CLIMATE RISK COUNTRY PROFILE

# ARGENTINA

WORLD BANK GROUP

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*Graphic Design:* Circle Graphics, Reisterstown, MD.

## ACKNOWLEDGEMENTS

This profile is part of a series of Climate Risk Country Profiles developed by the World Bank Group (WBG). The country profile synthesizes most relevant data and information on climate change, disaster risk reduction, and adaptation actions and policies at the country level. The country profile series are designed as a quick reference source for development practitioners to better integrate climate resilience in development planning and policy making. This effort is managed and led by Veronique Morin (Senior Climate Change Specialist, WBG) and Ana E. Bucher (Senior Climate Change Specialist, WBG).

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# FOREWORD

Climate change is a major risk to good development outcomes, and the World Bank Group is committed to playing an important role in helping countries integrate climate action into their core development agendas. The World Bank Group is committed to supporting client countries to invest in and build a low-carbon, climate-resilient future, helping them to be better prepared to adapt to current and future climate impacts.

The World Bank Group is investing in incorporating and systematically managing climate risks in development operations through its individual corporate commitments.

A key aspect of the World Bank Group's Action Plan on Adaptation and Resilience (2019) is to help countries shift from addressing adaptation as an incremental cost and isolated investment to systematically incorporating climate risks and opportunities at every phase of policy planning, investment design, implementation and evaluation of development outcomes. For all IDA and IBRD operations, climate and disaster risk screening is one of the mandatory corporate climate commitments. This is supported by the Bank Group's Climate and Disaster Risk Screening Tool which enables all Bank staff to assess short- and long-term climate and disaster risks in operations and national or sectoral planning processes. This screening tool draws up-to-date and relevant information from the World Bank's Climate Change Knowledge Portal, a comprehensive online 'one-stop shop' for global, regional, and country data related to climate change and development.

Recognizing the value of consistent, easy-to-use technical resources for client countries as well as to support respective internal climate risk assessment and adaptation planning processes, the World Bank Group's Climate Change Group has developed this content. Standardizing and pooling expertise facilitates the World Bank Group in conducting initial assessments of climate risks and opportunities across sectors within a country, within institutional portfolios across regions, and acts as a global resource for development practitioners.

For developing countries, the climate risk profiles are intended to serve as public goods to facilitate upstream country diagnostics, policy dialogue, and strategic planning by providing comprehensive overviews of trends and projected changes in key climate parameters, sector-specific implications, relevant policies and programs, adaptation priorities and opportunities for further actions.

It is my hope that these efforts will spur deepening of long-term risk management in developing countries and our engagement in supporting climate change adaptation planning at operational levels.

**Bernice Van Bronkhorst**
Global Director
Climate Change Group (CCG)
The World Bank Group (WBG)

# COUNTRY OVERVIEW

Argentina, the second largest country in South America after Brazil, covers an area of over 2.8 million square kilometers (km$^2$). It extends over the southern are of the South American continent and shares borders with Chile to the west, Bolivia and Paraguay to the north, and Uruguay to the north east. Argentina's eastern coast line stretches for over 4,700 meters (m) along the South Atlantic Ocean. Continental Argentina extends between 20° and 60° latitude in the Southern Hemisphere, and the country has regions of sub-tropical climates and mid-latitudes, as well as extreme thermal conditions, which vary from hot in the north to very cold in the extreme south and at the heights of the Sierras and the Andes Mountains. It has humid lowlands in eastern Argentina, especially along the rivers of the Rio de la Plata system. In the north lie the savannas and swamps of the Chaco region. The humid pampa (plain) in the west gives way to rangeland and finally to desert that is broken only by irrigated oases, with the Andes Mountains marking the end of the western plains (**Figure 1**). Argentina has a diverse geophysical landscape range from tropical climates in the north to tundra in the far south; Cerro Aconcagua is the Western Hemisphere's tallest mountain, while Laguna del Carbon is the lowest point in the Western Hemisphere. Argentina is endowed with natural resources, a significant amount of biodiversity and a vast range of vegetation.[1]

**FIGURE 1.** Topography of Argentina[2]


Argentina is one of the largest economies in Latin America and is endowed with extraordinary fertile lands, gas and lithium reserves, and has great potential for renewable energy. It is a leading food producer with large-scale agricultural and livestock industries. In addition, Argentina has significant opportunities in some manufacturing subsectors, and innovative services in high tech industries. However, the historical volatility of economic growth and the accumulation of institutional obstacles have impeded the country's development and urban poverty remains high.[3] While Argentina had seen improved economic growth and poverty records,[4] the COVID-19 pandemic has worsened the country's poverty and economic growth. Urban poverty remains high, reaching 42% of population in the second semester of 2020, with 10.5% resulting in extreme poverty and 57.7% of children experiencing poverty in 2020.[5] In addition to the country's current economic challenges, deforestation has become a major

[1] Argentina (2015). Third National Communication to the United Nations Framework Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Argnc3.pdf
[2] World Bank Group (2019). Climate Migration Profile – Argentina.
[3] World Bank (2021). Argentina – Overview. URL: https://www.worldbank.org/en/country/argentina/overview
[4] World Bank Group (2016): Argentina, Country Environmental Analysis. URL: https://openknowledge.worldbank.org/bitstream/handle/10986/25775/109527-ENGLISH-PUBLIC-ARG-CEA-Country-Environmental-Analysis-English.pdf?sequence=1&isAllowed=y
[5] World Bank (2021). Argentina – Overview. URL: https://www.worldbank.org/en/country/argentina/overview

environmental issue, especially in the north of the country, and with flooding events affecting thousands across the country, per year. Air pollution, waste management and water pollution are becoming serious problems especially in the growing urban centers of Argentina, but these remain only partially addressed.[6]

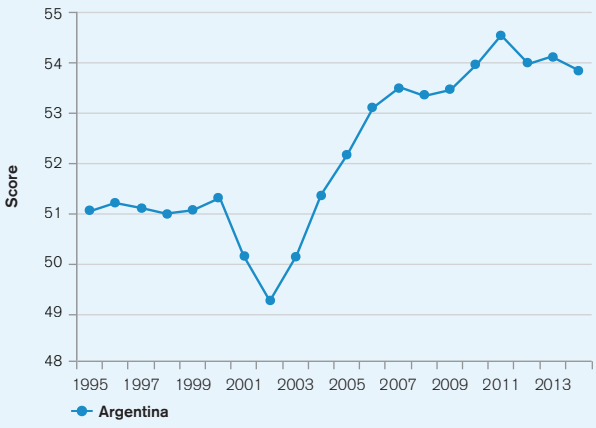
Argentina has an estimated 44.94 million people in 2019[7] with projections suggesting the country's population could reach nearly 49.2 and 54.9 million people by 2030 and 2050, respectively. The majority of Argentinians live in urban areas and a projected 93% and 95% will do so in 2030 and 2050, respectively.[8] The country has a Gross Domestic Product (GDP) of approximately $445.5 billion in 2019, with an annual growth rate of –2.1% (2019) (**Table 1**).[9]

**TABLE 1.** Data snapshot: Key development indicators[10]

| Indicator | |
|---|---|
| **Life Expectancy at Birth, Total (Years)** (2019) | 76.7 |
| **Population Density (People per sq. km Land Area)** (2018) | 16.3 |
| **% of Population With Access to Electricity** (2018) | 100% |
| **GDP per Capita (Current US$)** (2019) | $9,912.30 |

The ND-GAIN Index[11] ranks 181 countries using a score which calculates a country's vulnerability to climate change and other global challenges as well as their readiness to improve resilience. This Index aims to help businesses and the public sector better identify vulnerability and readiness in order to better prioritize investment for more efficient responses to global challenges. Due to a combination of political, geographic, and social factors, Argentina is recognized as vulnerable to climate change impacts, ranked 84th out of 181 countries in the 2020 ND-GAIN Index. The more vulnerable a country is the higher their score, while the more ready a country is to improve its resilience the lower it will be. Norway has the highest score and is ranked 1st. **Figure 2** is a time-series plot of the ND-GAIN Index showing Argentina's progress

**FIGURE 2.** ND-GAIN Index for Argentina




[6] World Bank Group (2016): Argentina, Country Environmental Analysis. URL: https://openknowledge.worldbank.org/bitstream/handle/10986/25775/109527-ENGLISH-PUBLIC-ARG-CEA-Country-Environmental-Analysis-English.pdf?sequence=1&isAllowed=y

[7] World Bank Open Data, Data Retrieved April 2021. Data Bank: Population Estimates and Projections, Argentina. URL: https://databank.worldbank.org/data/reports.aspx?source=health-nutrition-and-population-statistics:-population-estimates-and-projections

[8] World Bank Open Data, Data Retrieved April 2021. Data Bank: Population Estimates and Projections, Argentina. URL: https://databank.worldbank.org/data/reports.aspx?source=health-nutrition-and-population-statistics:-population-estimates-and-projections

[9] World Bank (2021). DataBank – World Development Indicators. URL: https://databank.worldbank.org/source/world-development-indicators [accessed 19 April, 2021]

[10] World Bank (2021). DataBank – World Development Indicators. URL: https://databank.worldbank.org/source/world-development-indicators [accessed 19 April, 2021]

[11] University of Notre Dame (2021). Notre Dame Global Adaptation Initiative. URL: https://gain.nd.edu/our-work/country-index/

Argentina submitted its Second Nationally-Determined Contributions to the UNFCCC in 2020 and its Third National Communication (NC3) in 2015, in support of efforts to reduce the country's vulnerability to climate variability and change. The country is additionally vulnerable given its high degrees of agricultural activity and the sector's prominence for the country's economy and continued economic development. Argentina has committed improving adaptation actions such as widening monitoring networks and strengthening early warning systems; instituting economic quantification of the climate change impacts and adaptation measures; creating multidisciplinary teams to support climate-related initiatives, and strengthening of initiatives that support the recovery and rehabilitation of lands, including the adaptation based in ecosystems, among others.[12]

## Green, Inclusive and Resilient Recovery

The coronavirus disease (COVID-19) pandemic has led to unprecedented adverse social and economic impacts. Further, the pandemic has demonstrated the compounding impacts of adding yet another shock on top of the multiple challenges that vulnerable populations already face in day-to-day life, with the potential to create devastating health, social, economic and environmental crises that can leave a deep, long-lasting mark. However, as governments take urgent action and lay the foundations for their financial, economic, and social recovery, they have a unique opportunity to create economies that are more sustainable, inclusive and resilient. Short and long-term recovery efforts should prioritize investments that boost jobs and economic activity; have positive impacts on human, social and natural capital; protect biodiversity and ecosystems services; boost resilience; and advance the decarbonization of economies.

# CLIMATOLOGY

## Climate Baseline

### Overview

The majority of Argentina's climate is subtropical The Patagonian provinces: Neuquén, Río Negro, Chubut, Santa Cruz and Tierra del Fuego, experience low rainfall, except in the strip adjacent to the Andes Mountains as well as in the southern end of the provinces of Santa Cruz and Tierra del Fuego. The contiguous strip of the Andes Mountains has abundant forests, glaciers and permanent snows, North of 40°S, the climate is subtropical with hot summers. At the eastern end of this region there is abundant rainfall, which decreases towards the west and desert areas with very scarce vegetation, where cities and agriculture exist in the oases of the rivers fed by rainfall in the Cordillera; including provinces of San Juan, La Rioja, Catamarca and part of Mendoza. In the east, covering part of the provinces of Entre Rios, Buenos Aires, Santa Fe, Córdoba, La Pampa and San Luis, due to the humid conditions,

