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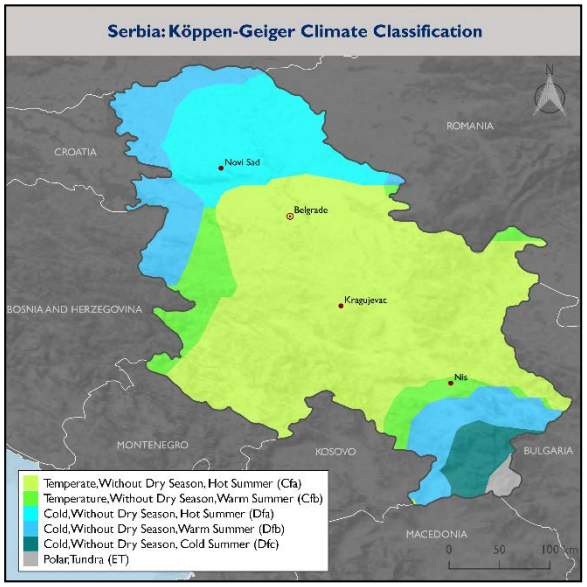
FACT SHEET

CLIMATE RISK PROFILE
SERBIA

COUNTRY OVERVIEW



Located in southeastern Europe, Serbia's terrain is highly varied, with fertile plains to the north, limestone ranges and basins to the east, and hills and mountains dissected by river valleys to the southeast. Navigable rivers include the Danube, Sava and Tisa. Serbia's market economy, dominated by services, industry and agriculture, continues to recover from the Balkan wars of the 1990s and the 2008 global economic crisis. Over the past two decades, droughts, floods, exceptionally harsh winters and other weather-related extreme events have caused major physical damage, financial losses and even deaths, with significant impacts on the economy, especially in the agricultural sector. In 2012, for more than 50 days, temperatures exceeded 35ºC resulting in more than one million ha of lost agricultural production and over $141 million in damages. In 2014, one of the heaviest rainfalls and worst floods on record affected more than 1.5 million people (20 percent of the population) and caused $2 billion in damages. Climate change projections indicate that Serbia and the Western Balkans face a high probability of continuing temperature increases, along with more frequent and prolonged droughts and wildfires. (Citations: 5, 10, 14, 15, 16, 21, 22, 25)

CLIMATE PROJECTIONS

- 1.5-2.2°C increase in temperatures by 2050
- 1.1 to 3.5% reduction in annual precipitation by 2050; 11-18% increase in consecutive dry days by 2050
- 21- 31% increase in total precipitation of extreme rainfall days by 2050

KEY CLIMATE IMPACTS

Human Health
Increased risk of heat stroke deaths and mosquito-related disease; Population displacement from weather extremes

Energy and Infrastructure
Disruption to electricity supplies
Reduced hydropower potential
Weather-related infrastructure damage

Agriculture
Reduced yields of rainfed crops
Soil erosion; Increased incidence of pests and diseases

Ecosystems
Loss of forest habitats and biodiversity
Changes in forest types and distribution
Increase in forest fires

Water Resources
Reduced water supply
Decline in water quality
Increase in flooding

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This document was prepared under the USAID Climate Change Integration Support (CCIS) Task Order No. AID-OAA-TO-15-00030 and is meant to provide a brief overview of climate risk issues. The key resources at the end of the document provide more in-depth country and sectoral analysis. The contents of this report do not necessarily reflect the views of USAID.

CLIMATE SUMMARY

Serbia has a continental climate, warm and humid from June through September and cold and dry from December through February. Its climate is influenced by elevation (including the Alps) and by proximity to the Mediterranean Sea. Average annual temperature for the country as a whole is about 10.6ºC, but temperatures are substantially cooler in the mountains (average annual temperature at altitudes above 1,000 m is about 6ºC) and warmer in the central and northern regions (average annual temperature in Belgrade is about 12.4ºC). Average annual precipitation is about 741 mm, ranging from about 600 mm in the north to about 2,000 mm in the mountainous regions. Precipitation occurs throughout the year, but there is a peak in May through July. The average intensity of heavy rainfall events is 16 mm per day (95th percentile of total daily precipitation values). Dry spells[1] average 10 days while cold spells[2] average 11. (2, 9, 11, 23)

HISTORICAL CLIMATE

Climate trends since 1960 include:

- Average annual temperature increased by 0.15°C per decade from 1960 to 2015.
- Average annual rainfall exhibited no significant trend from 1960 through 2015.
- Drought severity increased from 1990-2016, relative to 1960-1989.

