDG and Sendai Framework for Disaster Risk Reduction . Main focus will be at the measurement of climate impacts such as disaster deaths and losses; implementation of adaptation plans and measures; measurement of outputs such as improved water and sanitation; and outcomes such as reducing deaths and destruction from extreme events, development of EWS for preventing and reducing disaster risk, preventing and reducing hazard exposure and vulnerability to disaster, and increasing preparedness for response and recovery to strengthen resilience.

NAP development will be carried according to below scheme considered in UNFCCC technical guiding documents:


Indicative process flow for the NAP process at the national level in Azerbaijan
Cabinet of Ministers of Azerbaijan Republic
Climate Change Commission
National adaptation expert group
National Climate Change Focal Point & Supporting Institution (MENR)
Related ministries and sectorial institutions
The Public, Civil Society & Private Sector
Create national mandate for the NAP proces
Develop framework/ strategy document for execution of the NAP process
Draft technical approach papers for components of the NAP process
Prepare brief on UNFCCC NAP Process
Conduct activities to produce NAP sector plans
Get public and civil society feedback on plans
Integrate Sectoral Plans into a national plan (prioritization)
Arrange national stakeholder feedback and finalize national plan for endorsement
Endorsement of NAP

12.NAP FINANCING FRAMEWORK

An Investment Portfolio for the National Adaptation Plan (NAP) will be developed. This phase will clearly describe the NAP implementation framework, defining overarching objectives and targets. The Investment Portfolio will identify ways to finance climate change adaptation through potential national and international sources, in line with the prioritization of measures developed. As adaptation finance modalities continue to evolve, this approach will require regular updates.

The Investment Portfolio will consider two primary sources of financing: the national budget and international sources. Specific institutional processes and frameworks must be established to integrate NAP priority actions successfully into the national financing process, including the integration of Climate Change Adaptation (CCA) into sectoral policies, increasing adaptation capacities within relevant ministries, and strengthening inter-ministerial coordination and institutional arrangements.

National Adaptation Plans provide an opportunity to mobilize different knowledge systems. Ecosystem-based adaptation, leveraging the capacities, techniques, and knowledge of local populations with a close relationship to nature, will be emphasized. The mobilization of the best available knowledge, facilitated through the interaction of different knowledge systems, can enhance climate resilience and facilitate effective adaptation. A dialogue platform for these diverse knowledge systems will be an integral part of the NAP process.

13.ADAPTATION MONITORING AND EVALUATION FRAMEWORK

The Adaptation Monitoring and Evaluation Framework (M&E) is a critical component of the adaptation planning process, enabling decision-makers and planners to track the progress of adaptation measures towards building a more resilient and adaptive society. Therefore, it is essential to define specific objectives for the M&E process at various stages of adaptation planning.

A key element of the National Adaptation Plan (NAP) process will be the establishment of an effective M&E framework. The goal of this framework will be to:

• Ensure that adaptation plans are identified and integrated into development plans and programs across all sectors.

• Ensure that necessary actions are taken during the implementation phase to enhance resilience.

• Guarantee that resilience is achieved across all sectors and areas.

To monitor these processes, a relevant M&E framework will be created with sector-based indicators that track the country's resilience to climate impacts in both the medium and long term. As an initial step, the climate change assessment indexes developed within this NAP process (e.g., exposure, sensitivity, adaptation capacity, and vulnerability indexes) will be used for priority sectors (water, food, human health, human habitats). During the planning stage (2025-2026), the possibility of identifying additional indexes will be considered.

In the resilience evaluation process, trends can be assessed on an annual or long-term basis based on the results of the calculation of these indexes and their trends. This will help to evaluate how the measures implemented contribute to increasing resilience to climate change and identify areas where measures may not be effective or adequately designed.

The adaptation M&E framework will generate information for both national and international reporting requirements to demonstrate how adaptation actions are increasing resilience to climate change. It will also help track the participation of women and vulnerable groups in the NAP process, identify

opportunities for their equitable access to resources, and ensure that they benefit from adaptation interventions.

The Ministry of Ecology and Natural Resources (MENR), in its capacity as the climate change focal point, will be responsible for reviewing and reporting on the implementation of the NAP. The process will be overseen by the Climate Change Commissions.

All sectoral ministries will also be responsible for participating in the M&E process, not only for matters related to their respective sectors but also in areas where multisectoral approaches are necessary. Relevant executive powers, municipalities, and other stakeholders in the regions will also play an essential role in the M&E process.

14.PATHWAYS TO RESILIENCE

The implementation of adaptation measures for vulnerable sectors will drive socio-economic development by fostering a climate-resilient population and ecosystems, integrating adaptation across sectors and levels of government.

In the short term, measures will be taken to enhance the adaptive capacity and resilience of key social and economic sectors and vulnerable ecosystems to climate change, incorporating climate change issues into national and sectoral development plans at both national and regional levels.

Financing these measures will receive appropriate attention from decision-makers based on the requirements outlined in national and sectoral plans. Relevant state commissions and key institutions responsible for NAP and sectoral plans will promptly address financial matters and make necessary decisions for their resolution.

The NAP implementation at national and local levels will ensure attention to Gender Equality, Social Inclusion, Livelihoods, and other key concerns.

The NAP process aims to achieve adaptation goals in alignment with economic and sustainable development objectives and commitments under the UNFCCC, the Paris Agreement, SDGs, and the Sendai Framework for Disaster Risk Reduction. Gender-responsive, Indigenous people-supportive, and socially inclusive actions will be implemented through the engagement of different stakeholders, ensuring resilience across populations, economies, and ecosystems while generating evidence and data to monitor progress.

Short-term actions will lay the foundation for long-term adaptation outcomes, focusing on building enhanced adaptation planning capacity and integrating adaptation across sectors. The adaptation monitoring and review mechanism will be crucial in implementing measures that contribute to achieving the SDGs and the Sendai Framework for Disaster Risk Reduction.

