

# Colombia

This climate fact sheet summarizes the available information on the climate of Colombia and the impact of climate change on humanitarian activities in-country. Each fact sheet in the series was written using information from peer-reviewed academic papers, government publications, and other documentation from international non-governmental organizations.

## 1. Climate overview

**Average temperature:** Columbia is characterized by three climatic zones, defined by the country's topography. The annual average temperature is 24–27°C in the tropical zone along the coast, 18°C in the temperate zones located between 1,000–2,000m in elevation and 13–17°C in the higher elevation areas (>3000m) (World Bank, 2021).

**Average rainfall:** Columbia's climate features one to two rainy and dry seasons, depending on the region (World Bank, 2023). Average annual rainfall is 2,630mm but varies significantly across the country. The Andean interior and the West Pacific coast receive the highest rainfall with 6,000–7,000mm per year. The north and west receive less than 500mm per year (World Bank, 2021)

**Major drivers of climate variability:** 1. El Niño–Southern Oscillation (ENSO); 2. Intertropical Convergence Zone (ITCZ); 3. topography of the Andes mountains along with the influences of the western Atlantic Ocean, eastern Pacific Ocean and the Amazon basin.

**Figure 1:** Observed climatology of mean temperature (a), annual mean total precipitation (b) and monthly climatology (c) over 1991–2020. (Adapted from World Bank, 2022).

**Figure 2:** Observed mean monthly climatology from 1991–2020 (from World Bank, 2021).

## Short overview

Colombia's climate is tropical along the coast and the eastern lowlands, and cooler in the highlands and Andes. The climate variations across the country are influenced by its topography. Due to the influence of the ITCZ, the country experiences a bimodal rainfall season from April to June and October to December. Northern areas have a single rainy season from May to October (USAID, 2017). Spatial variability is determined by the interaction of the ITCZ with the topography of the Andes mountains as well as the western Atlantic ocean, eastern Pacific ocean and the Amazon basin. ENSO creates irregular periodic variation in the temperature as well as sea surface temperature, thus influencing year-to-year variability and extreme weather events such as droughts, floods and heatwaves. El Niño creates warmer and drier conditions than average, whereas La Niña is associated with wetter conditions (USAID, 2017; World Bank, 2021).

The diverse and varied geography of Colombia means that it is exposed to a broad array of environmental hazards (hydrometeorological as well as geophysical) which are directly impacted and exacerbated by the impacts of climate change across the country. Colombia is one of the most vulnerable countries to humanitarian crises and disasters, ranked 29th out of 191 countries by the 2022 Inform Risk Index (DRMKC, 2022). The country is exposed to droughts, tropical cyclones, flooding, flash flooding and landslides along with their associated hazards.

## Climate change in Colombia

### Historical climate

### Projected climate

#### Temperature

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| <ul style="list-style-type: none"> <li>▪ The mean annual temperature over Colombia has increased at a rate of approximately 0.2°C/decade in 1961–2015 (Gutiérrez <i>et al.</i>, 2021b).</li> <li>▪ The frequency and intensity of hot extremes have increased, and cold extremes have decreased (Seneviratne <i>et al.</i>, 2021).</li> </ul> | <ul style="list-style-type: none"> <li>▪ Mean temperatures are projected to rise until 2050 by at least 3–3.5°C for a high greenhouse gas (GHG) concentration scenario (SSP5–8.5) and 2–3°C for low GHG concentration scenario (SSP2–4.5) (Gutiérrez <i>et al.</i>, 2021a).</li> <li>▪ Maximum and minimum temperatures will increase, and heatwaves will intensify in duration and peak temperatures. The annual number of very hot days (above 35°C) is projected to rise dramatically and with high certainty (Gutiérrez <i>et al.</i>, 2021b; Ranasinghe <i>et al.</i>, 2021; Seneviratne <i>et al.</i>, 2021).</li> </ul> |
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#### Precipitation