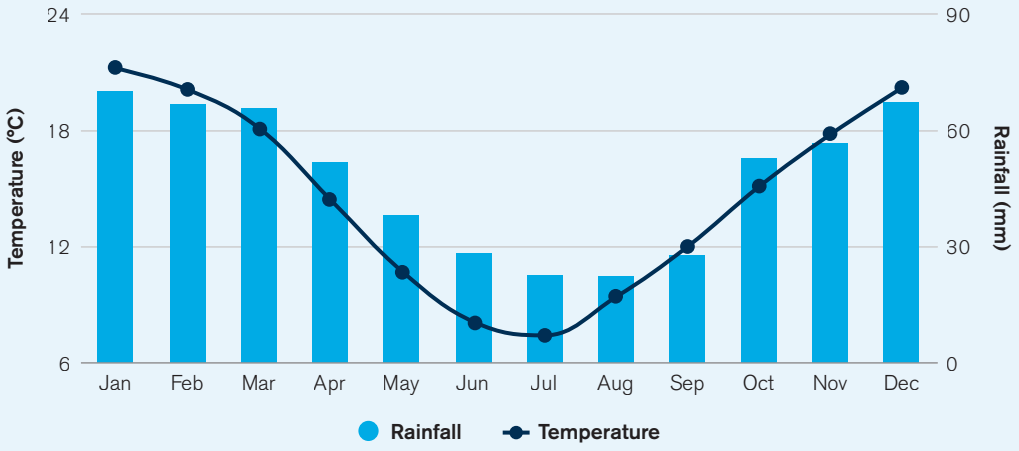
[12] Argentina (2020). Second Nationally-Determined Contributions of the Argentine Republic. Ministry of Environment and Sustainable Development, Argentine Republic. URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Argentina%20Second/Argentina_Segunda%20Contribución%20Nacional.pdf

rain-fed agriculture and cattle raising is extensive. Apart from the north of this region, the original vegetation has been almost totally replaced. The region between the humid east and the west arid is semi-arid, whose vegetation, originally from the mountains, was modified by cattle breeding. In this region, the precipitation occurs almost entirely during the summer period. In the north of the country, in the province of Misiones and on the eastern slopes of the Tucumán, Salta and Jujuy, the high temperatures and abundant rainfall results in tropical forests. In Misiones, part of the original forest was replaced by commercial forestry, primarily pine. Commercial forestation of pines and eucalyptus also extends to the provinces of Corrientes and Entre Rios. The provinces of Chaco and Formosa, east of Salta and north of Santiago del Estero are in the region of the Chaco characterized by arboreal vegetation in the form of a park, where it is also develops extensive cattle raising and, increasingly, dry farming.[13]

Given the country's extensive territory, its climate features and seasonality are influenced by the presence of Los Andes Mountain extending along the west of the country as well as the El Niño-Southern Oscillation (ENSO) and the Indian Dipole. Sea surface temperature anomalies also influence Argentina's weather. Additionally, warm (cold) phase of El Niño and a positive (negative) phase of Indian Dipole are all related to increased (decreased) spring and autumn precipitation in northeastern Argentina and Central Andes and the signal decreases in summer and winter.[14]

Analysis of data from the World Bank Group's Climate Change Knowledge Portal (CCKP) (**Table 2**) shows historical climate information for the period 1901–2020. Mean annual temperature for Argentina is 14.3°C, with average monthly temperatures ranging between 7°C (July) and 17°C (January). Mean annual precipitation is 541 millimeters (mm), with year-round rainfall and highest rainfall occurring October to April for the latest climatology, 1991–2020 (**Figure 3**).[15] **Figure 4** presents the spatial variation of observed average annual precipitation and temperature.

**FIGURE 3.** Average monthly temperature and rainfall of Argentina for 1991–2020[16]




[13] Argentina (2017). Second Biennial Update Report of The Argentine Republic to The United Nations Framework Convention On Climate Change. URL: https://unfccc.int/documents/180598

[14] Garbarini, E. et al. (2016). ENSO Influence over Precipitation in Argentina. Advance in Environmental Research. 52(2016). URL: https://www.researchgate.net/publication/319184288_ENSO_Influence_over_Precipitation_in_Argentina

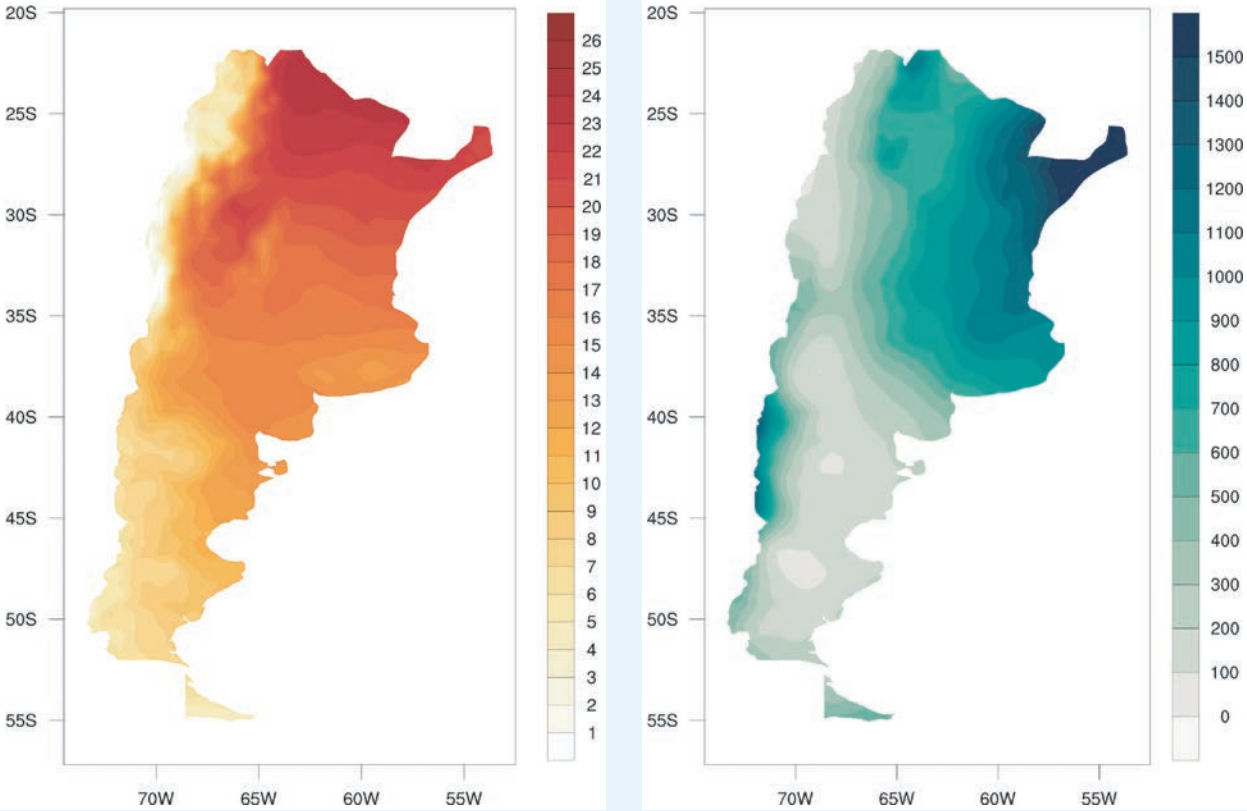
[15] WBG Climate Change Knowledge Portal (CCKP, 2021). Argentina Historical Data. URL: https://climateknowledgeportal.worldbank.org/country/argentina/climate-data-historical

[16] WBG Climate Change Knowledge Portal (CCKP, 2021). Argentina Historical Data. URL: https://climateknowledgeportal.worldbank.org/country/argentina/climate-data-historical

**TABLE 2.** Data snapshot: Country-level summary statistics

| Climate Variables | 1901–2020 |
|---|---|
| **Mean Annual Temperature (°C)** | 14.3°C |
| **Mean Annual Precipitation (mm)** | 541.0 mm |
| **Mean Maximum Annual Temperature (°C)** | 20.9°C |
| **Mean Minimum Annual Temperature (°C)** | 7.8°C |

**FIGURE 4.** Map of average annual temperature (°C) (left); annual precipitation (mm) (right) for Argentina, 1991–2020[17]



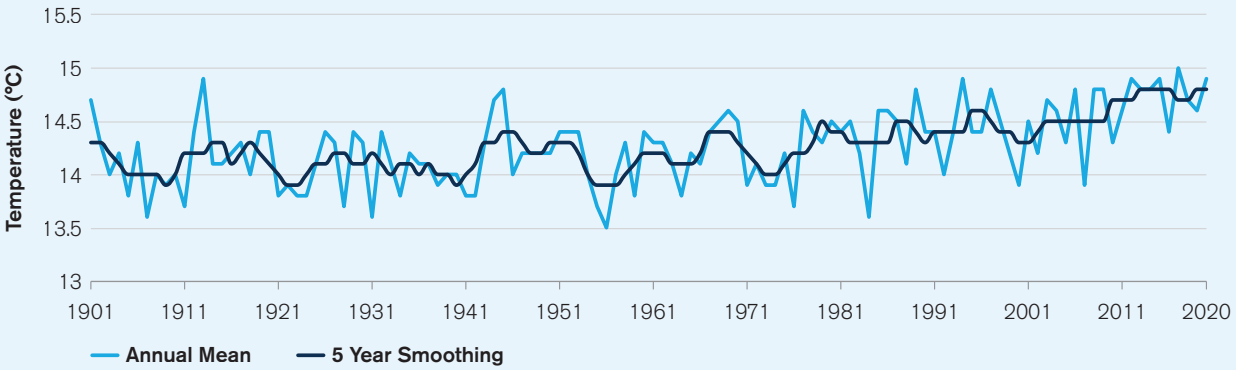

[17] WBG Climate Change Knowledge Portal (CCKP, 2021). Argentina Historical Data. URL: https://climateknowledgeportal.worldbank.org/country/Argentina/climate-data-historical

## Key Trends

### *Temperature*

Argentina has experienced temperature increase since the 1960s (**Figure 5**), although warming trends are below global averages. In the majority of non-Patagonia areas of Argentina, temperature increases were observed at an average of 0.5°C between 1960–2010; smaller increases were observed in the center of the country. In the Patagonia region, observed temperature increase was greater than in the rest of the country; with increases exceeding 1°C. Extreme temperatures in the east and north of the country were also observed to increase, as well as the occurrence of more frequent heat waves and a reduction in frosts.[18] While average temperature increases were below global mean increase, strong trends were observed for increases in extreme temperatures as well as heat waves over the past decades.[19]

**FIGURE 5.** Observed temperature for Argentina, 1901–2020[20]




### *Precipitation*

In Argentina, precipitation trends are highly variable and affected by interannual and interdecadal variations. However, between 1960 and 2010, mean annual precipitation was observed to increase. Largest observed changes (some in excess of 200 mm of rainfall) occurred in the east of the country as well as in semi-arid areas in the south. Significant increases in precipitation were observed over much of subtropical Argentina, since 1960. This has been favorable to agriculture yields and the extension of crop lands into the country's semi-arid regions. However, these increases derived from more frequent heavy rainfalls and consequent flooding of rural and urban areas. Since the early 1970s, the primary rivers of the Plata Basin have increased their mean flows, this was due not only to increased precipitation, but also to land use changes. In contrast, over the Andes Mountains, reduced rainfall and increased temperature has led to glaciers receding and reduced river flows.[21] In the Patagonian Andes,

[18] Argentina (2015). Third National Communication to the United Nations Framework Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Argnc3.pdf

[19] Barros, V. et al. (2014). Climate change in Argentina: trends, projections, impacts and adaptation. *WIREs Clim Change* (2014). DOI: https://doi.org/10.1002/wcc.316

[20] WB Climate Change Knowledge Portal (CCKP, 2021). Argentina URL: https://climateknowledgeportal.worldbank.org/country/argentina/climate-data-historical

[21] Barros, V. et al. (2014). Climate change in Argentina: trends, projections, impacts and adaptation. *WIREs Clim Change* (2014). DOI: https://doi.org/10.1002/wcc.316

precipitation had a negative change in the period 1960–2010 and the rivers in northern Mendoza and San Juan seem to indicate reductions in precipitation (and water availability) in their upper basins over the Cordillera. Also observed was the shift of more frequent and intense rainfall events in much of the country, which resulted in more frequent flooding. In the west and most notably in the north, the winter dry periods have become longer and drier, which has generated problems in the availability of water for some populations.[22]

# Climate Future

## Overview

The main data source for the World Bank Group's Climate Change Knowledge Portal (CCKP) is the CMIP5 (Coupled Inter-comparison Project No.5) data ensemble, which builds the database for the global climate change projections presented in the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC). Four Representative Concentration Pathways (i.e. RCP2.6, RCP4.5, RCP6.0, and RCP8.5) were selected and defined by their total radiative forcing (cumulative measure of GHG emissions from all sources) pathway and level by 2100. The RCP2.6 for example represents a very strong mitigation scenario, whereas the RCP8.5 assumes business-as-usual scenario. For more information, please refer to the RCP Database. For simplification, these scenarios are referred to as a low (RCP2.6); a medium (RCP4.5) and a high (RCP8.5) emission scenario in this profile. **Table 3** provides CMIP5 projections for essential climate variables under high emission scenario (RCP 8.5) over 4 different time horizons. **Figure 6** presents the multi-model (CMIP5) ensemble of 32 Global Circulation Models (GCMs) showing the projected changes in annual precipitation and temperature for the periods 2040–2059 and 2080–2099.