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INITIAL NATIONAL ADAPTATION PLAN

ANNEXES

AZERBAIJAN 2024

16. ANNEXES

16.1. Annex 1. Proposed for further (during 2025-2026) consideration initial list of measures in the sphere of resilience of water sector to climate change

	Strategic Objective	Strategic Outcome	Strategic Action	Short term activities (2025-2026 years)	Medium termactivities (2027-2030)	After 2030	Actor	Other institutions
1	Enhance water use efficiency and promote the sustainable management of water resources in agriculture and ensuring long-term productivity	Strengthened resilience of irrigation infrastructure to ensure durability for agricultural needs	Enhance the planning, design, and implementation of climate-resilient irrigation infrastructure and systems to ensure adaptability and sustainability in the face of changing environmental conditions	Implement climate-proofing measures for irrigation facilities, such as using concrete materials, to increase durability and resistance to environmental impacts	Ensure long-term climate resilience of irrigation facilities by integrating durable materials like concrete, enhancing their ability to withstand extreme weather conditions and environmental challenges	All related water efficiency measures are integrated into sectorial development plans and are fully operational	ASWRA, Ministry of Agricultur e	MENR, MoH, Local executive powers and municipalities, WUAs, farmers and residents
				Investigate alternative irrigation methods, such as solar-powered pumps and lift irrigation systems, to enhance efficiency and sustainability in water management.	Application of priority alternative irrigation methods		ASWRA, Ministry of Agriculture	Ministry of Agriculture, MENR, MoH, Local executive powers and municipalities, WUAs, farmers and residents
			Strengthen the database and inventory of irrigation schemes to support more effective planning, management, and optimization of water resources and infrastructure development.	Establish a comprehensive irrigation schemes database system to enhance data collection, monitoring, and management	Implement modeling and simulations to analyze discharge scenarios for proposed irrigation schemes, ensuring effective design and optimized water resource management		ASWRA, Ministry of Agriculture	Ministry of Agriculture, MENR, MoH, Local executive powers and municipalities, WUAs, farmers and residents

2	Enhance the institutional capacity for effective water management	Establishment of a comprehensive and effective water resources planning and monitoring system.	Enhance the capacity and effectiveness of Water User Associations (WUAs).	Organize workshops to train WUA members on effective water management practices and governance. Create and distribute guides and toolkits on best practices for water management and association governance.	Work with water users and sectors to apply developed guidelines into their water management practices governance.	Water use efficiency by sectors is high and NAP relevant measures is being implemented successfully	ASWRA	Ministry of Agriculture, MENR, MoH, Local executive powers and municipalities, WUAs, farmers and residents
			Implement community outreach programs to enhance awareness of the role and benefits of WUAs in local water management.	Organize community outreach programs to raise awareness about the role and benefits of WUAs in local water management.	Establish collaborations with NGOs, governmental agencies, and other organizations to enhance outreach efforts and resource sharing.	2025-2032	ASWRA	Ministry of Agriculture, MENR, MoH, Local executive powers and municipalities, WUAs, farmers and residents
3	Establish effective governance for river basin management	Improved coordination and collaboration among stakeholders, leading to sustainable water resource management on the basis of basin approach and enhanced ecological health of river basins.	Facilitate regular stakeholder engagement meetings and workshops to align goals, share knowledge, and develop integrated management plans for river basin sustainability.	Creation of such basin institutions as Basin Management Organization (BMO) and Public Basin Council (PBC) for each of identified basin districts to test collaborative approaches and sustainable practices in river basin management Develop and adopt relevant guidelines on application of basin approach Develop River Basin Management Plan (RBMP)	Start to implement RBMPs in basin districts and increase capacity of national basin institutions towards implementation of basin wide RBMPs	RBMPs are fully operational in all basin districts and all relevant sectors are collaborating in the basin to provide climate change resilience of water and related sectors in this sphere	ASWRA, MENR	Ministry of Agriculture, MoH, Local executive powers and municipalities, WUAs, farmers and residents
				Establish a public council for each river basin.	Organizing the country into designated river basin areas.	2025-2032	ASWRA	Ministry of Agriculture, MENR, MoH, Local executive powers and municipalities, WUAs, farmers and residents

4	Harvest alternative atmospheric water	Enhanced water availability and resilience in water-scarce regions, contributing to sustainable water management and improved community well-being	Implement and scale up atmospheric water harvesting technologies in targeted regions to increase access to sustainable water sources	Implement and scale up atmospheric water harvesting technologies in targeted regions to increase access to sustainable water sources Host workshops for local communities and stakeholders to educate them about atmospheric water harvesting systems, their benefits, and maintenance requirements to encourage local engagement and ownership.	Start atmospheric water harvesting systems application in irrigation, greening of areas, for technical and other purpose use and provide local engagement and ownership.	Atmospheric water harvesting systems are widely applied in majority of sectors, including irrigation, greening of areas, for technical and other purpose use and provide local engagement and ownership.	ASWRA, MENR	Ministry of Agriculture, MENR, MoH, Local executive powers and municipalities, WUAs, farmers and residents
				Set up small-scale pilot projects to demonstrate atmospheric water harvesting technologies, collecting data on performance, water quality, and community acceptance.		2025-2032	ASWRA, MENR	
5	Improve irrigation water efficiency	Maximized agricultural productivity with minimized water usage	Implement best practices for efficient irrigation management.	Host workshops for farmers and irrigation managers on water-efficient irrigation techniques, such as drip irrigation and scheduling methods, to enhance their knowledge and skills. Build networks among farmers, researchers, and agricultural extension services to facilitate the exchange of knowledge and experiences related to water-efficient irrigation techniques and technologies.	Start to apply water efficient irrigation methods, techniques and technologies.by farmers	Efficient irrigation methods, techniques and technologies. Are fully applied in all river basin districts and irrigation water efficiency meet requirements for climate change resilience of agricultural water use	ASWRA, MA	Other institutions
				Perform assessments of existing irrigation systems to identify inefficiencies and areas for improvement, providing tailored recommendations for optimization.	Existing irrigation systems are assessed and identified and inefficiencies and areas with improper irrigation infrastructure rehabilitated		ASWRA	Ministry of Agriculture, MENR, MoH, Local executive powers and municipalities, WUAs, farmers and residents

6.	Improve drinking water efficiency	Maximized efficiency on potable water usage	Reducing NRW and ensuring efficiency water supply	Rehabilitation of existing infrastructure	Expanding installation of modern measurement devices in main pipelines, exploration of illegal use cases and hidden leakages		ASWRA	MENR, Ministry of Economy, Local executive powers and municipalities
			Exploring opportunities for possible recycle and reuse practices	**Rehabilitation of existing wastewater treatment plants, implementations of recycle and reuse systems**	**Expanding opportunities for recycling and use in other purposes of waste waters generated during processing work in water supply and waste water disposal facilities.**		**ASWRA**	MENR, MoH, Ministry of Economy, Local executive powers and municipalities