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| <ul style="list-style-type: none"> <li>▪ While overall trends in mean annual rainfall are unclear, there has been a statistically significant increase in average March and December rainfall in 1960–2005, offset partially by decreases (not statistically significant) in June and April (World Bank, 2021).</li> </ul> | <ul style="list-style-type: none"> <li>▪ There is no consensus on long-term precipitation changes, as some findings point towards overall reductions in rainfall (Gutiérrez <i>et al.</i>, 2021b).</li> <li>▪ The frequency of extreme rainfall days could increase by 26–37 per cent by 2050 (USAID, 2017).</li> </ul> |
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## 2. Priorities of the Red Cross Red Crescent Movement under climate change

### 2.1 Scale up climate-smart disaster risk reduction (DRR), early action and preparedness

#### Observed hazard

##### Flooding

Floods are the most frequent type of adverse event across Colombia. It is estimated that over 12 per cent of national territory is susceptible to flooding (not including coastal flooding), correlating to 28 per cent of the area in which the population resides (World Bank, 2012). Over the period 1970–2011, more than one million dwellings were impacted by natural hazards; 73 per cent of those cases were due to the impact of floods (World Bank, 2012).

#### Projected risk

##### Flooding

Flooding is projected to account for 66 per cent of future natural disasters, especially in the north of the country along the Magdalena, Cauca and Atrato rivers and in the east along rivers in the Orinoco basin (Moran *et al.*, 2019).

The correlation between ENSO and climate change is unknown and difficult to project. However, if a correlation exists, the impacts of El Niño and La Niña events in future years could lead to an increased incidence and impact of extreme weather (World Bank, 2022). Notably, this would lead to more severe flooding, droughts and heatwaves, all of which would have socioecological impacts both in the short-term (loss of life and destruction of infrastructure) and long-term (impacts on agriculture, energy security and livelihoods).

##### Landslides

The topography of Colombia means a significant portion of land surface area is vulnerable to landslides. Eighteen per cent of the national territory is in 'high' and 'very high' hazard locations, prone to landslides. In the years 1970–2011, landslides were the cause of the highest percentage of deaths from natural hazards, totalling 36 per cent of cases (World Bank, 2012).

Land use change and deforestation are significant contributors to landslide and flood risk. On top of this, cattle farming and other agricultural practices are leading to loss of forested land and soil degradation – it is estimated that in 1990–2005, Colombia increased its head of cattle by 1.3 million (World Bank, 2012).

Cities such as Bogotá, and other highland areas, are vulnerable to increased temperatures and melting of glacial ice/snow as well as increased rainfall and surface runoff, causing both landslides and flooding.

In recent years, attention has been put towards more sustainable approaches to cattle farming, combining pastures with tree planting to tackle the issues that come with overuse of the land and associated degradation (World Bank, 2019).

## Observed hazard

## Projected risk

### Droughts

El Niño can produce high temperatures and droughts in Colombia, impacting agricultural output and hydroelectric power plants that are the main domestic energy supply. Drought conditions have increased approximately 2.2 times in frequency and are the most common between January and March, and July and September (World Bank, 2023).

The OECD (2019) predicts that shifting precipitation patterns are expected to transform the Caribbean region's climate towards increasing aridity which will expose populations to increased drought risk. The Andean mountainous areas are projected to see temperature increases which will have impacts on water availability and potentially lead to drought conditions; this is combined with the exacerbating flood and landslide risks that already exist (OECD, 2019a).

### Sea level rise

Colombia's costal region spreads along 3,208km out of which 1,760km are along the Caribbean Sea and 1,448km along the Pacific Ocean. Costal erosion is high and growing, occurring in approximately 50 per cent of the Caribbean coastline. High levels of erosion are occurring due to extreme wave-height, rising sea levels and ecosystem destruction (World Bank, 2023).

Sea level rise is projected to increase 0.19m by 2050 and 0.64m by 2100 on Colombia's Pacific coast, and 0.34m by 2050 and 0.94m by 2100 along the Caribbean coastline. Rising sea levels are expected to affect between 1.4–1.7 million people across the country by 2050 (World Bank, 2023).

