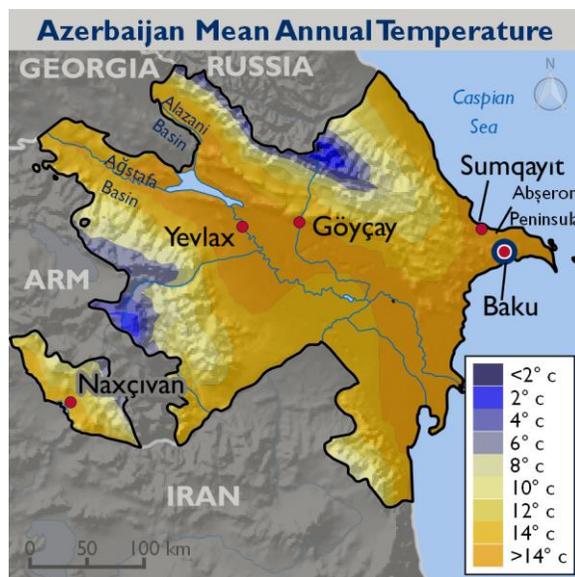




CLIMATE CHANGE RISK PROFILE AZERBAIJAN

COUNTRY OVERVIEW

Azerbaijan is an emerging middle-income country whose strong economic growth (fueled by oil and gas revenues) led to a steep decline in poverty rates, from 46.7 percent in 2002 to 5 percent in 2014. Oil and gas only employ 7 percent of the population, though, and as revenues are expected to level off in coming years, the country must now diversify its economy to maintain growth and sustain development gains. Agriculture contributes only 7 percent of GDP but is a critical component of the non-oil economy, with significant potential to boost the country's export revenues. As a key source of jobs and a priority in the context of food security, Azerbaijan's agriculture sector will be increasingly at risk from higher temperatures, unpredictable rainfall and natural disasters. The country's rapid economic development created a number of environmental challenges that will be exacerbated by climate change, such as severe air pollution from industrial plants, contamination of the Caspian Sea (water pollution), soil degradation (erosion, desertification), and important biodiversity and forest reserve degradation and losses. Another major risk to economic development and the population is the increase in frequency and intensity of natural disasters. Azerbaijan is considered to be one of the most flood-prone areas in the world, with the population at risk mainly along the southern slope of the Greater Caucasus and in the high mountain zone of Naxçivan. Extreme events, mainly floods, landslides and mudslides, cost Azerbaijan an estimated \$70–80 million annually. (2, 4, 6, 7, 8)



CLIMATE PROJECTIONS



1.4–2.8°C increase in temperatures by 2050



Increased incidence of natural disasters, especially floods



1.5–2 m rise in Caspian Sea level by 2050

KEY CLIMATE IMPACTS

Agriculture



Reduced crop yields
Loss of soil and arable land to flooding
Shift in production zones

Water Resources



Reduced freshwater supplies
Accelerated glacial melt; increased risk of flash floods

Human Health



Increased incidence of heat-related issues
Exacerbation of existing disease burden
Risk of spreading vector-borne disease

Tourism



Increased costs from damages and loss in key tourism centers, particularly ski resorts and beaches

Coastal Resources and Infrastructure



Flood damage to resorts, businesses, urban centers

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CLIMATE SUMMARY

Climate patterns in Azerbaijan are influenced by three important physical features: the Caspian Sea, whose shoreline forms a natural boundary to the east; the Greater Caucasus mountain range in the north; and the extensive lowlands in the center of the country. Nine out of 11 of the world’s climate zones are found within the country’s boundaries, including semi-desert, dry lowlands, foothills and mountain tundra, with temperatures varying depending on proximity to sea, regional landscape dynamics, and arctic and temperate wind dynamics. Average annual temperatures range between 14–15°C in the lowlands and coastal regions and 4–5°C in the mountain regions. Annual precipitation levels range from 1,600–1,800 mm in the southern regions to 200–350 mm in the eastern Abşeron Peninsula. (1, 2, 3, 6, 8)

HISTORICAL CLIMATE

Climate trends over the past few decades include:

- Increase in average annual temperatures by 0.4°C per year since 1991 (3 times higher than the increase between 1961 and 1990).
- On average, decrease in rainfall by 9 percent over the past decade, with the highest decreases in Gänça–Qazax, Naxçıvan and the Kura-Araks lowlands.
- Increase in extreme events such as floods, droughts and heat waves. An average of 17.5 floods per year were recorded from 2002–2008 (compared to 3.5 per year previously).
- Fifty percent glacial loss in the past 110 years.
- Rise in sea level of 2.5 meters (1978–1995).

FUTURE CLIMATE

Projected climate changes include:

- Increase in temperatures of 1.4–2.8°C by 2050 and 3–6°C by 2100 across the country.
- Decrease in precipitation by 5 percent by 2040 in Naxçıvan and Lesser Caucasus areas, with no significant changes in other areas. Projections for rainfall are less certain overall and vary greatly by model and scenario.
- Greater frequency and magnitude of flood events due to increased intensity of single rainfall events.
- Caspian Sea level rise of 1.5–2 meters by 2050.