16.2. Annex 2. Proposed for further (during 2025-2026) consideration initial list of measures in the sphere of resilience of Caspian sea coastal zone to climate change

Strategic Objective	Strategic Outcome	Strategic Action	Short term activities (2025-2026 years)	Medium term activities (2027-2030)	After 2030	Actor	Other institutions
Increasing the stability of sea transport to changes in level	Resillent port and shipping infrastructure against level fluctuations	Planning and reconstruction of port infrastructure and systems under conditions of changing sea levels	Development of the dredging program for ASCO's "Bibiheybat Ship Repair Plant" and "Zigh Ship Repair and Construction Plant", Zira seaport, Baku international seaport, Zyghi guuru cargo seaport, Baku Hovsan international commercial seaport	Carrying out dredging works in " Bibiheybat Sheep repairing and Zigh Sheep repairing and construction plants	Sea level fluctuations are mainstreamed into the operation of all shipping structures	Azerbaijan Shipping Company	**MENR, MoH, Local executive powers and municipalities, farmers and residents**
		Increasing the dredging capacity of the Sea Transport Fleet	Increasing dredging technique	Carrying out dredging works in all ports		Azerbaijan Shipping Company	**MENR, Local executive powers and municipalities, farmers and residents**
		Mapping of shallow areas created under conditions of falling sea level	Planning of dredging and channelization works in the emerging inter-island shallows	Implementation of dredging works in Pirallahi, Gurgan, Chilov ports		ASWRA, Ministry of Agriculture	**MENR, Local executive powers and municipalities, farmers and residents**
Strengthening the institutional and legal capacity of coastal management	Strengthened coastal management	Strengthening the work of state structures and local municipalities involved in coastal management	Analysis of the institutional situation of Coastal Management, Organization of trainings for state structures and local municipalities involved in coastal management	Development and approval of a new institutional and legal framework for coastal management	Implementation of the new legal framework and organization of enforcement mechanisms	MENR	**MoES, SOCAR, MENR, Local executive powers and municipalities, local communities**

Increasing the knowledge of municipalities, communities and local executive representatives living in coastal areas	Enhanced adaptation of communities living in coastal areas to level changes	Raising awareness of level changes for the community and local institutions	Organization of various community programs	Preparation and implementation of a plan of actions related to the protection of biodiversity and greening of coastal strips	Implementation of measures related to greening and biodiversity in administrative regions located in all coastal zones	MENR, Local organizai tons	**MoES, Local executive powers and municipalities, WUAs, farmers and residents**
Protection of tourism infrastructure in coastal areas from level changes	Strengthened tourism infrastructure against level changes in coastal areas	Absence of tourism facilities Maximum and minimum sea level intervals	In areas up to 1000 m from the coast mapping of tourist facilities	In coastal areas, in the range of -25.5 and -30 m Demolition of located tourist facilities Greening of open areas more than 500 m from the coast	Tourism infrastructure is fully adapted to level changes	MENR, STA	**MoES, Local executive powers and municipalities, and residents**
Protection of national parks and protected areas located in coastal areas from level changes	Strengthened capacity of National parks and other protected areas against coastal changes	Conservation of wetland ecosystems under changing sea levels	Restoration of drying wetland ecosystems or creation of new wetland ecosystems in landlocked areas	Mapping of wetland ecosystems and development of conservation plans in nearshore areas	Organization of restoration works in Kizylagac, Absheron, Samur-Yalama national parks, Aghzibir and Yashma areas, restoration of dried wetland ecosystems	MENR	**Local executive poüers**
Protection of habitats of fish stocks from level changes	Strengthened capacity of the fishing sector against level changes	Restoration of historic spawning grounds in coastal areas and river-sea ecosystems, construction of new fish breeding facilities	Mapping historical spawning sites in coastal areas and river-sea ecosystems, improving the operation of fish farms and planning additional fish farms	Restoration of river-marine ecosystems, reduction of water taken from rivers in the entire sea basin	New fish breeding facilities were built, and river-sea ecosystems were restored in the Kur River and other rivers.	ASWRA, MENR	**MENR, Ministry of Economy, Local executive powers and municipalities**

Restoration of polluted areas freed from the sea	Cleaned lands along the coastline of the Absheron peninsula	Restoration of contaminated lands	Mapping of polluted areas along the coastline of the Absheron peninsula	Conducting of cleanup projects along the coastline of the Absheron peninsula	The polluted areas are cleaned and greened	Baku city and Garadagh districts executive power Sumgait Executive Power.	**MENR, Local municipialities**
Reducing the impact of sea level change on habitats	**Settlements adapted to changes in level**	**Conducting Sea Level Change Planning to adapt habitats to changing sea levels**	**Mapping change lanes between -25.5 and -30.0 Shorelines in all coastal areas and prohibiting construction**	**Gradually moving houses and facilities outside the lane and starting greening works by identifying possible greening areas**	**Organization of full protection of the changing lane and completion of greening works**	**MENR, STA, Local Municipalities**	**MoES**

16.3. Annex 3. Proposed for further (during 2025-2026) consideration initial list of measures in the area of agriculture sector climate change adaptation

	Strategic Objective	Strategic Outcome	Strategic Action	Short term activities (2025-2026 years)	Medium term activities (2027-2030)	After 2030	Actor	Other institutions
1	Restoration, increase, and protection of soil fertility	Reducing the direct or indirect effects of climate change	Improvement of legislation	Drafting legislation and submitting it to the government for approval			MoA	**FSA, WRSA, MENR, Executive powers of regions, municipalities, WUAS**
			To carry out restoration work on lands subjected to degradation (erosion, salinization, salinization, etc.);	Planting field protection and soil protection forest strips in places where the soil is more exposed to wind erosion	Adoption of grazing standards to prevent overburdening and erosion of pastures	Legal documents are enforced and field protection measures are effective and NAP actions are mainstreamed into sectorial plans and strategies	MoA	**FSA, WRSA, MENR, Executive powers of regions, municipalities, WUAS**
					Combined use of biological and inorganic fertilizers		MoA	**FSA, WRSA, MENR, Executive powers of regions, municipalities, WUAS**
					Using perennial vegetation to restore soil fertility.		MoA	**FSA, WRSA, MENR, Executive powers of regions, municipalities, WUAS**
							MoA	**FSA, WRSA, MENR, Executive powers of regions, municipalities, WUA**