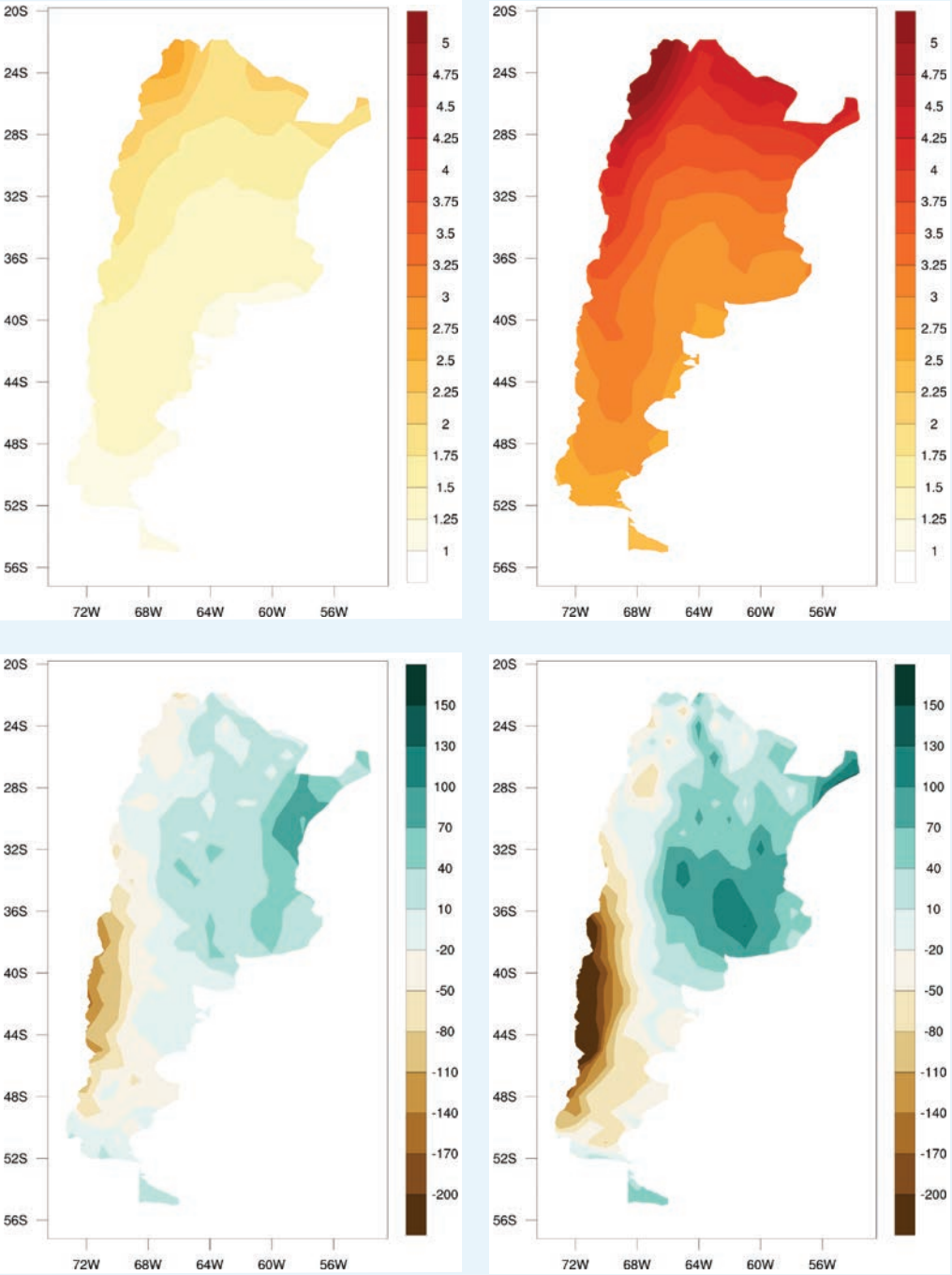
**TABLE 3.** Data snapshot: CMIP5 ensemble projection

| Cmip5 Ensemble Projection | 2020–2039 | 2040–2059 | 2060–2079 | 2080–2099 |
|---|---|---|---|---|
| **Annual Temperature Anomaly (°C)** | **+0.2 to +1.6** (+0.9°C) | **+0.6 to +2.4** (+1.6°C) | **+1.2 to +3.6** (+2.4°C) | **+1.6 to +4.9** (+3.3°C) |
| **Annual Precipitation Anomaly (mm)** | **–13.6 to +14.0** (–0.40 mm) | **–14.9 to +16.9** (–0.18 mm) | **–16.0 to +19.8** (+0.1 mm) | **–17.4 to +24.4** (+1.1 mm) |

*Note:* The table shows CMIP5 ensemble projection under RCP8.5. Bold value is the range (10th–90th Percentile) and values in parentheses show the median (or 50th Percentile).

[22] Argentina (2015). Third National Communication to the United Nations Framework Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Argnc3.pdf

**FIGURE 6.** CMIP5 multi-model ensemble projected change (32 GCMs) in annual temperature (top) and precipitation (bottom) by 2040–2059 (left) and by 2080–2099 (right), relative to 1986–2005 baseline under RCP8.5[23]




[23] WBG Climate Change Knowledge Portal (CCKP, 2021). Argentina Projected Future Climate. URL: https://climateknowledgeportal.worldbank.org/country/Argentina/climate-data-projections

## Key Trends

### *Temperature*

While Argentina has a highly diverse topography and climates, the country is, overall, expected to experience increased temperatures. Temperatures across Argentina are projected to continue rising, with mean median annual temperatures projected to rise by +1.6°C by the 2050s and by 3.3°C by the end of the century under a high-emissions scenario (RCP 8.5). The Patagonian region is expected to see some of the most significant increases. The Andean glaciers will continue to experience increased temperatures, which is continuing to impact glacier recession. Semi-arid regions will continue to experience temperature spikes over summer months, with the greatest warming expected to occur in the northwest regions.[24]

Across all emissions scenarios, temperatures are projected to continue to rise in Argentina, through the end of the century. As seen in **Figure 7**, under a high-emissions scenario (RCP 8.5), average temperatures are projected to rise rapidly after the 2060s. High temperatures, analyzed in terms of the number of days above 25 degrees, are expected to rise significantly across the seasonal cycle, with the most pronounced changes occurring during March and April and September to December (**Figure 8**). Rising temperatures and extreme heat conditions will result in significant implications for human and animal health, agriculture, water resources, as well as biodiversity.

**FIGURE 7.** Historical and projected average temperature for Argentina from 1986 to 2099 (RCP8.5, Reference Period, 1986–2005)[25]

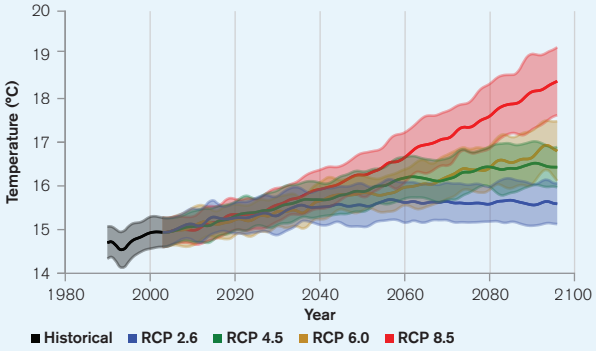
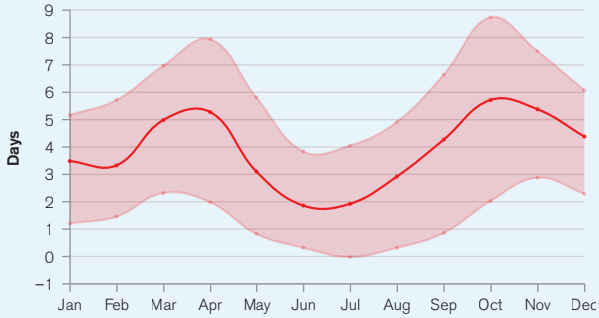



**FIGURE 8.** Projected change in Summer Days (Tmax >25°C) (RCP8.5, Reference Period, 1986–2005)[26]




[24] Argentina (2015). Third National Communication to the United Nations Framework Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Argnc3.pdf

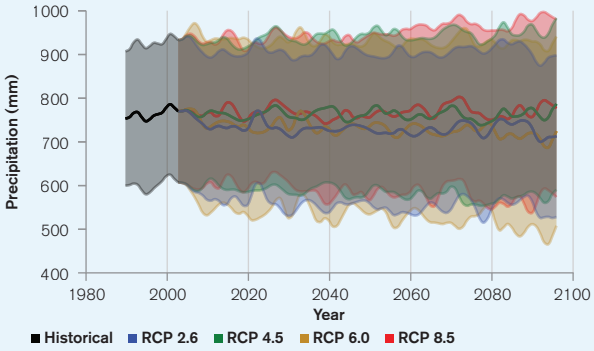
[25] WBG Climate Change Knowledge Portal (CCKP, 2021). Interactive Climate Indicator Dashboard – Agriculture. Argentina. URL https://climatedata.worldbank.org/CRMePortal/web/agriculture/crops-and-land-management?country=ARG&period=2080-2099

[26] WBG Climate Change Knowledge Portal (CCKP, 2021). Interactive Climate Indicator Dashboard – Agriculture. Argentina. URL https://climatedata.worldbank.org/CRMePortal/web/agriculture/crops-and-land-management?country=ARG&period=2080-2099

### *Precipitation*

Precipitation trends are highly variable across Argentina, however projected changes are not expected to be significant. Under a high-emission scenario, RCP8.5, a decrease of 10% to 205 is expected by the end of the century over the western Patagonia region and mountainous areas of Mendoza.[27] Increased precipitation is expected in the center and eastern parts of the country. Extreme precipitation events, such as extreme rainfall are also expected to increase in frequency and intensity.[28] As shown in **Figure 9** below, there is uncertainty on the future of rainfall patterns for Argentina[29] with most scenarios pointing to an average projected decrease in annual precipitation is by the of the century under a high emissions scenario for Argentina as a whole (RCP8.5).

**FIGURE 9.** Annual average precipitation in Argentina for 1986 to 2099 (Reference Period, 1986–2005)[30]




# CLIMATE RELATED NATURAL HAZARDS

## Overview

Argentina's diverse landscapes and climates as well as its geographic location results in the country being at high risk to national hazards. Over the past two decades, Argentina has experienced extreme events and widespread droughts across multiple regions, including core agricultural areas. The most devastating recent events occurred in 2006, 2009 and 2011, reportedly resulted in losses of more than US$4 billion dollars and more than one million people either directly or indirectly affected. During the spring of 2006, drought events peaked in the northeast of Argentina. 2009 precipitation deficits indicated a drought epicenter in the central Argentinian plains. In 2011, the northern Patagonia region experienced a combination of natural disasters due to severe drought conditions and a devastating volcanic eruption.[31]

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[27] Pérez, S. et al. (2015). Changes in Average Annual Precipitation in Argentina's Pampa Region and Their Possible Causes. MDPI. Climate. 3(1), 150–167. DOI: https://doi.org/10.3390/cli3010150

[28] Argentina (2015). Third National Communication to the United Nations Framework Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Argnc3.pdf

[29] WBG Climate Change Knowledge Portal (CCKP, 2021). Argentina Water Dashboard. Data Description. URL: https://climateknowledgeportal.worldbank.org/country/argentina/climate-sector-water

[30] WBG Climate Change Knowledge Portal (CCKP, 2021). Climate Data-Projections. Argentina. URL: https://climatedata.worldbank.org/CRMePortal/web/agriculture/crops-and-land-management?country=ARG&period=2080-2099

[31] Naumann, G. et al (2019). Dynamics of Socioeconomic Exposure, Vulnerability and Impacts of Recent Droughts in Argentina. Geosciences. 9(1), 39. DOI: https://doi.org/10.3390/geosciences9010039

Floods are expected to cause at least US$700 million in economic losses every year and one-in-three Argentinians live in a flood-prone area; approximately 14.2 million people. The majority of the population living in flood prone areas are concentrated in Greater Buenos Aires, Pampas and Gran Chaco regions, which together account for 65% of highly exposed population. The Greater Buenos Aries region accounts for almost 35% of this annual expected loss. The Pampas region and Gran Chaco follow, account for 18% and 12% of the annual expected loss respectively. 15 of the top 25 industrial parks in Argentina are located in flood-prone areas.[32] The coastal city of Buenos Aires is highly exposed due to flooding. Intense rainfall and exceptionally high tides in the La Plata River are the primary contributors. Increasing rainfall intensities, combined with low slopes and rapid urbanization of the area, which have modified natural drainage networks, thereby diminishing the capacity of soil to absorb potential flood waters, continue to pose significant challenges for flood risk management in the city.[33]

Data from the Emergency Event Database: EM-Dat database,[34] presented in **Table 4**, shows the country has endured various natural hazards, including floods, landslides, epidemic diseases, storms, earthquakes and droughts, costing lives, and economic damage.

