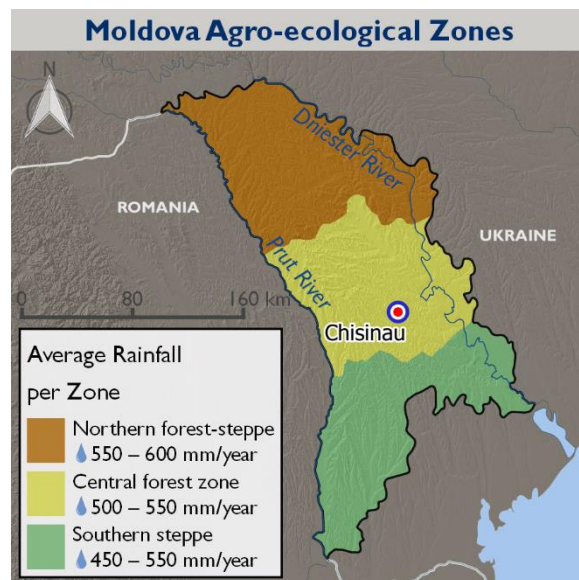


CLIMATE CHANGE RISK PROFILE MOLDOVA

COUNTRY OVERVIEW

Moldova is a small landlocked country bordered by Ukraine and Romania. Once part of the Soviet Union, Moldova experienced a steep economic decline following independence in 1991. Despite recent and steady recovery, it remains one of the poorest countries in Europe, with a poverty rate of 36.3 percent. With almost 60 percent of the population concentrated in rural areas, agriculture is a critical livelihood for rural communities and central to the country's food security. Major agricultural products, primarily grown for export, include cereals, fruits (grapes), vegetables, beef, milk and wine. Moldova is highly vulnerable to climate variability and change, which bring droughts, late spring frosts, hail, floods and severe storms. Increasingly erratic weather patterns have resulted in loss of life and income through rising food and energy prices. One of the most severe droughts on record occurred in 2007, affecting 75–80 percent of the population and resulting in significant damage to the economy. The following year, floods from torrential rains caused \$120 million in damage to houses, bridges and roads and flooded 7,500 hectares of agricultural land. (2, 9, 14)



CLIMATE PROJECTIONS



2°–3°C increase in temperatures by 2050



Increase in the frequency and severity of drought



Increase in rainfall variability

KEY CLIMATE IMPACTS

Water

Increased water scarcity for industrial and agricultural use



Agriculture

Reduced yields
Increased risk of pests/diseases
Increased risk of food insecurity



Livestock

Reduced productivity
Reduced feed, forage and pasture



Human Health

Increased risk of heat stress
Exacerbation of respiratory and cardiovascular disease



Forest Ecosystems

Increased risk of forest fires
Expansion of dry forests, leading to loss of forests such as beech and oak



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CLIMATE SUMMARY

Moldova has a temperate climate with short, mild winters and long, warm summers. The country has highly variable rainfall levels, and drought-like conditions are common. Three agro-ecological zones divide the country horizontally by elevation, with varying temperature and precipitation. Most precipitation occurs as rain in the warmer months, particularly in June and July. (5, 7, 10, 14)

- **Northern forest-steppe:** Annual temperatures average 6.3°–9.7°C, and precipitation ranges from 550–600 mm. This region experiences a drought (defined as sustained and extensive occurrence of below-average precipitation levels), once every 10 years on average.
- **Central forest zone:** Annual temperatures range from 7.5°–10°C and precipitation ranges from 500–550 mm per year. This region experiences a drought once every six years on average.
- **Southern steppe:** Annual temperatures range from 8.3°–11.5°C and precipitation ranges from 450–550 mm per year, with a significant portion of winter precipitation falling as snow. This region experiences a drought once every three to four years on average.

HISTORICAL CLIMATE

Historical weather data preceding Moldova’s independence from the Soviet Republic are limited. Where information is available, climate trends from the 1980s to the present include:

- Increase in temperatures of 0.58°C per decade (with warming most significant between March–August). Seven of the ten warmest years in Moldova’s history occurred within the past two decades.
- Gradual decline in rainfall and shift in seasonal rainfall patterns, with rainfall levels increasing March–May and decreasing June–August.

FUTURE CLIMATE

Projected changes include:

- Increase in average temperature of 2°–3°C by 2050, with warming greatest from June– August.
- Increase in the number “hot” days (exceed current climate by 10 percent) by 32 and “dry” days (zero precipitation) by 12 by 2050.
- Changes in precipitation uncertain; some projections suggest a mild reduction in annual precipitation by 2100, with drier summers (June– August), wetter winters (December–February) and more variable precipitation.
- Increase in the frequency and severity of extreme events such as droughts and floods.