FUTURE CLIMATE

Projected changes by 2050 include[3]:

- An increase in average annual temperature of 1.5° to 2.2°C.
- A decrease in average annual precipitation of 1.1 to 3.5 percent, with the largest reductions in July and August.
- An increase in the number of consecutive dry days[4] by 11 to 18 percent.
- A 21 to 31 percent increase in total annual precipitation on extreme rainfall days[5].

SECTOR IMPACTS AND VULNERABILITIES

HUMAN HEALTH

The most severe heat wave ever recorded in Serbia occurred in 2007, with the maximum temperature reaching 44.9°C. Heat stroke, sometimes resulting in mortality, has become more frequent with the increase in heatwaves. Older adults and the chronically ill are more vulnerable to climate-related health effects, such as heat stroke. A very high proportion (approximately 17 percent) of Serbia's population is aged 65 and older, which increases the country's vulnerability to climate-related health effects. Since 2000, wetter and warmer climatic conditions in the Balkans have become more suitable for mosquitos; the Asian tiger mosquito (a vector for dengue and Chikungunya) was first found in northwestern Serbia in 2009. In 2014, severe floods affected 1.6 million Serbians across 38 municipalities and resulted in 50 deaths; more than 32,000 people had to leave their homes. (1, 5, 7, 26)

Climate Stressors and Climate Risks HUMAN HEALTH

Stressors	Risks
Rising temperatures and increased heat waves	Increase in diseases transmitted by mosquitos
	Increased illness and mortality from heat stroke
Increased frequency of intense precipitation	Increased stress on aging and chronically ill populations
	Increase in injuries and deaths from flooding

[1] Dry spells are defined as the number of days with daily precipitation values below the 5th percentile.

[2] Cold spells are defined as the number of days with the daily average temperature below the 5th percentile.

[3] Relative to the data from 1986-2015.

[4] Maximum number of consecutive days per year with less than 1 mm of precipitation.

[5] Annual total precipitation when daily precipitation exceeds the 99th percentile (calculated from days when it precipitated at least 1 mm).

ENERGY AND INFRASTRUCTURE

Heat waves increase demand for air conditioning, which may lead to power outages. Serbia is primarily dependent on fossil fuels, but it also produces over 30 percent of electricity from hydropower, which could be negatively affected by accelerated evaporation and drought. Water used for cooling thermal power plants may also be affected by water scarcity. More frequent extreme events such as heavy rainfall and flooding can damage electricity distribution systems. Floods in 2014 caused an estimated $197 million in damages to the Serbian power sector. Floods can also lead to landslides, which destroyed houses, roads, bridges and other infrastructure in 2014. (3, 15,19, 21, 26)

Climate Stressors and Climate Risks ENERGY AND INFRASTRUCTURE

Stressors	Risks
More frequent heat waves	Increased power outages
Changes in seasonality of precipitation	Disruption to electricity supplies
	Reduced hydropower production
Increased drought	Damage to electricity distribution systems
Increased storms	Damage to infrastructure

AGRICULTURE

Agriculture is the third largest contributor to Serbia's GDP, accounting for 9.7 percent, and the most important export sector, accounting for over 21 percent. Production is concentrated in the north (Vojvodina), where crops are vulnerable to decreasing precipitation and increasing temperatures, primarily during the summer growing season. Projected declines in temperature and precipitation will affect rainfed crops, which dominate Serbian agriculture. Rainfed maize may decline by as much as 58 percent due to reduced rainfall and higher temperatures in summer. Increases in temperature have already brought about increases in fungal diseases and pests that reduce crop production. Cereals and fruits are the most important agricultural products in terms of production area and economic output; fruit production is particularly vulnerable to spring frost, hail, extremely low winter temperatures, low precipitation and/or heavy rainfall events. (4, 12, 17, 20, 25)

Climate Stressors and Climate Risks AGRICULTURE

Stressors	Risks
Rising temperatures	Decreased yield of important crops (e.g., maize, fruit)
Increased intensity and frequency of heavy rainfall events	Increased fungal diseases and pests affecting grain and fruit products
Increased drought conditions and dry spell length	Reduced soil fertility

ECOSYSTEMS

Serbia is characterized by a huge geographic and biological diversity. Terrestrial vegetation types (biomes) include deciduous forests, steppes, coniferous forests and highland "tundra." The most vulnerable ecosystems to expected temperature and precipitation changes include wetland and steppe habitats. Significant changes to grasslands, riparian habitats and forested ecosystems are also expected in response to changes in the amount and seasonal distribution of precipitation. As climatic zones shift, some species will adjust their geographic range, while others will be unable to keep pace with climatic changes and simply decline. Forests, which are one of the prime natural resources in Serbia, cover over 32 percent of the territory and are expected to change in terms of their composition, structure and distribution in response to changes in temperature and precipitation. Increased temperature combined with more frequent and intense droughts may also increase the risk of forest fires. (6, 10, 13, 19)