**TABLE 4.** Natural disasters in Argentina, 1900–2020

| Natural Hazard 1900–2020 | Subtype | Events Count | Total Deaths | Total Affected | Total Damage ('000 USD) |
|---|---|---|---|---|---|
| **Drought** | Drought | 4 | 8 | 35,032 | 3,520,000 |
| **Epidemic** | Bacterial Disease | 1 | 67 | 3,883 | 0 |
| | Viral Disease | 1 | 6 | 13,366 | |
| **Flood** | Riverine Flood | 32 | 248 | 7,143,411 | 6,192,210 |
| | Flash Flood | 3 | 45 | 4,420 | 250,000 |
| **Earthquake** | Ground Movement | 5 | 10,476 | 241,065 | 180,000 |
| **Landslide** | Landslide | 4 | 103 | 35,030 | 15,000 |
| **Storm** | Convective Storm | 12 | 298 | 145,148 | 106,200 |
| **Volcanic Activity** | Ash Fall | 4 | 0 | 56,964 | 1,000,000 |
| **Extreme Temperatures** | Heat Wave | 1 | 100 | 66,000 | 104,000 |
| | Cold Wave | 7 | 85 | 28,500 | |
| **Wildfire** | Forest Fire | 4 | 8 | 152,752 | 100,000 |
| | Land Fire (Brush, Bush, Pasture) | 24 | 0 | 0 | 0 |

[32] Swiss Re (2015). Staying afloat, Flood Risk in Argentina. URL: https://media.swissre.com/documents/Swiss_Re_Argentina_Flood_Risk_Publ_long.PDF

[33] World Bank Group (2020). A Data-Driven Framework to address Gender Issues in Managing Flood Risks – Flood Risk Management Support Project for the City of Buenos Aires, Argentina. Water Guidance Note. Global Water Security and Sanitation Partnership. URL: https://openknowledge.worldbank.org/handle/10986/34375

[34] EM-DAT: The Emergency Events Database – Universite catholique de Louvain (UCL) – CRED, D. Guha-Sapir, Brussels, Belgium. http://emdat.be/emdat_db/

# Key Trends

As the climate changes, weather related disasters and long-term hazard trends are likely to continue, exacerbating existing vulnerabilities in Argentina. An estimated 60% of natural disasters in Argentina are floods, which have resulted in 95% of economic losses for affected populations. The majority of regional flooding has been linked with warm phases of the El Niño-Southern Oscillation (ENSO) phenomenon. Additionally, heavy rainfall results in overflow of major rivers in the La Plata Region (Paraná, Bermejo, Pilcomayo, Uruguay, Paraguay and their tributaries). Flooding has also occurred following severe storms which have increased flows of mountain rivers, resulting in downstream, low-land flood events.[35] Heavy rainfall has also resulted in landslides and mudslides.

Argentina has also been adversely affected by increased aridity and drought events. The regions most exposed to adverse drought impacts are mainly located in concordance with the core crop and livestock areas located in central Argentina (Buenos Aires, Córdoba, La Pampa, Santa Fe and Entre Ríos provinces). Recently Argentina has suffered through intense drought periods in 2006–2007, 2008–2009, and 2011–2012, which significantly impacted the country's agriculture and livestock sectors.[36]

The Andes Mountains (borders between Argentina and Chile) has some of the highest tectonic activity in the world, with frequent earthquakes and volcanic eruptions. The Andean magmatic arc that develops along the Argentine-Chilean border includes approximately 120 known active volcanoes, of which 38 are entirely or partially located in Argentine territory. While the majority of the volcanoes considered active are located in Chilean territory or on the international border, in the case of eruption, ash dispersion can occur mostly over Argentine territory due to the effect of atmospheric circulation. Although this dispersion does not generate direct loss of human lives, it does produce harmful socio-economic consequences on the affected communities.[37]

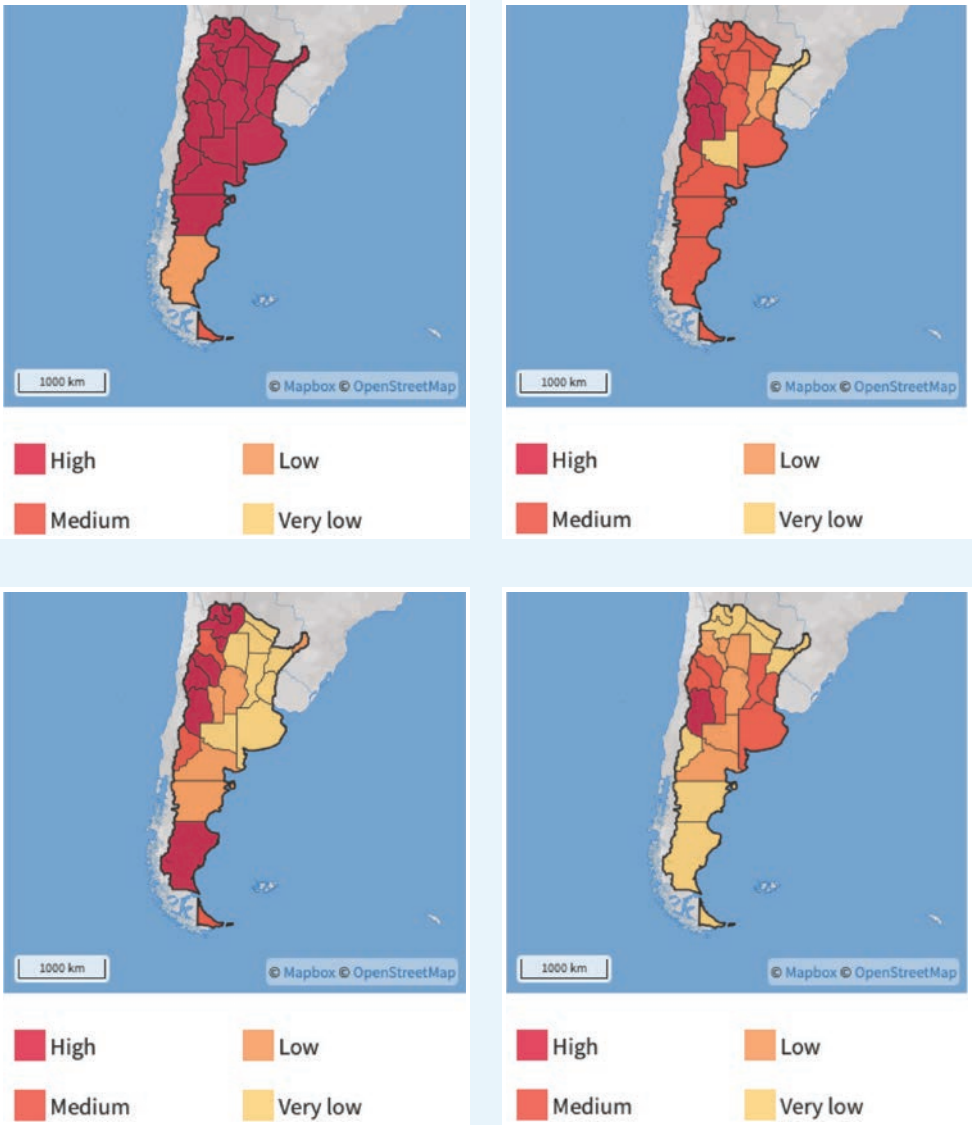
As temperatures rise, these will likely (i) exacerbate existing tensions for water between agricultural and livestock needs as well as human populations needs, especially during the dry seasons; (ii) alter water quality from available surface sources; and (iii) increase pressures on urban zones as urbanization rates grow. Small-scale farmers are particularly vulnerable to the effects of climate change due to their dependency on rainfed agriculture for food production and income generation, as well as their limited capacity to adapt. Extreme weather events such as droughts negatively impact agro-pastoralists' livelihoods due to the loss of productive assets, severely affecting their food security. **Figure 10** shows current risk from river floods, earthquakes, landslides and water scarcity.

[35] Argentina (2018). Plan nacional para la reducción del riesgo de desastres 2018–2023 (PNRRD). URL: https://www.preventionweb.net/files/60547_pnrrd201820233.pdf

[36] Naumann, G. et al (2019). Dynamics of Socioeconomic Exposure, Vulnerability and Impacts of Recent Droughts in Argentina. Geosciences. 9(1), 39. DOI: https://doi.org/10.3390/geosciences9010039

[37] Argentina (2018). Plan nacional para la reducción del riesgo de desastres 2018–2023 (PNRRD). URL: https://www.preventionweb.net/files/60547_pnrrd201820233.pdf

**FIGURE 10.** Risk of riverine flood (upper left), risk of earthquakes (upper right); risk of landslides (lower left); and risk of water scarcity (lower right)[38]




[38] ThinkHazard! (2020). Argentina. URL: https://www.thinkhazard.org/en/report/12-argentina

### *Gender*

An increasing body of research has shown that climate-related disasters have impacted human populations in many areas including agricultural production, food security, water management and public health. The level of impacts and coping strategies of populations depends heavily on their socio-economic status, socio-cultural norms, access to resources, poverty as well as gender. Research has also provided more evidence that the effects are not gender neutral, as women and children are among the highest risk groups. Key factors that account for the differences between women's and men's vulnerability to climate change risks include: gender-based differences in time use; access to assets and credit, treatment by formal institutions, which can constrain women's opportunities, limited access to policy discussions and decision making, and a lack of sex-disaggregated data for policy change.[39]

## Implications for DRM

The Argentinian government is committed to strengthening its capacity to manage and reduce disaster risks and to continue to increase awareness and adaptive capacity amongst at-risk populations. The country's disaster risk management (DRM) approach includes broad communication and risk-management practices as well as direct support to promote the integration of provinces, municipalities and communities as well as non-governmental organizations and civil society throughout the whole cycle of the country's Disaster Risk Management strategies. The country's National Plan for Disaster Risk Reduction 2018–2023 focuses on information dissemination and training to raise awareness of the hazards and identify vulnerabilities to improve safety conditions and increase communities' resilience capacity.[40] Disaster risk management in Argentina recognizes the need to integrate environmental, climate change, and land use and water resource management into DRM process. Specific projects, such as the 'Flood Risk Management Support for the City of Buenos Aires' (approved in 2016), are aimed at supporting greater efficiency in addressing flood risk management for critical infrastructure, economic zones and human settlements, while also addressing the different risks and impacts experienced for both men and women.[41]

[39] World Bank Group (2016). Gender Equality, Poverty Reduction, and Inclusive Growth. URL: http://documents1.worldbank.org/curated/en/820851467992505410/pdf/102114-REVISED-PUBLIC-WBG-Gender-Strategy.pdf

[40] Argentina (2018). Plan nacional para la reducción del riesgo de desastres 2018–2023 (PNRRD). URL: https://www.preventionweb.net/files/60547_pnrrd201820233.pdf

[41] World Bank Group (2020). A Data-Driven Framework to address Gender Issues in Managing Flood Risks – Flood Risk Management Support Project for the City of Buenos Aires, Argentina. Water Guidance Note. Global Water Security and Sanitation Partnership. URL: https://openknowledge.worldbank.org/handle/10986/34375

# Agriculture

## Overview

Agriculture is a critical source of export earnings and food security in Argentina. The sector still accounts for 6% of the country's GDP; rainfed agriculture is responsible for 87% of the sector's value.[42] Approximately 75% of Argentina's farms are 'family farms; and they account for roughly 18% of the agricultural land and 27% of total agricultural output.[43] The country is known for having highly fertile plains, with two-thirds of the country having arid or semi-arid land. The majority of the country's agriculture occurs in the fertile plains in the east and in the highly irrigated valleys at the foot of the Andes Mountains. Argentina has a diversified industry; agriculture and its direct manufactures contribute up to 55% of the country's export revenue.[44] The country is dominated by small-scale producers, but also has medium and large-scale commercial operations. Given Argentina's diverse topographies and climates, the country's farming systems have developed for their specific regions.[45] The temperate mixed (Pampa) farming system in Eastern and Central Argentina occupies almost 36% of the country's total land area. This area is known for its very fertile soils, which allow for extensive and intensive livestock and crop (primarily maize, soybean, and wheat) production, especially in the provinces of Buenos Aires, Córdoba, and Santa Fe. The area is dominated the use of mechanization in the Pampas prairies.[46] In Southern Argentina (Patagonia), pastoral farming extends across more than 20% of the country. The climate is drier and cooler than in the Pampa region and, given the scarce reported irrigation resources for crop production, sheep and cattle ranching is the main agricultural activity. Irrigation is estimated to benefit just 5% of Argentina's agricultural area.[47] The irrigated farming systems in the West have allowed for the intensification of agriculture in the region, which has generally been commercially oriented (grapevines). The cereal-livestock (Campos) farming system in Northeastern provinces (Misiones, Corrientes, and Entre Ríos) is a relatively new agricultural region. The area is oriented towards livestock production but also produces tea, mate leaves, citrus, rice, and, to a lesser extent, maize, sunflower, sorghum, and wheat. The high-altitude areas have mixed (Central Andes) farming systems in the Northwestern provinces (Jujuy, Salta, Catamarca, la Rioja, San Juan) and is mainly dedicated to the production of sugarcane, tobacco, horticulture, and tropical fruit. Extensive dry land, mixed (Gran Chaco) farming system in the Northern provinces (Formosa, Chaco, Santiago del Estereo) is considered less suitable for crop production.[48] However, significant potential exists to expand irrigation, as well as increase efficiency in existing irrigation infrastructure to complement rainfed crops and improve agricultural opportunity in water stressed and arid agricultural areas.[49]