SECTOR IMPACTS AND VULNERABILITIES

AGRICULTURE

The agriculture sector’s vulnerability to climate change in Azerbaijan stems from high reliance on subsistence farming, with low productivity, high rates of soil degradation and limited land availability. The low productivity and yields will be aggravated by rising temperatures and increased water stress. Models suggest that all key crop yields will be compromised (except for pasture), with rainfed potato and cotton expected to experience the greatest yield declines. Eighty percent of farming takes place in arid or semi-arid parts of the country, increasing crop vulnerability to variable rainfall regimes. Irrigated crops (80 percent of agricultural output) will also be at risk from projected water shortages, and higher temperatures will require increased irrigation to maintain yields. Given their sensitivity to heat, wheat (important for food security) and grapes (a highly profitable commercial crop) will be pushed to less productive and limited land at higher altitudes as temperatures rise. Single intense rainfall events are expected to increase in magnitude, leading to a flooding risk for crop

Climate Stressors and Climate Risks AGRICULTURE	
Stressors	Risks
Rising temperatures, especially during the summer	Reduced crop yields (especially rainfed potato and cotton); increased pasture yields
	Shift in elevation of vineyards and wheat-growing areas
More variable precipitation	Less water available for crops due to evaporation of irrigation water and/or reduced rainfall
Increased frequency and magnitude of flooding	Increased water requirements for crops due to higher temperatures
	Delayed planting, destroyed crops, waterlogging, damaged agricultural infrastructure and loss of topsoil due to flooding

production. Each year, an estimated 300 km² of agricultural land are affected by floods, and soil losses are estimated at 0.5 million m³ annually. In 2010, 33 percent of cereal production was lost due to flooding. (1, 2, 6, 8)

WATER RESOURCES

Azerbaijan already struggles with water deficits, partially due to uneven seasonal and geographical distribution. Although uncertainties exist about the future of rainfall for the country, a scenario under which temperatures increase and rainfall is reduced could reduce total available water resources by 10–15 percent by 2040. Transboundary rivers are a major source of freshwater in the country, but studies show that water flow of major rivers is already decreasing as a result of reduced winter and spring precipitation. Projections suggest flows will continue to decrease (i.e., by 35 percent in the Alazani (Ganikh) Basin and 12.5 percent in the Ağstafa Basin by 2100). Increased temperatures have reduced glacier areas in the Gusarchay Basin (a major water source) by 50 percent since 1890. This rapid melting increases the risk of glacial lake outburst floods, which would devastate downstream

TOURISM

Tourism is an emerging industry in Azerbaijan, contributing more than 8 percent to national GDP in 2015. The industry is climate-sensitive, dependent on the country's current resources of snow, water and moderate temperatures (e.g., skiing in Shahdag, enjoying beach resorts such as Nabran, or hiking in Göygöl and Zangezur National Parks). Climate change is likely to impact tourism as reduced snow limits ski resorts, where at least 20–30 cm of snowpack is required to operate; the growing number of mud- and landslides in mountain areas poses a risk to popular hiking destinations; and the rising level of the Caspian Sea threatens beach resorts and coastal tourism infrastructure. (3, 5)

HEALTH

The duration and number of heat waves increased five times since 1990 and projections suggest these will continue to rise, with direct impacts to public health. In addition to immediate health concerns such as heat stroke, a clear link can be made between extreme temperatures and increased risk for people with cardiovascular or chronic respiratory diseases, especially among the elderly. During heat waves, the number of first aid calls related to blood, respiratory and neural diseases increases significantly. Although the prevalence of malaria is low, higher temperatures could increase malaria risk, particularly in mountain regions; the temperature conditions favorable for malaria vectors increased by 15–30 days in the highlands since 1960. (2, 3, 5)

Climate Stressors and Climate Risks WATER RESOURCES	
Stressors	Risks
Increased temperatures, especially during the summer	Increased evaporation of surface water sources; earlier occurrence of snowmelt and reduced snow cover
More variable precipitation	Reduction of river flows by 10–20 percent, reducing freshwater water supply
Increased frequency and magnitude of flooding	Accelerated glacial melt, increasing flood risk
	Extensive damage to water infrastructure from flash floods and land- and mudslides

communities and infrastructure. Groundwater resources are currently underutilized and could be an important source of freshwater during low water seasons, if tapped sustainably. (5, 6, 8)

Climate Stressors and Climate Risks TOURISM	
Stressors	Risks
Increased temperatures	Shortened ski season due to earlier snowmelt and/or upward shift of skiing regions, resulting in substantial cost increases for service providers and operators
More variable precipitation	Loss of life and damage to infrastructure from floods and land- and mudslides
Increased frequency and magnitude of flooding	Damage to coastal tourism infrastructure; losses due to coastal erosion at key tourist hotspots