It is essential to note that many of these hazards are interrelated and produce compound risks in the same areas and communities. In addition, risk must be understood as the interplay between hazard risk, exposure and vulnerability which makes certain individuals, communities and sectors more impacted by the hazards. All project design should take such compounding risks into account.

## Legal and policy framework for DRR in Colombia

1. **Law 1523/2012:** Calls for stakeholders to engage in preparedness planning. This includes the adoption of national and subnational strategies for disaster response, civil protection exercises and training, and the installation of warning systems.
2. **National Disaster Risk Management System (SNGRD):** Is composed of six main government agencies: (1) National Council for Risk Management; (2) National Unit for Risk Management; (3) National Committee for Risk Knowledge; (4) National Committee for Disaster Management; (5) National Committee for Disaster Risk Management; and (6) Departmental and Municipal Council for Risk Management.
3. **The National Strategy for Disaster Response:** Is designed to set out and specify the roles and responsibility of various stakeholders engaging in disaster preparedness and response. First to respond to a disaster are the local police and the military, fire brigade and local branches of civil society organizations, such as the Colombian Red Cross and Colombian Civil Defense. The National Strategy also outlines specific roles for businesses and individuals in the event of a disaster (OECD, 2019b).

## 2.2 Reduce health impacts of climate change

Climate change is projected to significantly impact health including an increase in communicable diseases as well as greater morbidity and mortality from heatwaves. These risks are compounded by increased exposure to air pollutants and current decreases in medical capacity, on top of an already overburdened healthcare infrastructure (Tran *et al.*, 2015; WHO, 2016).

Climate change will increase the incidence of non-communicable diseases (for example, acute respiratory infections) as well as communicable diseases, mainly vector-borne, for example, dengue fever, leishmaniasis, leptospirosis and malaria (Tran *et al.*, 2015). In addition, waterborne diseases such as cholera and diarrhoeal diseases are expected to increase (de la Mata & Valencia-Amaya, 2014; World Bank, 2021). Indirectly, extreme climatic events affect health by impacting agriculture and altering food markets, incomes and consumption (Becerra-Valbuena & Bonilla, 2021). Additionally, an increase of air pollution can affect the health of expectant mothers and infants (*ibid*).

The increased incidence of heat stress and risks of injuries from extreme events will affect vulnerable populations, including children, the elderly, street vendors, those with chronic illnesses and other marginalized groups (USAID, 2017). As a result, heat-related morbidity and mortality are projected to increase (WHO, 2016).

Health issues connected to inadequate water, sanitation and hygiene (WASH) infrastructure are projected to be exacerbated with increases in temperature and precipitation, especially in the Andean areas (UNDP, 2010). Climate change is also projected to contribute to a rise in mental health issues, especially among displaced people and marginalized groups in urban areas (Shultz *et al.*, 2014; WHO, 2016). Finally, climate change has a significant potential to overload and damage hospital infrastructure and affect the quality of medical services (WHO, 2016).

## 2.3 Ensure sustainable water supplies

Colombia is a water-rich country but unequal distribution, mismanagement, pollution, deforestation, and highly variable rainfall results in water shortages (World Bank, 2021). The country's key climatic risks to water resources are increased household and agricultural water stress, reduced water quality, reduced hydropower potential in certain regions, increased flooding in some areas, and increased salinization in the coastal aquifers (USAID, 2017).

### Water, Sanitation and Hygiene (WASH)

Projections indicate that one-third of Colombia will face significant annual variations in rainfall by 2100, with some areas becoming as much as 30 per cent wetter or 30 per cent drier because of climatic changes (Lora *et al.*, 2021; República de Colombia, 2010). The projected increase in extreme rainfall events – by 26–37 per cent by 2050 – will affect the seasonal availability of water resources as well as increase the frequency of natural hazards such as landslides and flooding (USAID, 2017).