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[42] World Bank Group (2021). Argentina Water Security Assessment – Valuing Water. (Unpublished)
[43] FAO (2021). Argentina. World Agricultural Watch. URL: http://www.fao.org/world-agriculture-watch/our-program/arg/en/
[44] Barros, V. et al. (2014). Climate change in Argentina: trends, projections, impacts and adaptation. *WIREs Clim Change* (2014). DOI: 10.1002/wcc.316
[45] OECD (2019). Agricultural Policies in Argentina. Trade and Agricultural Directorate Committee for Agriculture. TAD/CA(2018)9/FINAL. URL: https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=TAD/CA(2018)9/FINAL&docLanguage=En
[46] OECD (2019). Agricultural Policies in Argentina. Trade and Agricultural Directorate Committee for Agriculture. TAD/CA(2018)9/FINAL. URL: https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=TAD/CA(2018)9/FINAL&docLanguage=En
[47] World Bank Group (2021). Argentina Water Security Assessment – Valuing Water. (Unpublished)
[48] World Bank; CIAT; CATIE (2014). Supplementary material to Climate-Smart Agriculture in Argentina. CSA Country Profiles for Latin America Series. Washington D.C.: The World Bank Group. URL: https://assets.publishing.service.gov.uk/media/57a089dce5274a27b20002d5/Supplementary-material_Argentina.pdf
[49] World Bank Group (2021). Argentina Water Security Assessment – Valuing Water. (Unpublished)

Land use changes in Argentina have been largely related to the expansion of its agricultural area into pastures and forests in marginal areas (Northeast and Northwest) and the replacement of cereals with oil-seeds, among others. Cropland area has increased significantly and crop production has increased fivefold in the past three to four decades, trends driven by the increased value of crops relative to livestock. More crops are now produced and higher yields obtained, while livestock activities have been replaced or shifted to marginal areas less suitable for agricultural activities such as the semiarid areas of San Luis, Mendoza, the Northwest, (Salta, Tucuman, Santiago del Estereo), and the Northeast (Chaco, Formosa, Corrientes). Maize production has increased almost four times, and wheat production has doubled. Since 2004, production dramatically decreased following agricultural policies such as high export taxes that discouraged producers from exporting wheat.[50] Soybeans, a crop introduced to Argentina in the early 1970s, gained popularity rapidly due to the increased international demand; current production is dominated by multinational corporations. Land used for soybean has seen the largest change, from 2 million hectares in 1980 to 20 million hectares in 2017.[51]

## Climate Change Impacts

Argentina's agriculture sector is considered to be at high-risk to climate variability and change given the wide range of extreme events that the country regularly experiences, including floods and droughts, as well as rising temperatures and desertification (in some areas, exacerbated by deforestation and poor land use practices). However, in certain areas, agricultural opportunity is expected to increase. In the majority of the country's humid pampas, and increase in rainfall as well as extreme rainfall events is expected in both quantity and intensity, leading to an expected increase in flood risks. Appropriate water management can reduce those risks, while also increasing water availability for the region, boosting production. The government has projected the amount of water available for soybeans, maize, wheat, sunflower and cotton, the main crops, which in most of the country are produced without irrigation, to be maintained until the 2040s. However, increasing drought is likely for key livestock zones.[52]

It is estimated that soybean and corn yields may increase considerably, with wheat production reducing slightly. This is due to the anticipated increase in summer rainfall (December to February), which favors soybean and crop production in the Pampean region. While a reduction of spring rainfall and a prolonged dry winter period will impact wheat produced in the central zones of the country.[53] In northern Patagonia, fruit and vegetable growing could be negatively affected in the future because of a reduction in the available water for irrigation from rivers as well as expanded temperature variability and freezing temperatures occurring during growing seasons.[54] Increases in water demand due to population growth, and reduction of river stream flows, changes to glacial melt and increasing demand on primary water sources, are likely to lead to additional necessity and use of ground water for irrigation, potentially increasing costs for irrigation costs.[55]

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[50] Sly, M. (2017). The Argentine portion of the soybean commodity chain. Nature, Palgrave Communications. 3:17095. DOI: 10.1057/palcomms.2017.95

[51] OECD (2019). Agricultural Policies in Argentina. Trade and Agricultural Directorate Committee for Agriculture. TAD/CA(2018)9/FINAL. URL: https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=TAD/CA(2018)9/FINAL&docLanguage=En

[52] Gutman, D. (2019). Does Climate Change Offer New Opportunities for Agriculture in Argentina? IPS New Agency. [February 25, 2019]. URL: http://www.ipsnews.net/2019/02/climate-change-offer-new-opportunities-agriculture-argentina/

[53] Argentina (2015). Third National Communication to the United Nations Framework Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Argnc3.pdf

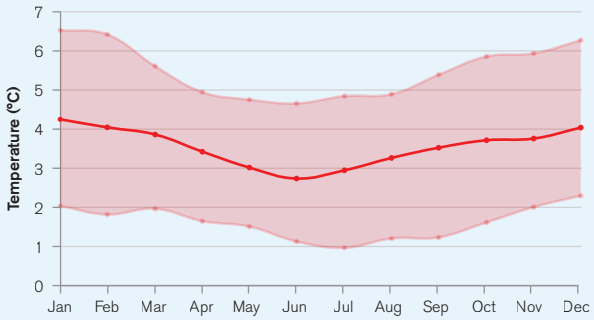
[54] Barrio, R. et al., (2021). Climate change impacts on agriculture's southern frontier-Perspectives for farming in North Patagonia. International Journal of Climatology. DOI: https://doi.org/10.1002/joc.6649

[55] World Bank Group (2021). Argentina Water Security Assessment – Valuing Water. (Unpublished)

Livestock, mainly cattle, is expected to reduce in productivity in the northern and central regions, with potential to increase in the west. This is largely associated with the reduction of foraging opportunities due to projected increase in direness in the regions. Livestock displacement is also considered likely and a high-risk, given the increases in temperatures in the eastern regions.[56]

Increasing temperatures and the projected increase in evapotranspiration is of concern for the country's farming region, particularly the Central Andes and the central region of the typically humid-Pampas. Most significant changes in temperature are expected to be experienced in the north and northwest of the country.[57] Rising temperatures, particularly daily maximum temperatures, pose an increased risk of heat stress for livestock and could significantly reduce critical crop yields for agricultural communities. Under present climate conditions, heat stress already poses challenges for heat dissipation in livestock populations, rendering them vulnerable to heat stress during certain periods of the year. Heat stress can reduce milk production and reproduction, particularly for cattle. As heat increases, so does the likelihood of altered growing seasons. **Figure 11** shows the projected change in average daily maximum temperatures for Argentina across the seasonal cycle. What is clear is that higher maximum temperatures are expected throughout the year.

**FIGURE 11.** Average daily max temperature for Argentina (RCP8.5, Reference Period, 1986–2005)[58]




## Adaptation Options

Argentina is committed to increasing awareness of climate change impacts throughout its agricultural communities and increasing the provision of quantified information and adaptation options. This includes improved monitoring of water resources and economic evaluations. Technical assistance and training may be provided for specific regions where changing crop type production maybe advised to adapt to long-term climate change trends.[59] Additional adaptation strategies can include varietal changes to certain crops or aligning planting dates with evolving rainfall patterns. Irrigation systems to supplement water supplies during dry periods could help to reduce the risk from droughts to key crops, especially areas impacted by rivers flows and changes to glacial melt. Increased investment, insurance and credit options should be implemented to promote investments in climate impact assessments, funding smallholder adaptation pilots, financing and expanding national extension mechanisms to achieve an

[56] Argentina (2015). Third National Communication to the United Nations Framework Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Argnc3.pdf
[57] World Bank Group (2021). Argentina Water Security Assessment – Valuing Water. (Unpublished)
[58] WBG Climate Change Knowledge Portal (CCKP, 2021). Argentina Agriculture. Dashboard URL: https://climatedata.worldbank.org/CRMePortal/web/agriculture/crops-and-land-management?country=ARG&period=2080-2099
[59] Argentina (2020). Second Nationally-Determined Contributions of the Argentine Republic. Ministry of Environment and Sustainable Development, Argentine Republic. URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Argentina%20Second/Argentina_Segunda%20Contribución%20Nacional.pdf

adequate level of technology transfer to rural producers, and establishing agricultural insurance mechanisms for smallholder farmers, especially in response to increasing risks form natural disasters such as floods and droughts. While Argentina's agricultural risk management system has significant strengths, expanded access and opportunity with co-operative structures can further support diverse and broad agricultural value chains.[60]

# Coastal Zones and Sea Level Rise

## Overview

Argentina's coast (4,989 km) support numerous important economic activities for the country, including commercial activities, ports, fishing, hydrocarbon extraction as well as providing important tourists destination and activities. The coasts of Argentina are dominated by high cliffs or stepped terrain near the shore. For that reason, although the situation of these coasts under the projected 21st century scenarios of sea-level rise (SLR) have not been studied in detail, it is not expected that significant loss of land would result from permanent flooding. However, low-lying cities and ports are expected to be impacted, such as, tidal islands south of the city of Bahía Blanca in the extreme south of the Province of Buenos Aires.[61]

## Climate Change Impacts

Projected climate change trends could affect key maritime activities in Argentina due to increasing water temperatures, changes in the circulation of ocean currents and the rise in mean sea level. Fishing opportunities are expected to benefit through a moderate warming scenario. The majority of maritime coasts in Argentina are not expected to suffer permeant floods in the 21st century, the tidal flats on the coast south and Bahía Blanca and the enclaves of Bahía Anegada and San Blas are likely to experience significant coastal flooding. Beaches surrounded by cliffs or sand dunes are expected to gradually lose their extension; reducing productivity for the tourism industry. In some environments, such as coastal wetlands, salt marshes, and other ecosystem services are likely to be affected. The Coastal lagoon of Mar Chiquita and the coastal sector between Bahía Blanca and Bahía San Blas in the province of Buenos Aires, and the northern coast of Golfo San Matías. Coastal erosion is also a concern, especially for the beaches along Buenos Aries coastline, coasts north of the Río Negro, south of Chubut and north of Santa Cruz.[62]

While the Argentine coast is not very high, in a scenario of increasing mean sea level of 0.50 m, very likely in this century, only a narrow strip one or two kilometers from the southern coast of Samborombón Bay would be flooded permanently. In this area, the nature of the soil is not very firm, which can speed up the process of retreating the coast. With the exception of this area, in the rest of the Argentine coast, the rise in sea level will manifest itself with

[60] OECD (2019). Agricultural Policies in Argentina. Trade and Agricultural Directorate Committee for Agriculture. TAD/CA(2018)9/FINAL. URL: https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=TAD/CA(2018)9/FINAL&docLanguage=En

[61] Barros, V. et al. (2014). Climate change in Argentina: trends, projections, impacts and adaptation. *WIREs Clim Change* (2014). DOI: 10.1002/wcc.316

[62] Argentina (2015). Third National Communication to the United Nations Framework Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Argnc3.pdf

the worsening of recurrent floods due to the effect of associated storms with strong winds from the southeast, especially when overlapping with major astronomical tides. Coastal erosion and saline intrusion is of significant concern for coastal areas and communities. Projections indicate the country may lose up to 3,700 km of its sandy coastline by the end of the century.[63]

The Río de la Plata is a freshwater estuary, which flows out to the sea, increasing sea levels will increase salinization up the river. As such, it is expected that Argentina's greatest human impact of SLR will occur through the increased recurrence and spatial reach of storm surges on the Plata River coastal areas, including those of the Greater Buenos Aires city. Presently, in this city nearly 200,000 people are potentially affected by storm surges with an average recurrence of one in 20 years. In the SLR scenario of 50 cm, this number would be near tripled. This is a conservative estimate because it assumes no demographic growth, an outcome which according to current trends is highly unlikely.[64]

## Adaptation Options

For Argentina's at-risk coastal areas, maritime and coastal protected areas are being established to recognize and protect their important ecological value (Marine Protected Areas, National Law 27.037). Additionally, since 2014, the System of National Marine Protected Areas has increase protected areas from 43 to 56, expanding coverage area from 16,000 $km^2$ to over 54,000 $km^2$ (accounting for 85% in marine areas and 15% in land areas). Four provincial research are located in the Río de la Plata and its coasts. Protecting its coasts and sea biodiversity has been strengthened through the country's National Strategy on Biodiversity and its Action plan 2015–2020.