2	Reducing the risks caused by stress factors such as hot and dry climate in crop and animal husbandry	Reducing the risks caused by hot and dry climate conditions	Selection of plant species resistant to heat, drought and salt and applying them to the farm	Making changes in the planting calendar to avoid heat stress during critical periods of plant development, taking into account the longer growing season	Timely and correctly carry out pre-planting preparatory measures in cultivated areas	All climate adaptation measures are being implemented as main component of NAP and related risks are minimised	MoA	**FSA, WRSA, MENR, Executive powers of regions, municipalities, WUA**
					Adjusting the time and amount of irrigation and fertilizer application according to the season	All irrigation measures are being taken within NAP to provide resilience of Agriculture to climate change	MoA	**FSA, WRSA, MENR, Executive powers of regions, municipalities, WUAS**
			Reducing stress factors in animal husbandry	Choose heat-resistant breeds	Improving the quality of animal feed and drinking water resources	All irrigation measures are being taken within NAP to provide resilience of Agriculture to climate chnage	MoA	**FSA, WRSA, MENR, Executive powers of regions, municipalities, WUAS**
3	Reducing risks caused by stress factors such as pests and diseases in crop and animal husbandry	Increasing the resilience of the agricultural system to future climate changes	Reduce the impact of pests and diseases on crops	Conduct timely control measures against pests and pathogens	Breeding cultivars or varieties that are resistant to pests and diseases	All climate adaptation measures are being implemented as main component of NAP and related risks are minimised	MoA	**FSA, WRSA, MENR, Executive powers of regions, municipalities, WUA**
4	Conservation of biodiversity in areas around agricultural fields	Restoration and protection of ecosystems	Protect and restore natural ecosystems	To organize the creation of coastal protection zones in small rivers and wetlands	Creation of buffer zones between cultivated fields and natural ecosystems located on their borders	All irrigation measures are being taken within NAP to provide resilience of Agriculture to climate change	MoA	**FSA, WRSA, MENR, Executive powers of regions, municipalities, WUAS**
4			To promote the enhancement of biodiversity		Providing state support to buffer zones to be created between agricultural areas and natural ecosystems		MoA	**FSA, WRSA, MENR, Executive powers of regions, municipalities, WUAS**

5	Making changes in the management system to adapt to the expected effects	Ensuring to be prepared in advance for possible risks	Creating integrated agricultural systems	Developing integrated agroforestry systems	Developing an aquaponics system	All irrigation measures are being taken within NAP to provide resilience of Agriculture to climate change	MoA	**FSA, WRSA, MENR, Executive powers of regions, municipalities, WUAS**
			Providing state support and education in this direction	**Organization of trainings**	**Farmers' subsidy, credit mechanisms, software, etc. implement state support measures**			

16.4. Annex 4. Proposed for further (during 2025-2026) consideration initial list of measures in the sphere of Mountain Ecosystem Resilience to climate change

	Strategic Objective	Strategic Outcome	Strategic Action	Short term activities (2025-2026 years)	Medium term activities (2027-2030)	After 2030	Actor	Other institutions
1	Increase mountain ecosystems resilience to climate change trough development and implementation of appropriate measures on creation of new and expansion of existing specially protected natural areas;	Will be increased mountain ecosystems resilience to climate change in result of taken measures on their protection by created new and extended existing specially protected natural areas;	Identify areas where mountain ecosystems (flora and fauna, wetlands etc.) are most vulnerable to climate change and based on that develop and implement measures to increase their resilience through undertaking protective measures (creation of new and extending of existing specially protecting areas)	Identify areas where mountain ecosystems (flora and fauna, wetlands etc.) are most vulnerable to climate change and based on that in order to increase their resilience to develop where needed plans and programs on creation of new /or extending of existing specially protected natural areas and to create enabling condition to start their implementation, including mainstreaming of the to sectorial development programs	Implement developed plans and programs on creation of new /or extending of existing specially protected natural areas in most vulnerable to climate change areas by relevant sectors	Implementation of all developed plans and programs on creation of new /or extending of existing specially protected natural areas in all vulnerable regions as one of main component of NAP by participation of all relevant stakeholders	MENR	**MoA, MES, MoH, MoE, Local Executive powers and municipalities , local communities, companies and farmer associations**
2	Development plans for management of mountain ecosystems in the climate change context	Mountain ecosystems in protected areas properly against the climate change impact	Development of management plan for mountain ecosystems against climate change	Development of management plan for mountain ecosystems against climate change for protected areas of MENR	Development of management plan for mountain ecosystems against climate change	Management plans in protected areas are fully applied as a component of NAP process to protect mountain ecosystems from impacts of climate chnage	MENR	**MoA, MES, MoH, MoE, Local Executive powers and municipalities, local communities, companies and farmer associations**
3	Mainstreaming biodiversity into development plans for industries like mining, tourism, forestry,	Relevant sectors included biodiversity into development plans and implement relevant	To include biodiversity protection and conservation action into their development plans and take relevant	To develop mechanism to include biodiversity protection and conservation action into their development plans and identify sector specific measures on mountain	Based on developed mechanism to take biodiversity protection and conservation actions and implement developed sector specific measures on	To implement full scale biodiversity protection and mountain ecosystems climate change resilience measures as a component of	MENR	**MoA, MES MoH, MoE , Local Executive powers and municipalities , local communities,**