Climate Stressors and Climate Risks ECOSYSTEMS

Stressors	Risks
Rising temperatures	Declines in forest cover, habitat changes, and biodiversity loss
Reduced rainfall	Changes in species' abundance and distributions
Increased drought conditions	Increased frequency and intensity of fires and pest outbreaks

WATER RESOURCES

Flooding in Serbia can occur throughout the year, with the peak in spring when there are high levels of precipitation and snowmelt from the mountains. The 2014 floods damaged flood protection infrastructure (mostly embankments), which failed due to underground erosion beneath their foundations. It is expected that more floods will occur by the end of the 21st century, with an increase (close to 20 percent) in the frequency of 100-year floods for large rivers such as the Danube, Sava, and Tisa. However, Serbia needs to contend with not only too much runoff, but also too little. Annual river discharge has decreased in some areas due to changes in precipitation. It is estimated that the average annual discharge in Serbia will drop by roughly 13 percent by 2020 and by 19 percent by 2100, which may also be accompanied by reductions in water quality. These changes will likely occur in conjunction with more intense and frequent droughts, which will affect the availability of surface moisture and groundwater. (3, 6, 13, 14, 19, 24, 26)

Climate Stressors and Climate Risks WATER RESOURCES

Stressors	Risks
Rising temperatures	Reduced snow cover and surface water from snowmelt
Reduced precipitation and increased incidence of drought	Reduced surface waters and water supply shortages
	Declines in agricultural production
Increased intensity and frequency of extreme precipitation	Damage to infrastructure from flooding

POLICY CONTEXT

Serbia was granted European Union (EU) candidate status in 2012, with the hopes of accession by 2020. This process has influenced several climate change actions nationally as Serbia begins the process of harmonizing its national legislation with the EU legislative framework.

INSTITUTIONAL FRAMEWORK

The Ministry of Agriculture and Environmental Protection is the climate change focal point. In 2014, a Climate Change Committee was created to oversee and monitor all relevant policies; it includes representatives of all relevant ministries, governmental institutions, universities and scientific institutions. Serbia's second National Communication is currently under development. A National Climate Change Strategy and Action Plan is also currently under development and is expected to provide a framework for adaptation priorities in areas such as agriculture, forestry and water management. (7, 15, 19)

NATIONAL STRATEGIES AND PLANS

- Initial National Communication to the UNFCCC (2010)
- Intended Nationally Determined Contribution (2015)
- First Biennial Update Report of The Republic of Serbia under the UNFCCC (2016)

KEY RESOURCES

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Map source: Adapted from Koppen-Geiger Classification information

SELECTED ONGOING EXPERIENCES

Selected Program	Amount	Donor	Year	Implementer
Enhancement of DRRM capacities and mainstreaming Climate Change Adaptation practices into Agriculture sector in the Western Balkans	$485,000	FAO	2016-2017	FAO
Climate Smart Urban Development Challenge	$12.5 million	UNDP	2016-2020	Ministry of Agriculture and Environmental Protection (MAEP)
Second National Communication	$500,000	GEF	2012-2015	UNDP, MAEP
Climate change adaptation in the Western Balkans	$3.8 million	GIZ/BMZ	2012-2018	Ministry of Energy, Development and Environmental Protection
South-East European Multi-Hazard Early Warning Advisory System	$565,000	USAID/WMO	2016-2017	Finnish Meteorological Institute (FMI)
Climate Smart Urban Development Challenge	$1.9 million	GEF/UNDP	2016-2020	MAEP
EU Floods Recovery Program	$46 million	EU	2014-2016	UNDP, UNICEF, IOM
Building Local Community Resilience for the Sustainable Development of Watersheds in South Eastern Europe	$472,000	USEPA	2014-2019	Regional Environmental Center for Central and Eastern Europe
Supporting Serbia's Disaster Risk Management Program	$394,000	EU	2016-2018	World Bank
Strengthening of Early Warning Systems under Serbia National DRM Program III	$720,000	Multi Donor Trust Fund	2016-2018	Public Investment Management Office of Serbia
Supporting Serbia's Disaster Risk Management Program	$4.1 million	EU	2016-2018	Public Investment Management Office of Serbia, World Bank
Floods Emergency Recovery Project	$300 million	World Bank	2014-2017	Ministry of Finance, MAEP