However, the coasts, specifically those of the Río de la Plata will be affected by sea level rise, with intrusion felt most pronounced in the south of Samborombón bay. Much of the rest of the areas coastal zones are expected to experience an increase and greater occurrence of flooding caused by storm surge. Given the recognized severity of these risks, national and local governments have increased regulation in regards to coastal area buildings to secure future investments from damaging storms and rising water levels.[65] Additional adaptation strategies could focus on land use changes to reduce flooding and sedimentation, as well as adapting of homes and infrastructure in response to erosion and flooding. Argentina has committed to supporting investigation to better understand and identify hot spots of coastal risks, along with their stressors, in order to prioritize actions.[66]

[63] World Bank Group (2021). Argentina Water Security Assessment – Valuing Water. (Unpublished)
[64] Argentina (2015). Third National Communication to the United Nations Framework Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Argnc3.pdf
[65] Argentina (2015). Third National Communication to the United Nations Framework Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Argnc3.pdf
[66] Argentina (2020). Second Nationally-Determined Contributions of the Argentine Republic. Ministry of Environment and Sustainable Development, Argentine Republic. URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Argentina%20Second/Argentina_Segunda%20Contribución%20Nacional.pdf

# Energy

## Overview

In 2016, Argentina was the largest dry gas producer and the fourth-largest petroleum and other liquids producer in South America. Natural gas, which is widely used in the country's electricity, industrial, and residential sectors, represents 52% of total primary energy consumption. Oil is the primary fuel used in the transportation sector and represented 36% of total primary energy consumption. A smaller share of the country's total energy consumption can be attributed to nuclear, coal, and hydropower, which are used for electricity generation, while other renewable resources are used to produce biofuels for transportation. Historically, Argentina's energy sector policies have prompted an imbalance of energy supply and demand by limiting the industry's attractiveness to private investors, restraining the profits of domestic producers, and shielding consumers from rising prices. Over the past decade, domestic demand for energy grew rapidly while production of petroleum and other liquids and of natural gas declined, resulting in Argentina becoming a net hydrocarbons importer. The government increased natural gas, gasoline, and electricity prices in 2016 to reduce historically high subsidies for consumers. It intends to further narrow Argentina's energy supply gap, by eliminating natural gas subsidies by 2022, raising domestic prices to attract sufficient investment in production, and becoming energy self-efficient.[67]

Hydropower is the country's second source for generating electricity, after thermal power, and produces 34,000 gigawatts per hour, approximately 29% of the total energy generation share.[68] Argentina has also been aggressively investing in renewable energy. From 2016 through 2019, the government awarded contracts for 6.5 gigawatts (GW) of new renewable energy capacity, helping to make wind and solar the country's cheapest unsubsidized sources of energy. Roughly 5 GW of this capacity is already either in operation or under construction, attracting nearly $7.5 billion in new investment and creating more than 11,000 new jobs. When fully operational, these projects are expected to push renewables to 18% of Argentina's total power supply, significant gain from the 1.8% before 2016.[69]

In 2018, the federal Government created the Government Secretariat of Energy, formerly the Ministry of Energy, which was established under the authority of the Ministry of Treasury. The Secretariat is responsible for regulating natural gas transportation and distribution activities, and oversees upstream oil and natural gas production. Argentina produces approximately 136 billion kilowatt hours (BkWh) of electricity annually and is now the second-largest consumer of electricity in South America, after Brazil.

[67] EIA (2017). Argentina. US Energy Information Administration. URL: https://www.eia.gov/international/analysis/country/ARG
[68] World Bank Group (2021). Argentina Water Security Assessment – Valuing Water. (Unpublished)
[69] Marcacci, S. (2019). Argentina may be the hottest renewable energy market you haven't heard of. Can it spur a global boom? Energy Innovation: Policy and Technology. Forbes. URL: https://www.forbes.com/sites/energyinnovation/2019/10/15/argentina-may-be-the-hottest-renewable-energy-market-you-havent-heard-of-can-it-spur-a-global-boom/?sh=cb8880feeb2d

## Climate Change Impacts

Economic growth in Argentina, industrial expansion, urbanization, and population growth have greatly increased electricity demand. The Argentinian energy generation systems are expected to be increasingly and significantly affected by climate change trends and conditions relating to extreme events. Increasing demand is already placing distribution and network challenges for densely populated urban centers. Significant impacts are also expected for the country's hydroelectric generation capabilities due to changes in river flows and infrastructure networks, which may be at risk due to severe winds.

Hydroelectric production capacities depend on volumes of water availability, which is likely to decrease under projected future climate scenarios.[70] Current installed hydroelectric power generation is 11,107 megawatts (MW) and the generation of hydraulic flow depends on the flow rates and changes to hydraulic dams that are reliant on water flows from precipitation patterns. Climate variability influences the hydraulicity and generation percentages have fluctuated between 29% and 35% in recent years. Dams on the Parańa and Uruguay rivers are significant components to this generation and are not expected to experience significant impacts as river flows do not experience great variation throughout the year. However, hydrological trends in western regions are largely opposite of those in the Plata basin. River flows for the Mendoza and San Juan have experienced negative trends throughout the last century, largely due to strong interannual and interdecadal variations. Projected changes are expected to also increase energy demand, directly in relation to increased demand for cooling due to increased temperatures. Extreme temperatures (particularly for Buenos Aires) are expected to add additional complexities for generation and transmission networks. Risks from increased temperatures and potential supply disruption are especially risky for vulnerable populations.[71]

Cooling Degree Days show the relationship between daily heat and cooling demand, typically sourced through a form of active cooling or an evaporative process. The change in cooling degree days provides insight into the potential for extended seasons of power demand or periods in which cooling demand (power demands) will increase. As seen in **Figure 12**, seasonal increases for cooling demands are expected to increase throughout the year. The Warm Spell Duration Index represents the number of days in a sequence of at least six days in which the daily maximum temperature is greater than the 90th percentile of daily maximum temperature. As shown in **Figure 13**, warm spells are expected to sharply increase in the second half of the century.

[70] World Bank Group (2021). Argentina Water Security Assessment – Valuing Water. (Unpublished)
[71] Argentina (2015). Third National Communication to the United Nations Framework Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Argnc3.pdf

**FIGURE 12.** Change in Cooling Degree Days (degree days –65°F) in Argentina (Reference Period, 1986–2005)[72]

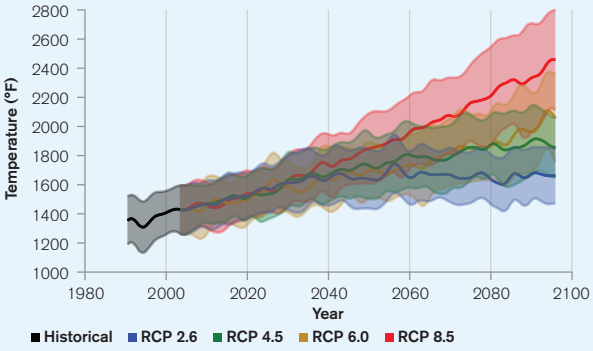
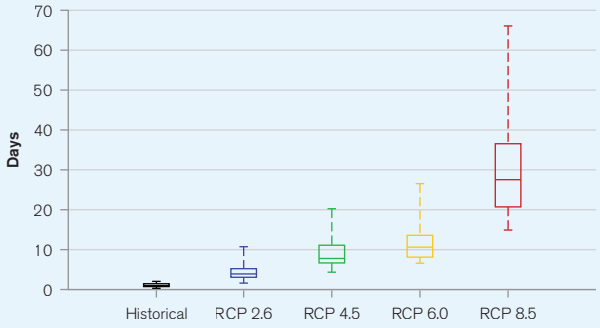



**FIGURE 13.** Projected change in Warm Spell Duration Index in Argentina for the period 2080 to 2099 (Reference Period, 1986–2005)[73]




## Adaptation Options

The population is already heavily reliant upon extensive use of air conditioning. Extreme heat can lead to service disruptions and failures due to an overload of demand; heat waves are the most common event resulting in service disruptions. While investments in energy generation have increased, key investments in distribution networks need to be scaled up to meet growing demands. This current mismatch has resulted in growing challenges throughout the sector.[74]

Adaptation options for the hydropower sector should focus on improved water resource management under changing conditions. Additional investments may need to be made in building more storage capacity, improving turbine efficiencies or other engineering measures to make efficient use of available resources. Integrated water use management will be required as competing demands for water begin to come into play through increased demand for water for other uses such as irrigation and urban demands. Increased investments should also continue to be made for other sources of renewable energy generation through solar power and wind.[75]

[72] WBG Climate Change Knowledge Portal (CCKP, 2021). Argentina – Energy. URL: https://climateknowledgeportal.worldbank.org/country/argentina/climate-data-projections

[73] WBG Climate Change Knowledge Portal (CCKP, 2021). Argentina – Energy. URL: https://climateknowledgeportal.worldbank.org/country/argentina/climate-data-projections

[74] Argentina (2015). Third National Communication to the United Nations Framework Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Argnc3.pdf

[75] EIA (2017). Argentina. US Energy Information Administration. URL: https://www.eia.gov/international/analysis/country/ARG

# Health

## Overview

Argentina's health system is one of the most fragmented and segmented in the Americas and includes public and private sectors and the social security sector. Such fragmentation is largely determined by the country's federal structure, in that each of the 23 provinces functions independently and has constitutional responsibility for the leadership, financing, and delivery of health services.[76] Approximately 36% of the population does not have any formal coverage and receives its healthcare through the public system and approximately 16% afford private coverage. Argentina's health system's fragmentation falls into three broad areas: i) coverage, not all the population has access to the same health benefits and services; ii) regulatory functions, leadership and regulatory authority are spread throughout 24 jurisdictions and various subsectors; and iii) geographic disparities, given the extreme economic-development differences from region to region. Thus the national health authority, given the resources it administers and the federal structure, is limited in how effectively it can require provincial governments to adhere to new national legislation.[77] Argentina's sub-tropical climate is highly appropriate for transmission of vector-borne diseases such as dengue, malaria, chikungunya, zika, and leishmaniasis.[78]

## Climate Change Impacts

Argentina's geographic location and climate profile puts the country particularly at his risk to projected climate change trends impacting the country. Rising temperatures are particularly problematic, for example, mean annual temperature were observed to increase by 0.5°C and by 1°C in the Patagonia region over the past 50 years. This projects up to a 2°C and 4°C increase in the south and north of the country. This is expected to bring higher levels of hydric stress and increased drought, and desertification.[79] The incidence of waterborne diseases and the distribution of food and vectors could be affected. Rising temperatures will expand the range, seasonality and distribution of vector-borne illnesses such as malaria and zika into higher elevation areas. Projection models show a potential spread of these disease to migrate south and west, likely resulting in the number of people exposed to the disease could triple by the end of the century. Populations living around irrigate areas are nearly six times more at risk. Projections also indicate more variable rainfall, rising seas and more frequent extreme weather events. Increases in pollution and associated respiratory illnesses are also expected to increase with rising temperatures.[80]

[76] PAHO (2017). Argentina. Health in the Americas. URL: https://www.paho.org/salud-en-las-americas-2017/?p=2706
[77] Novick, G. (2017). Health Care Organization and Delivery in Argentina: A case of fragmentation, inefficiency and inequality. Global Policy. 8(2), 93–96. DOI: 10.1111/1758-5899.12267
[78] Argentina (2015). Third National Communication to the United Nations Framework Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Argnc3.pdf
[79] PAHO (2017). Argentina. Health in the Americas. URL: https://www.paho.org/salud-en-las-americas-2017/?p=2706
[80] Argentina (2015). Third National Communication to the United Nations Framework Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Argnc3.pdf

Rising temperatures year-round will bring a more pronounced heat season with more frequent and intense heatwaves becoming a 'new normal'. **Figure 14** shows the expected Number of Days with a Heat Index >35°C through the 2090s; showing to a sharp acceleration by mid-century and continue to sharply increase under a high-emission scenario (RCP 8.5) through the end of the century. Heat discomfort and heat stress increases mortality and morbidity for the most vulnerable, especially the elderly, children and pregnant women. Additionally, children's learning ability significantly decreases with increased heat exposure. **Figure 15** shows that tropical nights, minimum temperatures (>20°C), will follow a similar warming as days with a high heat index, rising rapidly under a high-emission scenario (RCP8.5).