	fisheries, and agriculture, including measures on climate change adaptation.	measures on ecosystems climate change resilience in their respective sectors.	measures on mountain ecosystems resilience to climate change	ecosystems resilience to climate change	mountain ecosystems resilience to climate change	NAP and their development plans		**companies and farmer associations**
4	Mainstreaming of climate change adaptation into mountain ecosystem services and policies	Strategies on mainstreaming of the climate change adaptation into mountain ecosystem services and policies are developed and implemented by relevant sectors, state institutions and other stakeholders	Based on mountains climate change vulnerability assessment to develop Strategies on mainstreaming of the climate change adaptation into mountain ecosystem and create enabling environment for their implementation	Develop strategies on mainstreaming of the climate change adaptation into vulnerable mountain ecosystems discuss them with relevant stakeholders and local communities and adopt it by government	Application of strategies on mainstreaming of the climate change adaptation into vulnerable mountain ecosystems by the state institutions. relevant stakeholders and local communities	Reach full implementation of strategies on mainstreaming of the climate change adaptation into vulnerable mountain ecosystems as an important component of NAP process	MENR	**MoA, MES, MoH, MoE, Local Executive powers and municipalities, local communities, companies and farmer associations**
5	Management of disaster risks caused by climate change for mountain ecosystems and local communities	Develop risk management plans and integrate them into land use plans in mountain regions	Reduction of disaster risks for mountain ecosystems and local communities according to development of risk management plans and application of them within the land use plans	Development of hazard risk maps and risk management plans and integrate them into land use plans	Implementation of hazard risk management plans by different sectors within the land use plans	Reach full and sustainable application of risk management for mountain ecosystems and local communities as an important part of NAP process	MENR	**MoA, MES, MoH, MoE, Local Executive powers and municipalities , local communities, companies and farmer associations**
6	Making changes to existing legislation to strengthen public and community-based management, implementing incentive solutions to expand community-based forest management taking into	Updated legislation to strengthen public and community-based management, implementing incentive solutions to expand community-based forest management taking into account current	Updating and enforcement of legislation to strengthen public and community-based management, identification and implementation of incentive solutions to expand community-based forest management taking into account current and future climate change	Updating and adoption of legislation to strengthen public and community-based management, incentive solutions to expand community-based forest management taking into account current and future climate change will be identified	Enforcement in mountain areas and communities of updated legislation to strengthen public and community-based management, application of identified incentive solutions to expand community-based forest management taking into account current and future climate change	In all mountain ecosystems and communities updated legislation to strengthen public and community-based management and identified incentive solutions to expand community-based forest management taking into account current and future climate change are fully applied as an	MENR	**MoA, MES, MoH, MoE, Executive powers and municipalities, local communities, companies and farmer associations**

	account current and future climate change	and future climate change is developed and enforces				important NAP measure,		
7	Launching educational campaigns, awareness programs, and interactive trainings to educate the general public, school students, marginalized groups and indigenous communities about the importance of biodiversity conservation in the context of climate change adaptation	General public, school students, and community members are full aware about the importance of biodiversity conservation in the context of climate change adaptation	Preparation of informative materials and training programs aimed at increasing awareness and building capacity on biodiversity conservation in the context of climate change adaptation	Preparation of materials and training programs aimed at increasing awareness and building capacity on biodiversity conservation in the context of climate change and their are delivery to community representatives through regularly provided trainings and workshops	Prepared materials and training programs aimed at increasing awareness and building capacity on biodiversity conservation in the context of climate change are delivered to community representatives through regularly provided trainings and workshops	In all communities of mountain zones, for decision makers, different stakeholders, population and school students awareness raising companies and trainings are regularly provided to be able in full scale apply NAP measures related to their active participation in increasing of resilience of mountain ecosystems to climate change	MENR	**MoA, MES, MoH, MoE, Local Executive powers and municipalities , local communities, companies and farmer associations**
9	**Facilitate the sharing of data and technologies to enhance transboundary water cooperation and address shared challenges.**	**Mountain ecosystems of transboundary areas are well protected from climate change impacts through strengthened transboundary cooperation to address shared challenges in the area of climate change resilience**	**Increase transboundary cooperation through signed agreements on sharing of data and technologies and taking joint actions in transboundary mountain areas to increase their resilience to climate change impacts**	**Preparation and signing of agreements with neighboring countries in transboundary areas on sharing of data and technologies and taking joint actions to increase transboundary mountain areas resilience to climate change impacts**	**Start cooperation with neighboring countries in transboundary areas on sharing of data and technologies and taking joint actions to increase transboundary mountain areas resilience to climate change impacts**	**Cooperation is ongoing in all transboundary areas with neighboring countries on sharing of data and technologies and taking joint actions to increase transboundary mountain areas resilience to climate change impacts as an important part of NAP**	**MENR**	**MFA, MoA, MES, MoH, MoE, Local Executive powers and municipalities , local communities, companies and farmer associations**

16.5. Annex 5. Priority adaptation measures for climate changes and human health

	Strategic Objective	StrategicOutcome	Strategic Action	Short term activities (2025-2026 years)	Medium term activities (2027-2030)	After 2030	Actor	Other institutions
1	Improving the medical-meteorological warning system about the expectation of intense heat and heat waves	Improvement of the medical-meteorological warning system on the Absheron Peninsula.	Development of an improved medical-meteorological warning system on the Absheron peninsula	Improvement of medical-meteorological warning methodology for Absheron	Ensuring the functionality of the improved medical-meteorological warning system on the Absheron Peninsula in the Early Warning System	Ensuring stable operation of the improved medical-meteorological warning system in the Early Warning System on the Absheron Peninsula	MENR Ministry of Health, Administration of the Regional Medical Divisions (TABIB)	MES, ETN Acad. H.A. Institute of Geography named after Aliyev, Relevant Local Authorities
		Development of a medical-meteorological warning system for other regions or regions	Preparation of medical-meteorological warning methodology for other regions or regions	Preparation of medical-meteorological warning methodology for other regions or regions	Integrating medical-meteorological warnings prepared for other regions or regions into the Early Warning System	Sustained functioning of the medical-meteorological warning system throughout the country as a component of the Early Warning System		
2	Ensuring availability of health training on climate change and climate factors for health workers	Ensuring that climate change and climate-related health education is included in the core curriculum of medical universities and medical colleges, as well as providing relevant training in medical institutions	Development of a training program on health related to climate changes and climate factors for medical personnel and inclusion in the basic education program in all medical universities and medical colleges	Development of a health training program for medical personnel on climate changes and climate factors Development of training for health workers on climate change adaptation using WHO training modules	Ensuring that climate change and climate-related health education is included in the core curriculum of medical universities and medical colleges Training health workers on climate change adaptation and empowering them to address climate-sensitive health issues	Improving health education and continuing training of health workers on climate change and climate factors	Ministry of Health, TABIB	Ministry of Science and Education Ministry of Emergency Situations, MENR

3	Developing the resilience of the public health system and infrastructure to extreme events and climate risks	Improving health system resilience to climate change	Improving health infrastructure to adapt to climate change impacts	Improvement of laboratory equipment for climate sensitive diseases	Strengthening laboratory capacity and monitoring systems for climate-sensitive diseases	Ensuring sustainable operation of laboratory facilities and monitoring systems for climate-sensitive diseases	Ministry of Health, TABIB	MoE, SWRA, Relevant Local Authorities
			Improving access to water supply and sanitation for health facilities	Provision of existing water, sanitation and hygiene infrastructures with climate change resistant technologies	Upgrading existing water, sanitation and hygiene infrastructures with inclusive accessibility based on assessment of climate change resilient technology and tools			
4	Enhancing health emergency preparedness and responding to climate-induced risks	Improving the capacity of health facilities to cope with climate change disasters	Improving emergency preparedness and response skills	Conducting a possible risk assessment for health facilities related to climate change risks Assessing capacity for emergency medical services related to climate change risks	Increasing the level of preparedness for health care institutions related to the risks of climate change Strengthening the technical base and preparedness of climate emergency medical services	Ensuring sustainable preparedness activities for health care institutions related to the risks of climate change	Ministry of Health, TABIB	MENR MES, Relevant Local Authorities