SECTOR IMPACTS AND VULNERABILITIES

WATER RESOURCES

Moldova is situated in the Black Sea basin and the country’s transboundary river systems, the Dniester and Prut, provide approximately two-thirds of the country’s water resources. Climate change is projected to decrease surface flows by 16–20 percent from 2020–2029. This is especially concerning given Moldova’s limited groundwater reserves. Households without access to the Dniester and Prut, the majority of whom live in the southern region, rely on local surface water sources that are at high risk of depletion in drought years (several reservoirs on the Isnovat River dried up in 2007 during a severe drought). Impacts will be greatest for the industrial sector in Transnistria and municipal use in Chisinau, which combined consume around 80 percent of the available water supply. Even without climate change, water shortages are expected in the next several decades due to increased demand. With increased temperatures

Climate Stressors and Climate Risks WATER RESOURCES	
Stressors	Risks
Increased temperatures Drought and reduced rainfall	Reduced surface flows and water quality
	Increased scarcity of water resources for industrial use (reducing hydropower production and heating/cooling potential); increased energy costs
	Increased scarcity of water resources for irrigation, particularly during the summer growing season
	Exacerbation of uneven spatial distribution of water resources, particularly in the southern region

and variable rainfall, water shortages are expected even sooner for the Reut and the Upper and Lower Nistru Basins as irrigation demands are projected to increase 10–15 percent by 2040. (1, 5, 6, 7, 8, 10, 11, 12)

AGRICULTURE

Agriculture employs 30 percent of the population and is the backbone of the rural economy. Climate change and variability already impact the sector, with 3 percent of GDP lost annually on average as a result of drought, heavy rains and flooding. The 2007 drought, one of the worst in recent history, caused a 23 percent decline in production from 2006. Wheat and maize, two main staple crops, were significantly impacted: wheat production fell by 40 percent and maize fell by 73 percent. Moldova's high-value exports, grapes and apples, are also impacted by the increasing incidence and severity of drought, particularly as higher temperatures are increasing their crop water demands. Projections of higher temperatures and variable rainfall will heavily impact yields of rainfed crops, which comprise 87 percent of production. Increased demand for irrigation combined with reduced water supply overall are

LIVESTOCK

Higher temperatures and drought impact the livestock sector (primarily poultry, cattle and sheep) directly by compromising animal health, and indirectly by reducing feed availability and quality. The severe drought of 2007 cost livestock producers \$305 million and decreased herd size by 1.8 percent. Climate change could result in an estimated 35 percent cumulative loss in net revenue for the sector by 2040, particularly for chickens and cattle. Higher temperatures and variable rainfall also adversely affect production of feed crops and pasture across all regions. During the 2007 drought, a decline in barley production (the primary source of animal feed) forced households to purchase costly imported animal feed and increased competition for

HUMAN HEALTH

Climate change already imposes a number of direct and indirect effects on health outcomes in Moldova. Rising air temperatures exacerbate heart conditions and severe circulatory and respiratory diseases. Acute respiratory infections are already the second highest cause of death in children under five. Higher temperatures also lead to heat stress, particularly among vulnerable populations (young and elderly). During the 2007 drought, six heat waves were recorded from May to September, resulting in 146 excess deaths in Chisinau. Shocks to agricultural production, such as floods and droughts, have important consequences for health in terms of food security and malnutrition, particularly in rural

Climate Stressors and Climate Risks AGRICULTURE	
Stressors	Risks
Increased temperatures	Reduced yields of rainfed crops, with highest risks for wheat, maize and pasture, particularly in the southern region
Changes in rainfall patterns	Reductions in irrigated crop yields due to decreased river runoff and increased crop water demands
Increased incidence and severity of extreme events (drought, flooding, heat waves, etc.)	Shifts in the growing season
	Increased risk of pests, diseases and weeds
	Increased frequency of crop damage due to extreme events
	Decline in rural income, livelihoods and food security

likely to lead to irrigation shortages, impacting irrigated crops as well. (4, 7, 11, 14)

Climate Stressors and Climate Risks LIVESTOCK	
Stressors	Risks
Increased temperatures	Reduced productivity due to heat stress
Changes in rainfall patterns	Increase in pests and diseases, leading to higher rates of morbidity and mortality
	Reduced production of livestock feed and pasture, leading to more expensive feed and/or increased competition for pastureland
Increase in floods, droughts, etc.	

pastureland. This trend is likely to continue as projections indicate a 4–7 percent decline in pasture productivity by 2040. (4, 7, 11)

Climate Stressors and Climate Risks HUMAN HEALTH	
Stressors	Risks
Increased temperatures	Increased rates of heart, circulatory and respiratory diseases
Changes in rainfall patterns	Increased incidence of heat stress, particularly among vulnerable populations
Increase in floods, droughts, etc.	Increased food insecurity and malnutrition, especially in rural communities

communities, where 21 percent of households were food energy deficient in 2013. (3, 6, 13)