**FIGURE 14.** Days with a Heat Index >35°C (Reference Period, 1986–2005)[81]

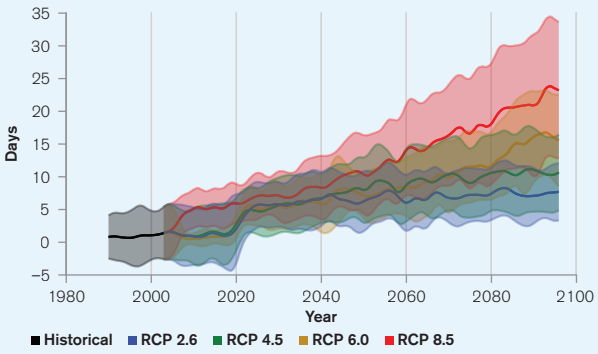
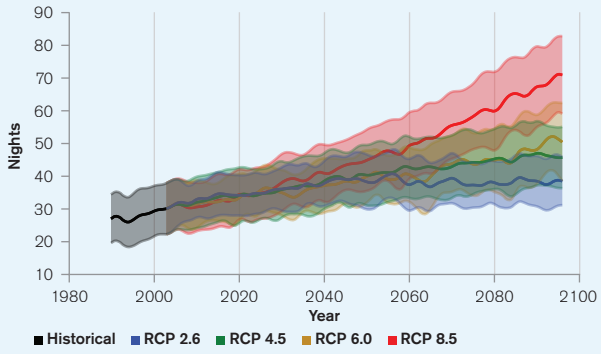



**FIGURE 15.** Number of Tropical Nights (Tmin >20°C) (Reference Period, 1986–2005)[82]




## Adaptation Options

Total health care spending in Argentina constitutes over 8.5% of GDP, one of the highest in Latin America, and while the entire population has access to the services provided by the public sector, significant gaps in regards to access remain. New challenges from demographic changes and new epidemiological patterns, has increased pressure for the Argentinian government to increase implementation of sustainable, effective strategies to combat poverty-related problems and improve living conditions. Additionally, the implementation of control programs, will help reduce indicators of morbidity and mortality from vector-borne as well as communicable diseases.[83] Increased awareness of health care personnel regarding the impacts of climate change and projected variability seasonal should be prioritized. Argentina has committed to investing in early warning systems and increasing its health climate services as well as broadening its communication efforts in regards to expected new health risks and possible disease expansion.[84]

[81] WBG Climate Change Knowledge Portal (CCKP, 2021). Argentina Health Sector Dashboard. URL: https://climatedata.worldbank.org/CRMePortal/web/health/systems-and-service?country=ARG&period=2080-2099

[82] WBG Climate Change Knowledge Portal (CCKP, 2021). Argentina Health Sector. URL: https://climateknowledgeportal.worldbank.org/country/argentina/climate-sector-health

[83] PAHO (2017). Argentina. Health in the Americas. URL: https://www.paho.org/salud-en-las-americas-2017/?p=2706

[84] Argentina (2020). Second Nationally-Determined Contributions of the Argentine Republic. Ministry of Environment and Sustainable Development, Argentine Republic. URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Argentina%20Second/Argentina_Segunda%20Contribución%20Nacional.pdf

# Transport

## Overview

The transport sector is a vital part of Argentina's economy. The gross value added of the transport sector contributed 271 billion pesos[85] to the national total in 2016, representing 4.4%. In relation to employment, it generated 482,103 jobs registered in 2016, or 7.4% of the total generated in the private sector during that year.

Road transport is the main mode of transport in Argentina and, in 2015, concentrated almost 90% of total long-distance freight transport. By comparison, the railway moves just over 5% of the total volumes, measured in ton-kilometers, and river and air transport has a marginal share of 1.5 per cent each. The national and provincial road network has a total length of 240,000 km, of which only 81,355 km (34 percent) are paved. The primary network, with a length of 40,290 km (of which 90 per cent is paved but only 38 per cent is in good condition) and an asset value estimated at USD 45.3 billion, concentrates two-thirds of the total transit volume. As the main lifeline of economic activity, primary routes facilitate trade and allow greater access to rural and urban areas. Therefore, increased efficiency in the primary road network sector is crucial to improving the performance of the transport sector in general.

In terms of transport of passengers, the urban transport system is vital for the Metropolitan Area of Buenos Aires, which has 138 passenger transport lines with urban services with 9,892 vehicles, moved 1,620 million passengers in 2016. The number of passengers by road intercity transport services in 2015 amounted to 37.2 million. As for intercity railways, in the first six months of 2016, the passengers transported amounted to 1.8 million. The air mode, for its part, carried 11.4 million passengers in 2016, according to data from the Argentine Air Navigation Company (EANA).

## Climate Change Impact

Argentina is a very hazard prone country, with flooding being the most widespread hazard responsible for about 22.5 billion USD economic losses since 1980 and 58% of all economic losses caused by natural disasters from 1966–2015[86]. Such losses could increase in the future with projected climate change related threats estimated to potentially impact between 4.5–7% of Argentina's GDP[87]. Amongst others, transport systems in Argentina are severely affected by widespread flooding, resulting in major incidents where road failures have led to communities being isolated in one instance and increasing transport logistic costs in another[88]. The continued provision of transport is critical to facilitating access to services, markets and key trade routes across the country.

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[85] Plan de Accion Nacionla del Transporte y Cambio Climatico (2017). Version 1 – 2017. Ministerio de Medio Ambiento y Desarrollo Sustenable, Ministero de Transportes y Presidencia de la Nacion. URL: https://www.argentina.gob.ar/sites/default/files/plan_de_accion_nacional_de_transporte_y_cc_1.pdf

[86] Swiss Re (2016). Staying Afloat – Flood Risk in Argentina. URL: https://reliefweb.int/sites/reliefweb.int/files/resources/Swiss_Re_Argentina_Flood_Risk_Publ_long.PDF

[87] Economic Commission for Latin America and the Caribbean (ECLAC) (2014). La Economía del Cambio Climático en la Argentina. URL: https://repositorio.cepal.org/handle/11362/35901

[88] Raffo, V., Santos, P. and Kesete, Y. (2018). Transport and cliamte change: Putting Argentina's resilience to the test, World Bank Blogs. [19 September, 2018]. URL: https://blogs.worldbank.org/transport/transport-and-climate-change-putting-argentina-s-resilience-test

Argentina's transport sectors need to be prepared for increasingly extreme flooding exposures, which will be magnified in the future with increasing frequencies due to climate change. Transport network exposures to extreme fluvial and pluvial flooding are extensive in Argentina. As high as 7,200–8,400 kilometers of roads, 300–320 kilometers of railways, 476–663 (12%–17% of total) national-roads bridges, 10–33 significant ports, and 7 significant airports are found to be exposed to the most intense 1 in 1000-year fluvial and pluvial flooding in current conditions. These estimates grow by as much as 5.7%–19.1% for roads, 1.9%–22.6% for railways, 2.7%–14.8% for national-roads bridges, 9.1%–60% for waterway ports, 14.3%–50% for airports across future median and future high climate outlooks.[89]

### Adaptation Options

New transport infrastructure must take into account climate change impacts that have been registered throughout the last decades, and that are expected to affect the network in the years to come. In 2016, during the National Climate Change Cabinet (GNCC — Gabinete Nacional de Cambio Climatico) a number of adaptation measures were identified for the transport sector: (1) Mapping climate risks and vulnerabilities as a diagnostic tool for the State to support and monitor climate change adaptation, (2) Quantifying the economic value of the climate change impacts and the implementation of adaptation measures, (3) Increase capacity and inter-agency collaboration for planification and management of climate change adaptation (involving MoT, DNV, Secretaría de Planificación Territorial y Coordinación de Obra Pública, Secretaría de Planificación de Cargas and INDEC) , (5) Creation of multidisciplinary teams to support the different ongoing or planned initiatives , and (6) Development of works and services to prevent floods, droughts and heatwaves.

## Water

### Overview

Argentina is endowed with abundant water resources and is home to one of the world's largest water basins, the Río de la Plata River Basin. Argentina is also home to one of the world's largest aquifers, the 1.2 million $km^2$ Guaraní aquifer; 19% of which (225,500 $km^2$) is within Argentina's jurisdiction. Significant volumes of Argentina's natural water capital flow from outside the country from the Paraná, Paraguay, and Uruguay rivers: more than 700 $km^3$ a year in external surface resource. However net volumes generated within the country amount to just 140 $km^3$ per year.[90] There are other additional, large, exploitable aquifers, especially in the western provinces, which particularly depends this supply source due to the aridity of the area and strong agricultural activity in the region.[91] However, Argentina's significant water resources are unevenly distributed; 85% of the total surface water available in the country is found in the territory of the Río de la Plata River Basin, where the majority of the country's population and economic activity are concentrated. In the very arid and semiarid provinces, San Juan and La Rioja, there is very little annual rainfall with less than 1% of available surface runoff.

[89] ITRC (2019). Transport Risk Analysis for Argentina – Final Report. Oxford Infrastructure Analytics Ltd. May 2019. URL: https://www.itrc.org.uk/casestudies/argentina-transport-risk-analysis/

[90] World Bank Group (2021). Argentina Water Security Assessment – Valuing Water. (Unpublished)

[91] Barros, V. et al. (2014). Climate change in Argentina: trends, projections, impacts and adaptation. *WIREs Clim Change* (2014). DOI: 10.1002/wcc.316

The contribution of groundwater to total water withdrawal is approximately 30%. But in addition, groundwater also ensures a multi-annual and inter-annual regulation of water resources, resulting in increased availability of water in times of drought. The use of these aquifers is limited, though, due to their quality (many are affected by human and/or natural pollution) and vulnerability (overexploitation of the resources and increasing pollution). Since 1995, water abstractions have increased by over 30%, reflecting both population growth and economic development and difficulties to decouple water demand from macroeconomic and demographic patterns. Argentina's economy faces significant threats from periodic episodes of "too little" and "too much" water. Flooding is the greatest natural disaster threat in Argentina, causing 60% of all natural disaster events and 95% of economic damages due to disaster events. Droughts have also had a significant impact on Argentina's economy in recent years, in particular in the agricultural sector.[92]

## Climate Change Impacts

Argentina faces surface and groundwater quality challenges, which represent an increasing threat to the ecological status of the country's water resources and a sustainable pattern of water supply. The primary source of pollution in surface water bodies is the discharge of household and industrial wastewater effluents without adequate treatment. Unsustainable agricultural practices, deforestation, use of agrochemicals and land-use changes, particularly the impact of urbanization, have also affected the water balance and the quality of water resources. The increase in the quantity of suspended solids due to greater water erosion because of deforestation, overgrazing or bad management of arable land is an issue in the province of Misiones and some of the surrounding areas of the Bermejo River Basin. Additionally, pesticides have been detected in the waters of the Uruguay River. Other surface water reservoirs such as the Río Hondo reservoir in the province of Santiago del Estero or the San Roque and Los Molinos Lakes in the province of Córdoba are polluted as a result of the discharge of untreated sewage water, originating in nearby urban and industrial settlements. In semi-arid and arid areas, inefficient irrigation and drainage systems are the source of salinization of water resources and land, representing a serious threat to the sustainability of the agricultural sector given the large share of agricultural land in these conditions.[93]

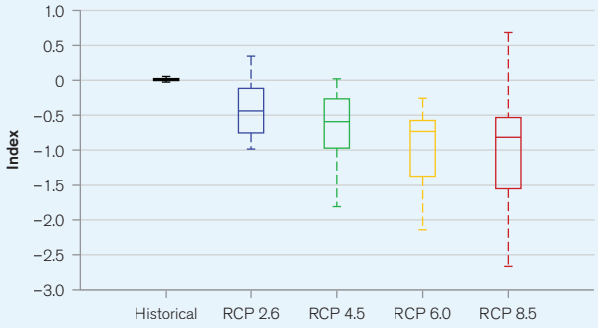
Rainfall distribution patterns are highly varied across the country, with significant aridity experienced in some areas.[94] Projected climate change trends and anticipated change in precipitation patterns in Argentina are further exacerbating the country's water challenges. A combination of factors, such as higher average temperatures over the past 70 years and increasing incidence and severity of drought (i.e. 2017–2018 *La Niña*) are increasing risks of aridity and drought across already arid zones in the country. More intense and frequent rainfall in other areas is

[92] OECD (2019). Water Governance in Argentina. OECD Studies on Water. DOI: https://doi.org/10.1787/22245081
[93] Argentina (2015). Third National Communication to the United Nations Framework Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Argnc3.pdf
[94] World Bank Group (2021). Argentina Water Security Assessment – Valuing Water. (Unpublished)

expected to shift further water availability, uses and demand. More water may be required to irrigate land, while at the same time evaporation in water bodies and reservoirs is likely to intensify with climate change effects, such as increased temperatures. An increase in average precipitation over the Andes region is expected, which will impact water availability in the high-altitude river basins in the regions of northern Mendoza and San Juan. An increase in the frequency of extreme rainfall in much of the eastern and central parts of the country, is expected, which will result in urban flooding, particularly in areas where drainage and urban planning are lacking. An increase of the duration of the dry winter periods in the west and north of the country, impacting water availability and creating more favorable conditions for grassland fires as well as greater stress on cattle.[95]

The projected annual Standardized Precipitation Evapotranspiration Index (SPEI), is an index which represents the measure of the given water deficit in a specific location, accounting for contributions of temperature-dependent evapotranspiration and providing insight into increasing or decreasing pressure on water resources (**Figure 16**). Negative values for SPEI represent dry conditions, with values below –2 indicating severe drought conditions, likewise, positive values indicate increased wet conditions. This is an important understanding for the water sector in regard to quantity and quality of supply for human consumption and agriculture use as well as for the energy sector as reductions in water availability impacts river flow and the hydropower generating capabilities. At national scale, Argentina is expected to experience slightly decreased (–0.82) SPEI through the end of the century, representing slightly drier conditions. While **Figure 13** shows nationally aggregated trends, **Figure 17** shows the spatial representation of SPEI across the country for the periods 2040–2059 and 2080–2099. As shown, the country will experience great regional disparity in terms of its water stress, most acutely occurring in the western and south-central areas in the 2050s and 2090s, respectively.