5	Strengthening the control and management of climate and water sensitive infectious diseases	Reducing the risk of climate- and water-sensitive infectious diseases for vulnerable populations, especially in warm regions	Improving the existing control system Improving the warning and forecasting system of climate and water sensitive infectious diseases	Improving the existing control system Development of a climate and water sensitive infectious disease warning and forecasting model	Improved on-site application of the control system Integrating climate and water sensitive infectious disease warning and forecasting model into Early Warning System	Improved ensuring stable operation of the surveillance system as a component of the Early Warning System across the country	Ministry of Health, TABIB	MES, MENR SWRA, Relevant Local Authorities

16.6. Annex 6. Initial NAP process setting in Azerbaijan

9 June 2022

More than 200 participants, including our valued partners, representatives from government agencies, key stakeholders, influencers, and a remarkable number of young people, joined our #OnlyOneEarth call at our event on #WorldEnvironmentDay. Together, we underscored the importance of collective action for a sustainable future, highlighting the critical need to protect our environment and take concrete steps against climate change. The enthusiastic engagement from such a diverse group inspires us to continue striving for impactful and inclusive environmental solutions. We are grateful for the support and commitment shown, which drives us closer to achieving our shared goals for a greener, healthier planet

19 April 2023

Our partners, namely the Ministry of Ecology and Natural Resources, Ministry of Science and Education, #GreenClimateFund and Modern Educational Complex named after Heydar Aliyev organized a School Symposium on Climate Change Mitigation and Adaptation measures. Within the event, high school students from 13 schools showcased their projects to promote environmental awareness and solutions. “The Future Starts Here” themed contest winners received awards.

9 May 2023

NAP project organized a study tour for government officials and local communities that focused on #climatechange impacts and adaptation measures in agriculture, water, and coastal areas.
The two-day study tour organized by the GCF-funded National Adaptation Plan project showcased local problems and solutions and included field visits to Alat Port, Pirsaat Water Reservoir, and the Azersu Kura River Treatment Plant. Participants also visited the Women Re source Center in Neftchala, where they provided a brief explanation of how climate change affects women and men and proceeded with interactive discussions about the gender-sensitive approach to adaptation to climate change. During the program, the government officials visited the Kura River, the main water arteria of the country, to learn about ecological challenges that have arisen in the Neftchala region, particularly in the estuary of the river.

30 May 2023

UNDP's National Adaptation Plan project, funded by the Green Climate Fund, delivered modern equipment to the Situation Center under the National Hydrometeorological Service.
This equipment will be used by the Ministry to provide operational, real-time, accurate and reliable weather data and forecasts to competent agencies, ministries, departments and institutions.

15 June 2023

UNDP Azerbaijan, IDEA Public Union, Ministry of Ecology and Natural Resources, Azərbaycan Gənclər Fondu / Azerbaijan Youth Foundation, and Tamiz Sheher OJSC joined forces for a clean-up campaign dedicated to #WorldEnvironmentDay.
This campaign took place just in time for the opening of the beach season, reminding everyone about the importance of maintaining clean and beautiful coasts.

31 July 2023

National Adaptation Plan project (#NAP) held a two-day study tour targeting vulnerable regions - Absheron, Shabran, and Guba. With the Ministry of Ecology and Natural Resources, the #GCF-funded project explored adaptation measures for climate change impacts on agriculture and water resources.
The tour program envisaged field visits to the Jeyranbatan and Takhtakorpu water reservoirs. The participants also visited the pilot farm area under the Agrarian Services Agency and alongside the local community actively engaged in a seminar in the Executive Power of Guba. the participants had the opportunity to visit agricultural fields, particularly the Fruit and Tea Cultivation Scientific Research Institute and Guba Regional Hydrometeorological Center.

1 August 2023

The GCF funded NAP project organized a two-day training session on "Climate change adaptation in agriculture" in the Guba and Khachmaz regions. Local communities participated in the event, discussing climate impacts and agricultural challenges.

The training focused on achieving sustainable agricultural development by promoting the cultivation of drought and salinity-resistant grain species, efficient water use through drip and modern irrigation systems and preparing for anomalous weather conditions in orchards.

Moreover, the participants delved into the gender aspect in the water sector. A local consultant shed light on the differential impacts of climate change on men and women, as well as the contributions of both genders in the efficient use of water.

11 August 2023

In partnership with the Ministry of Ecology and Natural Resources and the Ministry of Agriculture, the #GCF-funded project organized another training session on "Climate Change Adaptation in Agriculture" in Salyan and Neftchala regions to help local communities to tackle the impacts of #climatechange in agriculture.

The NAP project is currently hosting a series of trainings across Azerbaijani regions
that suffer the most from the impacts of climate change.

During these informative sessions, local specialists are teaming up with local farmers to share invaluable insights on achieving sustainable agricultural progress. The focus is on cultivating grain varieties that are resilient to drought and salinity, embracing effective water management techniques such as drip irrigation and modern irrigation systems, and proactively preparing for atypical weather patterns that can affect orchards.

These trainings also create a space for participants to deeply explore the gender dynamics within the realm of water management. In this context, local consultants shed light on the distinct ways in which climate change impacts men and women, underscoring the pivotal roles that both genders play in optimizing water resource utilization.

18 August 2023

The #GCF-funded #NAP project continues to support Azerbaijan in enhancing its climate legislation. In a recent workshop, co-organized together with the Ministry of Ecology and Natural Resources, government officials gathered to discuss a new legal framework and possible amendments for Azerbaijani legislation on effectively tackling the impacts of climate change.
In the second part of the event, the participants also had a chance to discuss how Caspian Sea level changes affect coastal regions with the representatives from #Caspian littoral states who joined the event online

25 August 2024

National Adaptation Plan project (#NAP) has recently addressed the impacts of #climatechange on agriculture in the Lankaran region.
In collaboration with the Ministry of Ecology and Natural Resources and the Ministry of Agriculture, the #GCF-funded project organized the third training for the farmers in the vulnerable regions of Azerbaijan to help local communities tackle the impacts of climate change in agriculture.
During the training in Lankaran, local specialists shared insights on the efficient use of water in agriculture and modern irrigation systems, drought-resistant rice varieties and their agrotechnical management, as well as tea and citrus plants and their seasonal agrotechnical care rules.
The training also served as a platform for participants to deeply explore the gender dynamics within the realm of water management.