Climate Stressors and Climate Risks HEALTH	
Stressors	Risks
Increased temperatures, especially during the summer	Increased incidence of heat stroke, heat exhaustion, heat cramps and skin rash
	Aggravation of cardiovascular and respiratory diseases, especially among the elderly
Increased number of heat waves	Increased range of vector-borne diseases, especially in the highlands
Increased frequency and magnitude of flooding	Loss of life and livelihoods from flood and landslide disasters; relocation from disaster-prone areas

COASTAL RESOURCES

Azerbaijan's Caspian Sea coastline is home to 40 percent of the population (4 million people). The country's largest urban centers (Baku and Sumqayit) and 75 percent of industrial resources and infrastructure are located along the coast. As the largest landlocked waterbody in the world, the Caspian Sea is particularly vulnerable to global climate change, as evidenced by its 2.5 meter rise from 1978–1995. This dramatic rise is partly attributed to changing climatic factors in the region, and has flooded settlements, forced migration of people living in lowlands, destroyed roads and railways, damaged industrial infrastructure and destroyed beaches economic losses totaled about \$2 billion. The sea level is projected to rise another 1.5–2 meters in the next 40 years, resulting in an additional \$4.1 billion in damages. (2, 6, 8, 9)

Climate Stressors and Climate Risks COASTAL RESOURCES	
Stressors	Risks
Increased minimum temperatures	Increased flooding risk, forcing inhabitants to migrate out of lowlands, destroying coastal infrastructure and eroding beaches
Sea level rise	Seawater intrusion/salinization of coastal aquifers, reducing water quality for densely populated urban areas

POLICY CONTEXT

INSTITUTIONAL FRAMEWORK

Azerbaijan's parliament ratified the United Nations Framework Convention on Climate Change (UNFCCC) on January 10, 1995, and the Kyoto Protocol was ratified on July 18, 2000. Azerbaijan has submitted three National Communications, the most recent in 2016. In 1997, State Commission on Climate Change was established, and includes relevant ministries, committees and other organizations. The basis for national environmental legislation is the Constitution, but issues related to climate change are not explicitly reflected in Azerbaijan's environmental laws. Climate change issues are addressed in the government's main strategic documents. (5)

NATIONAL STRATEGIES AND PLANS

- [Republic of Azerbaijan's Third National Communication to the UNFCCC](#) (2015)
- ["Azerbaijan 2020: Look into the Future" Development Concept](#) (2014)
- [Comprehensive Action Plan to improve environmental situation in the Republic of Azerbaijan in 2006](#) (2010)
- Action Plan on Improvement of the Ecological Situation and Efficient Use of Natural Resources in the Republic of Azerbaijan (2015–2020)
- National Adaptation Plan (NAP) (forthcoming)

KEY RESOURCES

1. Ahouissoussi, N. et al. 2014. [Reducing the Vulnerability of Azerbaijan's Agricultural Systems to Climate Change: Impact Assessment and Adaptation Options.](#)
 2. Republic of Azerbaijan. 2010. [Second National Communication to the UNFCCC.](#)
 3. Republic of Azerbaijan, 2015. [Third National Communication to the UNFCCC.](#)
 4. United Nations Development Program. 2012. [About Azerbaijan.](#)
 5. United Nations Environment Program. 2015. [Outlook on Climate Change Adaptation in the South Caucasus Mountains.](#)
 6. World Bank Group. 2012. [Republic of Azerbaijan Climate Change and Agriculture Country Note.](#)
 7. World Bank. 2016. [Azerbaijan.](#) Country Profile.
 8. World Wildlife Fund. 2008. [Climate Change in the Southern Caucasus: Impacts of Nature, People, and Society.](#)
 9. Zoi Environment Network/GRID –Arendal. 2011. [Vital Caspian Graphics 2.](#)
- Map Source: [WorldClim Global Climate Data](#) and Hijmans, R.J. et al. 2005. [Very high resolution interpolated climate surfaces for global land areas.](#) *International Journal of Climatology* 25: 1965–1978.

SELECTED ONGOING EXPERIENCES

Selected Program	Amount	Donor	Year	Implementer
Clima East Pilot Project "Ecosystem-based approaches to climate change"	\$1.5 million	UNDP/EU	2013–2016	UNDP
Integrating climate change risks into water and flood management by vulnerable mountainous communities in the Greater Caucasus region of Azerbaijan	\$10.06 million	UNDP	2011–2016	Ministry of Ecology and Natural Resources
Development of Azerbaijan's Fourth National Communication to the UNFCCC and Second Biennial Reporting	\$1.4 million	UNDP, GEF	2016	Ministry of Ecology and Natural Resources
Forest Law Enforcement and Governance– FLEG II	€9 million	EU/EC, World Bank	2012–2016	Ministry of Agriculture