A reduction in annual runoff of up to 30 per cent can already be observed in major river basins (República de Colombia, 2010). Half of the municipal headwaters are already showing signs of water shortage, and climate change projections show shortages will be greater in the

Andes, where 80 per cent of the population is located (República de Colombia, 2010). In addition, dam capacities are insufficient to meet altered water influx from decreasing glaciers and increasing extreme rainfall events (very high vulnerability according to the ND-GAIN Index) (ND-GAIN, 2021). A drastic reduction in hydropower production capacity will affect 43 per cent of existing dams, leaving the energy sector highly vulnerable as the climate changes (República de Colombia, 2010).

In addition to these climate-driven water shortages, extreme rainfall events are likely to cause increasing damage to water distribution infrastructure while increasing contamination from human waste (OECD, 2015). Currently, 4.9 million people lack access to improved sanitation, creating a significant risk of waterborne disease and decreased access to potable water for vulnerable populations (Water Aid Global, n.d.). Climate change will likely exacerbate existing water challenges.

## 2.4 Enable climate-resilient livelihoods and economic security

Colombia faces various climate-driven socioeconomic stressors, including crop, livestock, ecosystem and infrastructure damage, with direct consequences for local livelihoods especially in the sectors of agriculture, fisheries and tourism.

Agriculture in Colombia is highly vulnerable to temperature increases and extreme weather events. Livestock along with 80 per cent of crops – mainly high-value crops such as bananas, coffee, cocoa and tropical fruit – could be impacted, putting the livelihoods of smallholder farmers at risk (Boshell *et al.*, 2018; USAID, 2017). Changing precipitation patterns will impact soil and water availability, and higher temperatures will become unfavourable for certain crops while others will need to shift to higher altitudes (Eitzinger *et al.*, 2014). Moreover, the incidence of floods and landslides is projected to increase and will escalate soil erosion, reduce yields, damage crops and livestock, and eventually increase food insecurity (USAID, 2017). Additionally, 60 per cent of land suitable for irrigated rice production could be lost by the 2050s (CIAT, 2019). Collectively, these climatic risks disrupt food systems with eventual rises in food prices (Melo-Velandia *et al.*, 2022), threatening incomes and livelihoods. Climate change also puts pressure on fisheries yields, thereby impacting the livelihoods of those who traditionally rely on fishing (Selvaraj *et al.*, 2022). Furthermore, the tourism sector is susceptible to extreme events. Together with climatic impacts on infrastructure, there will be significant losses in the tourism sector, especially in the coastal areas, causing (or increasing) poverty for those highly dependent on tourism (Hernández-Narváez *et al.*, 2019).

## 2.5 Address climate displacement

### Current and future displacement challenges

Colombia has one of the world's highest rates of internal displacement due to conflict and violence. At the end of 2023, around 5.1 million people were living in internal displacement caused by clashes between government forces and non-state armed groups (IDMC, 2024a). There are around 3 million Venezuelan refugees and migrants in Colombia (UNHCR, 2024), displaced from their country of origin because of political instability and lack of access to basic healthcare and adequate nutrition (HRW, 2021). A smaller number of people (32,000 affected in 2021) are displaced by disasters. The country's high number of conflict-affected Internally Displaced Persons (IDPs) and displaced Venezuelans are vulnerable to climate change due to the hazard-prone locations in which they often settle, such as precarious informal urban settlements exposed to climate-driven disasters (Shultz *et al.* 2014).

The geographies of conflict and natural disasters often overlap (Deacon & Görgens, 2019). In 2023, 57,000 migrations were triggered due to storms and floods in the north of Colombia in addition to 47,000 displacements caused by wildfires. Floods caused 62,000 displacements in Arauca, a region where people have previously been affected by conflict and violence (IDMC, 2024b).