The NAP project is currently hosting a series of trainings across Azerbaijani regions that suffer the most from the impacts of climate change. So far, the project has held similar trainings in Guba, Khachmaz, Salyan and Neftchala regions of Azerbaijan.

31 August 2023

Another training session on "Climate change adaptation in agriculture" was organized within the #GCF-funded National Adaptation Plan project in the Nakhchivan Autonomous Republic of Azerbaijan
The two-day training was held in Nakhchivan and Sharur cities, which are considered as vulnerable to #climatechange impacts areas.
UNDP, in collaboration with the Green Climate Fund, the Ministry of Ecology and Natural Resources and the Ministry of Agriculture, is conducting a series of trainings in the Azerbaijani regions to inform farmers about a range of strategies they could employ to combat the impacts of climate change in agriculture. The similar training sessions were organized in Guba, Khachmaz, Salyan, Neftchala and Lankaran regions of Azerbaijan.

21 September 2023

National Adaptation Plan (#NAP) project made significant progress in its mission to develop a web-based platform for #climatechange-related information.
The Project team met with Umayra Taghiyeva, Deputy Minister of Ecology and Natural Resources, and Ilhama Gadimova, Deputy Minister of Agriculture, to unveil the initial sketches of Climate Portal.
During the meeting, the project introduced the structure of the Climate Portal and the details of

the accessibility and information database. After the introduction, the parties came up with their recommendations such as improving interactive map, the implementation of open public policy, and integration with the Ministry of Agriculture's mobile application and its database.

2 November 2023

"Caspian Sea level fluctuation in the context of Climate Change and Adaptation Measures" was organized by the Ministry of Ecology and Natural Resources of the Republic of Azerbaijan jointly with UNDP.
Talking about the urgency of a collaborative approach between neighbouring countries, it was underscored that along with the problems caused by the Caspian Sea, there are problems caused to the sea by human activities. In this regard, the need to prevent pollution and wastewater discharge into the sea. Based on its worldwide experience, UNDP is committed and will continue assisting the Government of Azerbaijan both at the national and local levels to address these challenges and ensure protection of environment and sustainable development.

2 November 2023

In collaboration with the Ministry of Ecology and Natural Resources, recently a study tour was organized for Azerbaijani government representatives to increase the knowledge and skills of the employees working in state institutions on climate change adaptation to different regions of the country as part of the #GCF-funded "Support to the National Adaptation Plan (NAP) for the purpose of planning and implementation of adaptation to climate change in Azerbaijan" project. The tour focused on combating #climatechange impacts

in vulnerable regions like Gobustan and Shamakhi.
During the two-day program, participants delved into the heart of #climatechangeadaptation. Participants explored the Ajıdere river and unusable water reservoir, engaging with farmers dealing with climate challenges in both livestock and agriculture. We met local communities in Tekle village, discussing their issues and adaptation options, emphasizing the power of community-led change. Additionally, climate change and gender issues were emphasized during the meeting with local women's communities.
The tour's second day saw in-depth discussions with Shamakhi's District Executive Power and State Agricultural Development Center. Together, we visited key sites like the Shamakhi Center for Grape Sapling Cultivation, Shamakhi radiometereological station and water reservoir, shedding light on climate's impact on water supply.

16 November 2023

The Ministry of Ecology and Natural Resources jointly with UNDP hosted a forum focused on Climate Change Adaptation and Meteorology that brought together representatives from Turkic-speaking countries. Ministers of environment and climate from Turkic countries, heads of hydrometeorological services, representatives of the diplomatic corps and international organizations, and employees of relevant state agencies participated in the forum.
The main goal of this meeting is to expand joint activities to combat the impacts of #climatechange and create effective mechanisms in the field of meteorology.

22 November 2023

National Adaptation Plan project jointly with ADA University and Institute of Development and Diplomacy Institute of Development and Diplomacy launched the 4-day training on Climate Change Adaptation Measures in water and coastal areas. The event is scheduled to take place from November 21st to 24th at the

ADA administrative building with the support of the Ministry of Ecology and Natural Resources of the Republic of Azerbaijan.
The main objective of this training initiative is to enhance the capacity of technical personnel operating in various government agencies. By bringing together international and local consultants, the organizers aim to provide a platform for knowledge exchange and skill development in the critical area of #climatechangeadaptation. The four-day training covers various topics like vulnerability assessment, climate change's impact on water, strategies for adapting to #climatechange in coastal areas, and the link between climate change and gender. Participants will also explore climate change scenarios and their impact on sustainable development.

22 December 2023

The Green Climate Fund-funded National Adaptation Plan project is back with its second round of training on Climate Change Adaptation in the Water Sector and Coastal Areas!
With the support of the Ministry of Ecology and Natural Resources of the Republic of Azerbaijan, this four-day training is set to enhance the capacity of another group of dedicated technical personnel from various government agencies.
During the training, the participants also acquired knowledge about the stages and methodology of the preparation of the National Adaptation Plan.
The NAP project supports the Government of Azerbaijan in three key sectors—water, agriculture, and coastal areas—identified as top priorities through stakeholder consultations conducted by the Ministry of Ecology and Natural Resources.

29 December 2023

The workshop organized by the #GCF-funded National Adaptation Plan (#NAP) project, which focused on enhancing legal frameworks in agriculture, water, and coastal areas.
The workshop brought together representatives from various government institutions to analyze the current legislation and regulatory frameworks governing the targeted sectors.
The discussions aimed at improving current legislation with a particular focus on climate risk management and National Adaptation Plan

31 January 2024

The National Adaptation Plan (NAP) project, implemented by UNDP with the support of the Green Climate Fund, supplies the provision of IT equipment for the Situation Center to improve data exchange and management. NAP project also plans to conduct capacity building trainings for the technical staff of the National Hydrometeorology Services. During the unpacking ceremony of the delivered equipment, future opportunities for cooperation, as well as potential joint projects to strengthen early warning systems and improve climate information dissemination were discussed

26 February 2024

National Adaptation Plan project organized a workshop that brought together stakeholders from government, academia, and civil society. As a part of the workshop, Ms. Jennifer Jadin, the UNDP Climate Finance Expert, and Mr. Rashad Hasanov, the National Climate Finance Expert, led an insightful session about the importance of climate finance and fiscal assessment of adaptation options. Climate finance is vital for both

mitigation and adaptation efforts. Large-scale investments can significantly reduce emissions and adapt to their growing impacts.