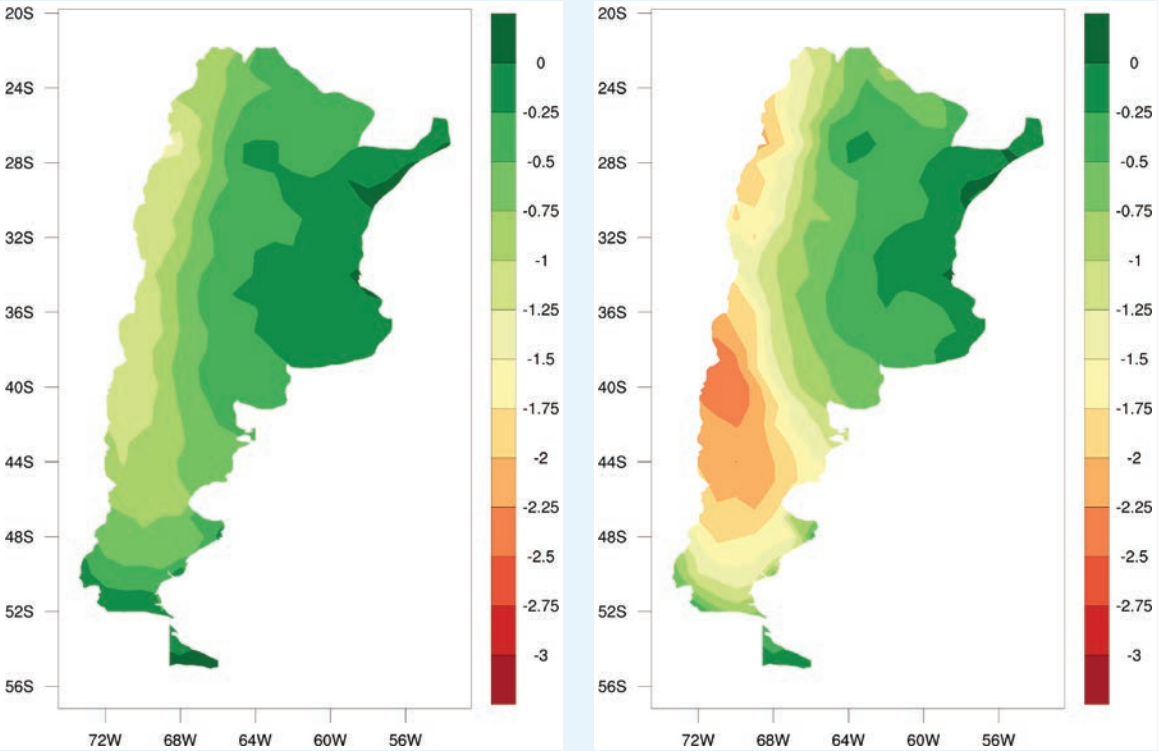
**FIGURE 16.** Annual SPEI Drought Index in Argentina for the period, 1986 to 2099 (Reference Period, 1986–2005)[96]




[95] OECD (2019). Water Governance in Argentina. OECD Studies on Water. DOI: https://doi.org/10.1787/22245081

[96] WBG Climate Change Knowledge Portal (CCKP, 2021). Argentina. Water Sector Dashboard. URL: https://climatedata.worldbank.org/CRMePortal/web/agriculture/crops-and-land-management?country=ARG&period=2080-2099

**FIGURE 17.** Spatial representation of SPEI across Argentina for the period 2040–2059 (left) and 2080–2099 (right), relative to 1986–2005 baseline under RCP8.5




## Adaptation Options

Argentina has made significant steps towards establishing a nationwide plan to deal with its water-related risks as part of a long-term vision. The National Water Plan (NWP) (2016) sets ambitious objectives to place water at the core of economic and social development. By 2023, the national government aims to achieve universal access for drinking water supply and 75% for sewage connections. The NWP also aims to increase protection against floods and droughts through strategic actions that combine both hard infrastructures, such as building flood protection infrastructure in cities or increasing the number of dams, along with better early warning and information systems.[97] In addition, the NWP seeks to support the irrigation needs of the agricultural sector by expanding the cultivated area by 300,000 hectares by 2022 (an increase of 17%). Finally, the NWP is intended as a commitment towards achieving the Agenda 2030, in particular Sustainable Development Goal 6 "Clean water and sanitation", to which Argentina committed for 2030.[98] Beyond the Guiding Principles of Water Policy, there is no policy or regulatory framework, which provides the specifics of integrated watershed management at the river basin level. Improved clarity and streamlined implementation between national and provincial management responsibilities can support more effective and efficient water management as well as territorial development.[99]

[97] Argentina (2020). Second Nationally-Determined Contributions of the Argentine Republic. Ministry of Environment and Sustainable Development, Argentine Republic. URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Argentina%20Second/Argentina_Segunda%20Contribución%20Nacional.pdf

[98] OECD (2019). Water Governance in Argentina. OECD Studies on Water. DOI: https://doi.org/10.1787/22245081

[99] World Bank Group (2021). Argentina Water Security Assessment – Valuing Water. (Unpublished)

## Institutional Framework for Adaptation

Argentina's Ministry of Environment and Sustainable Development is responsible for national action on climate change and reports to the head of the Cabinet of Ministers. Within the Ministry, the Directorate of Climate Change is charged with development of National communications and achieving co-financing form the Global Environment Facility (GEF). The Directorate is supported by the Economic Commission for Latin America and the Caribbean via the EUROCLIMA program to develop, finance and implement adaptation efforts.[100] Additional subgroups include the National Advisory Commission on Climate Change, which comprises various academic and industry experts, and the Gubernatorial Committee on Climate Change, comprised entirely of government entities and co-ordinates cross-sector government actions related to climate change and related adaption efforts.[101] Argentina is also the development of its National Adaptation Plan within the National Climate Change Cabinet. The plan will be based on the priorities identified by all sectors, jurisdictions (represented by the Federal Council of the Environment – COFEMA – and the participation of municipal representatives) and is expected to be relevant actors of the civil society, academia and the private sector. Adaptation meetings with representatives from the national government have been carried out (with the participation of the Ministries of Agro-Industry, Energy, Health, Science, Technology and Productive Innovation, Defense, Security, Finance and Public Finance, Interior and Transportation). A process to review the current policies and programs of public and private investment on adaptation has begun, with meetings on the Extended Cabinet with the participation of all relevant actors. Argentina also engages with its climate change policies and strategies with stakeholders in the public and private sector organizations, including Non-Governmental Organizations (NGOs), civil society, the donor community, and local communities.[102]

## Policy Framework for Adaptation

Argentina submitted its Third National Communication to the UNFCCC in 2015, its Initial Nationally-Determined Contribution (NDC) to the UNFCCC in 2016 and its Second NDC in 2020. Argentina is currently developing its National Adaptation Plan (NAP), with will identify the country's technical capacity needs, at the national and sub-national level as well as at the sectoral level. Argentina is already establishing the basis for its adaptation strategy, which includes tools for decision making and planning of the NAP process, and mechanisms to include local stakeholders, community-based organizations, non-governmental organizations as well as the private sector. Once finalized, Argentina's NAP will facilitate integration of climate change adaptation into the country's existing strategies, policies and programs and in this way facilitate the assessment and reduction of vulnerability to the adverse effects of climate change. The Argentinian government will advance adaptation planning across levels and will raise awareness on adaptation potential and needs as well as disseminate adaptation initiatives being carried out in the country and their respective impacts.

[100] Argentina (2015). Third National Communication to the United Nations Framework Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/Argnc3.pdf

[101] Nachmany, M. et al. (2015). Climate change Legislation in Argentina. The 2015 Global Climate Legislation Study. Grantham Institute – London School of Economics. URL: https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/05/ARGENTINA.pdf

[102] Argentina (2020). Second Nationally-Determined Contributions of the Argentine Republic. Ministry of Environment and Sustainable Development, Argentine Republic. URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Argentina%20Second/Argentina_Segunda%20Contribución%20Nacional.pdf

**National Frameworks and Plans**

- Third National Communication to the UNFCCC (2015) Spanish
- Second National Communication to the UNFCCC (2008) Spanish
- First National Communication to the UNFCCC (1999) Spanish
- Biennial Update Report Three (2019) Spanish
- Biennial Update Report Two (2017) Spanish
- Biennial Update Report One (2015) Spanish
- Second Nationally Determined Communication (2020) Spanish
- Initial Nationally Determined Communication (2016)

# Recommendations

## Research Gaps

- Support research on establishing and expanding inventory-based approaches for estimating greenhouse gas emissions across all sectors to improve Argentina's monitoring of its mitigation and emission reduction goals
- Increased research in to the impacts and costs-benefits of mitigating flood impact, which accounts for population and related vulnerabilities can better support opportunity for urban storm drainage infrastructure and flood resilience measures[103]
- Increase Argentina's monitoring networks, in particular its early alert systems for health, food security, water, energy and disaster risks
- Increase investigation and development of technologies to support environment projects meet the country's mitigation needs
- Increase understanding of vulnerabilities and exposure to climate risks through increased research efforts to better support the management of adaptation to climate change
- Increase research efforts for the economic quantification of the climate change impacts and related implementation of adaptation measures
- Improve engagement of vulnerable populations and address barriers to decision-making
- Incorporate climate resilient considerations in the engineering and design of new infrastructure

[103] World Bank Group (2021). Argentina Water Security Assessment – Valuing Water. (Unpublished)

## Data and Information Gaps

- Develop enhanced early warning systems for increased data on flood-prone areas and coastal zones
- Strengthen the technical capacity to integrate climate change risk management techniques and adaption options for farmers and the wider agricultural sector
- Develop finance instruments and/or market risk transfer mechanisms for the agricultural sector
- Increase climate change awareness throughout the Argentinian population.
- Develop effective communication strategies to broadcast climate change information and related adaptation efforts as well as opportunity for new technologies
- Implement formal and non-formal education programs on impacts, vulnerability and adaptation to climate change.

## Institutional Gaps

- Strengthen and empower water management and local actors should include training and tools to develop individual and collective capacity of the water managers
- Intensify capacity building for human resources and improve inter-institutional coordination for planning and management on adaptation to the climate change.
- Create multidisciplinary teams to support the diverse ongoing or planned initiatives, specifically with the objective of supporting the processes of land management.
- Develop structural and non-structural works to increase prevention of floods, droughts and other natural hazards such as landslides
- Strengthen initiatives that support the recovery and rehabilitation of lands, including the adaptation based in ecosystems.
- Revise current legislation on coastal zone management based on revised seal level rise forecast and exposure[104]

[104] Argentina (2020). Second Nationally-Determined Contributions of the Argentine Republic. Ministry of Environment and Sustainable Development, Argentine Republic. URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Argentina%20Second/Argentina_Segunda%20Contribución%20Nacional.pdf

CLIMATE RISK COUNTRY PROFILE

# ARGENTINA

WORLD BANK GROUP