Slow-onset disasters, such as drought, will also likely increase migration. The projected increase in average temperatures and changing climate patterns (such as reduced rainfall) means that rural Colombians will face pressure due to reduced livelihoods options, which will likely increase rural–urban migration (UNDP, 2010). One study modelling the migration that occurred during a severe drought in La Guajira, Colombia, in 2014, found, for example, that the population reduced by 10 per cent during the six months studied (Isaacman *et al.*, 2018).

Already displaced people in Colombia are more vulnerable to extreme weather events and other impacts of climate change. In 2023, 293,000 internal displacements were recorded due to conflict and violence and 351,00 because of disasters, bringing the total number of people living in displacement to 5.1 million (IDCM, 2024b). Indigenous peoples and women are considered the most vulnerable to climate change (Shultz *et al.*, 2014), including specific threats to their livelihoods, cultures and ways of life.

### Potential needs of migrants and displaced people

Dedicated institutions and frameworks for both conflict- and climate-induced displaced people are needed. The impact of increased rural–urban migration on migrants, displaced people and hosts in cities is crucial to plan for and address.

Improved protection of conflict-displaced people against climate disasters is equally important. The main body addressing the victims of conflict and natural disasters is La Unidad para la Atención y Reparación Integral a las Víctimas (Unit for Comprehensive Care and Reparation of Victims), playing a critical role in the Government's efforts to support and provide victims with necessary resources (Unidad para las Víctimas, n.d.).

## 2.6 Policy

Relevant information from the [Nationally Determined Contribution](#) (NDC) (2021)

**Emission target:** A 51 per cent greenhouse gas emissions (GHG) reduction target by 2030 below 'business as usual'. Colombia aims for carbon neutrality by 2050. Deforestation currently accounts for 36 per cent of the country's GHG emissions (The Nature Conservancy, 2020).

**Area of focus on adaptation:** Water resources, protection of terrestrial and coastal marine ecosystems, restoration, protected areas, infrastructure and agriculture.

**Inclusion of DRR:** Yes, risk management is perceived as a transversal element. The Unidad Nacional para la Gestión del Riesgo de Desastres (National Unit for Disaster Risk Management) has been involved with the National Adaptation Plan. One of the objectives is 'increasing the percentage of the monitoring network with real-time transmission connected to early warning systems (24–35 per cent) by 2030' (Government of Colombia, 2020). Early warning systems are an important element of the Colombian DRR strategies. The Institute of Hydrology, Meteorology and Environmental Studies (IDEAM) issues alerts but more work could be done to connect the early warning systems to inform disaster preparedness and awareness.

**National designated entity:** Directorate of Climate Change of the Ministry of Environment and Sustainable Development

### Other national policies on climate

- Colombia is one of the first countries with a [National Adaptation Plan](#). The plan emphasizes the role of women, youth and the most vulnerable as well as the private sector as key stakeholders in implementing climate-resilient strategies. It aims to reduce vulnerability and increase socioeconomic capacity (Government of Colombia, 2018).
- [Third National Communication of Climate Change](#) (TCNCC) includes an 'analysis of vulnerability and risk for climate change' with established indicators subdivided into six dimensions: food security; resources; water; biodiversity and ecosystem services; health; and human habitat and infrastructure (Government of Colombia, 2017).

### Climate finance

Most Green Climate Fund (GCF) projects in the country focus on natural resources management and nature-based solutions (GCF, 2022). National Societies cannot apply directly for climate finance from [the GCF](#), but they can be an implementing partner for an accredited entity (Climate Centre, 2022a).

National Societies can explore options for accessing climate funds through smaller funds, such as the [GEF's Small Grants Programme](#) or the [FFEM's Small Scale Initiatives Program](#). Other funding from bilateral donors, national climate funds, or multilateral climate funds like the Adaptation Fund, CREWS or GCCA+ could be explored (Climate Centre, 2022a).