UNDP has produced technical guidance manuals to assess fiscal impacts of climate change on investments, while also providing a comprehensive framework for policymakers and practitioners to identify, quantify, and incorporate the fiscal implications of climate-related risks into public and private investment planning and decision-making. The workshop aimed to ensure that users are aware of the tools and planning that go into climate finance, they know how to use them, and any resulting guidance documents are tailored to the specific needs and context of the country. The workshop served as a lead-up to the upcoming three-day seminar on the assessment of the fiscal impacts of climate change on private and public investments to build the capacity of stakeholders.

12 March 2024

Green Climate Fund-funded National Adaptation Plan project has successfully completed two editions of Trainings of Trainers sessions on Climate Change Adaptation in the Water Sector and Coastal Areas. With the support of the Ministry of Ecology and Natural Resources of the Republic of Azerbaijan, we have empowered over 50 technical personnel from various government agencies equipping them to become trainers on climate change adaptation.
Over three intensive days, our international and local consultants enhanced the capacity of technical personnel covering diverse topics including the impacts of climate change on both women and men. Our participants explored gender dynamics, inclusive language strategies and addressing power imbalances through interactive methods such as role-playing, group discussions and case studies.
However, our sessions were more than just lectures; they included interactive and dynamic working group activities for a practical learning experience. Following the sessions, our newly trainers are ready to share their knowledge throughout their respective government agencies

30 April 2024

UNDP Azerbaijan hosted the delegation from the Republic of Uzbekistan on Climate Change Adaptation. The study tour marked a significant milestone in regional cooperation for climate adaptation strategies. Within the visit, the delegation from Uzbekistan, with the support of the National Adaptation Plan (NAP) project funded by the Green Climate Fund and implemented by UNDP, has participated in comprehensive study tour to advance their understanding of climate adaptation measures, and learn relevant practices in the context of Azerbaijan. The first part of the tour included a series of meetings with relevant government agencies to increase knowledge exchange and cooperation between the two countries.

12 May 2024

The first phase of the executive-level courses on Climate Change Adaptation for civil servants within the UNDP Azerbaijan's "National Adaptation Plan support" project funded by the GCF was successfully completed. These courses, developed in partnership with the Academy of Public Administration under the President of the Republic of Azerbaijan, covered critical topics such as "How to adapt to the changing climate?" and have equipped civil servants with the essential tools and knowledge needed to address the challenges ahead.

17 May 2024

The COP29 Presidency in collaboration with the United Nations Development Programme is hosting the "Enhancing Ambition, Enabling Action: COP29 Sustainable Business Forum." The event brought together more than 300 Azerbaijan's business community to mobilise climate finance and innovation, in support of global climate efforts.

26 July 2024

We marked a major achievement with the completion of the second phase of Climate Change Adaptation courses for civil servants in the frame of the UNDP Azerbaijan's National Adaptation Plan project funded by the Green Climate Fund. These executive-level courses, developed in partnership with the Academy of Public Administration under the President of the Republic of Azerbaijan, focused on vital topics such as "The essence of Climate Change Adaptation". Dedicated civil servants are now better equipped with the knowledge and tools to tackle the challenges of climate change. Kudos to all certified colleagues from various government entities on this incredible milestone!

21 August 2024

Within the framework of the “National Adaptation Plan” project, 2-day intensive trainings were held for civil servants with the support of ADA University. These trainings are aimed at improving the knowledge and skills in total of 200 civil servants on climate change, project management, finance and agriculture. It should be noted that civil servants with technical knowledge will be invited to participate in the “Training of Trainers” in the next part of these trainings.
The project is funded by the Green Climate Fund.

26 September 2024

In the framework of the National Adaptation Plan (NAP) project implemented by UNDP Azerbaijan and financed by the Green Climate Fund, the 3-day “Training of Trainers” sessions with the subject of Climate Change Adaptation for relevant civil servants consisting of 50 personnel have started in collaboration with the ADA University. It should be noted that these trainings are carried out as a continuation of the 2-day intensive trainings on “Project Management and Finance” and “Climate Agriculture” held in July 2024. As a result of the mentioned trainings, civil servants will have the knowledge and skills to undergo trainings on the relevant subject.

03 October 2024

In the frame of the National Adaptation Plan (NAP) pro ect implemented by UNDP Azerbaijan and funded by the Green Climate Fund, the meeting of the Adaptation Working Group was held on the preparation of the National Adaptation Plan in collaboration with the Ministry of Ecology and Natural Resources (MENR). Leading employees of MENR, leading experts, including the Deputy Executive Secretary of the UN Intergovernmental Panel on Climate Change (IPCC) Ms. Ermida Fida, the Deputy Head of the Climate Change Department of the Ministry of Environment, Urban Development and Climate Change of the Republic of Türkiye Mr. Orhan Solak, the Expert of the Department Mr. Ali Cem, the National Adaptation Plan Project Manager at UNDP Azerbaijan Mr. Zaur Aliyev, and representatives of other state institutions and public organizations participated at the event.
In accordance with the objectives of the event, the participants discussed the formation of new scenarios in the framework of the preparation of the National Adaptation Plan, the integration of climate changes into the strategic development plans and programs of the relevant sectors.

At the end of the meeting, the gaps and priority adaptation measures were identified during the discussions of the National Adaptation Plan and the measures to be taken regarding taking the next steps were emphasized accordingly.

04 October 2024

A seminar on diversity, inclusion, climate resilience, and adaptation was held in Baku for representatives of small and medium-sized businesses, organized jointly by UNDP Azerbaijan under the National Adaptation Plan project funded by the Green Climate Fund, along with the Azerbaijan Office of Women In Tech, Azerconnect Group, SOCAR Cape LLC, and Procter & Gamble Azerbaijan.
The seminar focused on the impact of climate change on businesses, strategies for building resilience to these risks, and the importance of diversity and inclusion in strengthening workplace sustainability. Participants gained insights into the role diversity and inclusion play in increasing resilience, promoting gender equality, and creating inclusive business models.
The goal of the project is to support small and medium-sized businesses in building sustainable business models.