FORESTRY

Forests cover 11 percent of the land in Moldova and play an important ecosystem services role (e.g., they reduce erosion and runoff, sequester carbon, and serve as critical habitat for biodiversity) and provide the majority of fuelwood for rural communities unable to afford costly gas and electricity. Forestry activities could add \$0.5 million/year to the economy over the next 25 years, but this contribution is threatened by climate change. Even small changes in temperature and precipitation affect future forest growth and regeneration. Higher temperatures induce faster rates of water loss, leading to drier conditions that slow growth rates, and in severe cases, cause tree loss. Higher temperatures also tend to decrease the efficiency of water use by plants. In Moldova, climate change could lead to a decrease of beech, durmast and oak forests in

POLICY CONTEXT

INSTITUTIONAL FRAMEWORK

The Ministry of Environment and Natural Resources (MoEN), which houses the Climate Change Office, is responsible for developing and promoting state policies for environmental protection, natural resource management and conservation. Their responsibilities include implementing United Nations Framework Convention on Climate Change (UNFCCC) provisions as well as enforcing other environment treaties. However, climate change mitigation and adaptation strategies are highly fragmented across government ministries, each with their own sector action plans on mitigation and adaptation to climate change.

KEY RESOURCES

1. Aquastat. 2015. [Republic of Moldova](#).
2. CIA. 2016. [The World Factbook: Moldova](#).
3. Corobov, R. et al. 2012. [Heat-related mortality in Moldova: the summer of 2007](#).
4. Ministry of Environment and Natural Resources (MoEN). 2009. [Second National Communication of the Republic of Moldova under the UNFCCC](#).
5. Ministry of Environment and Territorial Development. 2000. [First National Communication of the Republic of Moldova under the UNFCCC](#).
6. MoEN. 2013. [Third National Communication of the Republic of Moldova under the UNFCCC](#).
7. MoEN. 2016. [First Biennial Update Report of the Republic of Moldova](#).
8. UNDP. 2009. [Climate Change in Moldova: Socio-Economic Impact and Policy Options for Adaptation](#).

Climate Stressors and Climate Risks FORESTRY	
Stressors	Risks
Increased temperatures	Reduced tree cover and reduced forest productivity
Changes in rainfall patterns	Increased risk of forest fires
	Increased rates of erosion, landslides and soil degradation
Increase in floods, droughts, etc.	Reduced wood for fuel, additional energy costs for rural households

favor of semi-arid forests and dryland pastures more suitable to hotter, drier conditions. By 2040, 15–25 percent of trees in the northern region will likely be water stressed. Hornbeam and ash will be the most vulnerable, with ash biomass growth estimated to decrease by 20–40 percent by mid-century. (6, 12)

NATIONAL STRATEGIES AND PLANS

- [Initial National Communication](#) (2000)
- [Second National Communication](#) (2009)
- [Third National Communication](#) (2013)

9. WHO. 2008. [Floods in Moldova, Romania, and Ukraine](#).
10. World Bank. 2010. [The Republic of Moldova: Climate Change and Agriculture Country Note](#).
11. World Bank. 2013. [Reducing the vulnerability of Moldova's Agricultural Systems to Climate Change](#).
12. World Bank. 2014. [Republic of Moldova Forest Policy Note](#).
13. World Bank. 2015. [Republic of Moldova Food Security Assessment](#).
14. World Bank. 2016. [Climate Change Knowledge Portal: Moldova](#).

Map modified from: World Bank. 2010. [The Republic of Moldova: Climate Change and Agriculture Country Note](#).

SELECTED ONGOING EXPERIENCES

The Moldovan government has primarily focused on reducing greenhouse gases across the industrial, agriculture and services sectors as the primary approach to combatting climate change versus introducing strategies and approaches to adapt to a changing environment.

Selected Program	Amount	Donor	Year	Implementer
Moldova Agriculture Competitiveness Project 2nd Additional Financing	\$10 million	World Bank	Not available	Ministry of Agriculture
Agricultural Competitiveness and Enterprise Development (link is external) (ACED) project	Not available	USAID and MCC	2011–2016	DAI
Project for Improvement of Medical Care Service	¥5.9 million	JICA	Not available	Ministry of Health
Multilateral Fund for the Implementation of the Montreal Protocol – Institutional Support	\$15.9 million	CIDA	2015–2017	Not available
Rehabilitation of the water supply system in the Municipality of Nisporeni, Republic of Moldova	€5 million	EU	2010–2016	Austrian Development Agency
Modernization of local public services in the Republic of Moldova	Not available	BMZ	2016–2018	Ministry of Regional Development and Construction (MRDC)
Rural Financial Services and Agribusiness Development Project (IFAD V)	\$39.3 million	IFAD	2011–2016	Not available
Support for Agriculture and Rural Development (SARD)	€6.5 million	EU	2016–2018	UNDP
Migration and Local Development” (MiDL)	\$1.9 million	SDC	2015–2017	UNDP
Export-led Development of Organic Agriculture in Moldova	Not available	USAID/CZDA	2016–2018	People in Need (PIN)