**Engaging in national climate adaptation planning is vital for accessing climate finance.**



## Additional resources

Climate Centre. (2022a). *Fact sheet on climate finance*. Red Cross Red Crescent Climate Centre. <https://www.climatecentre.org/wp-content/uploads/Fact-Sheet-on-Climate-Finance.pdf>

Climate Centre. (2022b). *Entry points for National Societies on climate finance partnerships*. Red Cross Red Crescent Climate Centre. <https://www.climatecentre.org/wp-content/uploads/Entry-Points-for-Climate-Finance-Partnerships.pdf>

## References

- Becerra-Valbuena, L.G., & Bonilla, J.A. (2021). *Climatic shocks, air quality, and health at birth in Bogotá*. [https://www.parisschoolofeconomics.eu/docs/becerra-luis/paper2\\_project\\_contamination\\_meteo\\_and\\_health\\_in\\_bogota.pdf](https://www.parisschoolofeconomics.eu/docs/becerra-luis/paper2_project_contamination_meteo_and_health_in_bogota.pdf)
- Boshell, F., Thomas, S.T., Nazareth, V., & Cenacchi, N. (2018). Climate change, agriculture, and adaptation options for Colombia (No. 01790; IFPRI Discussion Paper). *International Food Policy Research Institute*. <https://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/133035/filename/133249.pdf>
- CIAT. (2019). 'Colombia could lose 60% of land suitable for irrigated rice due to climate change', *Science Daily*. <https://www.sciencedaily.com/releases/2019/05/190529131148.htm>
- Deacon, H. & Görgens, M. (2019). 'Forced to leave: Determinants of slow-onset displacement in Colombia', GIGA Working Papers, No. 317, *German Institute of Global and Area Studies*. <https://www.econstor.eu/bitstream/10419/201382/1/1667974610.pdf>
- de la Mata, D., & Valencia-Amaya, M.G. (2014). 'The health impacts of severe climate shocks in Colombia', *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2533568>
- DRMKC. (2022). *INFORM Index for Risk Management. Colombia country profile*. Disaster Risk Management Knowledge Centre. <https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Risk/Country-Risk-Profile>
- Eitzinger, A., Läderach, P., Bunn, C., Quiroga, A., Benedikter, A., Pantoja, A., Gordon, J., & Bruni, M. (2014). 'Implications of a changing climate on food security and smallholders' livelihoods in Bogotá, Colombia', *Mitigation and Adaptation Strategies for Global Change*, 19(2), 161–176. <https://doi.org/10.1007/s11027-012-9432-0>
- GCF. (2022). *Colombia*. Green Climate Fund. <https://www.greenclimate.fund/countries/colombia>
- Government of Colombia. (2022). *SNGRD. Sistema Nacional de Gestión del Riesgo de Desastres*. <http://portal.gestiondelriesgo.gov.co/Paginas/Estructura.aspx>
- Government of Colombia. (2020). *Actualización de la Contribución Determinada a Nivel Nacional de Colombia* (Updated Nationally Determined Contribution). United Nations Framework Convention on Climate Change. <https://unfccc.int/NDCREG>
- Government of Colombia. (2018). *Plan Nacional de Adaptación al cambio climático*. United Nations Framework Convention on Climate Change. <https://www4.unfccc.int/sites/NAPC/Pages/national-adaptation-plans.aspx>
- Government of Colombia, *Departamento Nacional de Planeación*. (2017). Tercera Comunicación Nacional De Colombia. United Nations Framework Convention on Climate Change <https://unfccc.int/documents/75456>
- Gutiérrez, J.M., Jones, R.G., Narisma, G.T., Alves, L.M., Amjad, M., Gorodetskaya, I.V, Grose, M., Klutse, N.A.B., Krakovska, S., Li, J., Martínez-Castro, D., Mearns, L.O., Mernild, S.H., Ngo-Duc, T., van den Hurk, B., & Yoon, J.-H. (2021a). 'Atlas', in *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, eds. V. Masson-Delmotte, P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, et al. (Cambridge University Press). <https://www.ipcc.ch/report/ar6/wg1/chapter/atlas/>
- Gutiérrez, J.M., Jones, R.G., Narisma, G.T., Alves, L.M., Amjad, M., Gorodetskaya, I.V, Grose, M., Klutse, N.A.B., Krakovska, S., Li, J., Martínez-Castro, D., Mearns, L.O., Mernild, S.H., Ngo-Duc, T., van den Hurk, B., & Yoon, J.-H. (2021b). 'Interactive Atlas', in *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, eds. V. Masson-Delmotte, P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, et al. (Cambridge University Press). <http://interactive-atlas.ipcc.ch/>
- HRW. (2021). *Venezuela: Events of 2021*. Human Rights Watch. <https://www.hrw.org/world-report/2022/country-chapters/venezuela>
- Hernández-Narváez, D., Vega-Cabrera, A., Zamora-Bornachera, A., & Sierra-Correa, P.C. (2019). 'El cambio climático y los impactos socioeconómicos sobre la zona costera e insular colombiana', *Boletín de Investigaciones Marinas y Costeras - INVEMAR*, 48, 9–32. [http://www.scielo.org.co/scielo.php?pid=S0122-97612019000200009&script=sci\\_arttext&tlng=en](http://www.scielo.org.co/scielo.php?pid=S0122-97612019000200009&script=sci_arttext&tlng=en)
- IDMC. (2024b). *Country Profile: Colombia*. Internal Displacement Monitoring Centre. <https://www.internal-displacement.org/countries/colombia/>
- IDMC. (2024a). *GRID 2024: Global Report on Internal Displacement*. Internal Displacement Monitoring Centre. <https://api.internal-displacement.org/sites/default/files/publications/documents/IDMC-GRID-2024-Global-Report-on-Internal-Displacement.pdf>

- Isaacman, S., Frias-Martinez, V., & Frias-Martinez, E. (2018). 'Modeling human migration patterns during drought conditions in La Guajira, Colombia', in *Proceedings of the 1st ACM SIGCAS conference on computing and sustainable societies* (pp. 1–9). [https://dl.acm.org/doi/pdf/10.1145/3209811.3209861?casa\\_token=Jf5V5BE3VBwAAAAA:5GLkqF2Hh6DW3p9B8L3nk0lqa5OL7Srs8ZS23T-CCv7SiG6V\\_Kz3eE2FiHxOsLE9J6qjHFm6ZJt\\_rQ](https://dl.acm.org/doi/pdf/10.1145/3209811.3209861?casa_token=Jf5V5BE3VBwAAAAA:5GLkqF2Hh6DW3p9B8L3nk0lqa5OL7Srs8ZS23T-CCv7SiG6V_Kz3eE2FiHxOsLE9J6qjHFm6ZJt_rQ)
- Lora, P.A.P., Santander, A.G., & Cartaya, L.D.L. (2021). 'Adaptation to the impacts of climate change on water resources in the Andes (AICCA), Colombia', *Solutions Portal*. <https://www.weadapt.org/solutions-portal/adaptation-to-the-impacts-of-climate-change-on-water-resources-in-the-andes-aicca-colombia>
- Melo-Velandia, L.F., Orozco-Vanegas, A.C., & Parra-Amado, D. (2022). 'Extreme weather events and high Colombian food prices: A non-stationary extreme value approach', No. 1189: *Borradores de Economía*. [https://repositorio.banrep.gov.co/bitstream/handle/20.500.12134/10256/be\\_1189.pdf](https://repositorio.banrep.gov.co/bitstream/handle/20.500.12134/10256/be_1189.pdf)
- Moran, A., Raleigh, C., Bushby, W., J., Wight, C., & Tetrattech Company. (2019). *Fragility and climate risks: Colombia*. United States Agency for International Development. <https://www.strauscenter.org/wp-content/uploads/Country-Brief-Fragility-and-Climate-Risks-in-Colombia-2019.pdf>
- ND-GAIN. (2021). *Colombia*. Notre Dame Global Adaptation Initiative. <https://gain-new.crc.nd.edu/country/colombia>
- OECD. (2019b). *Risk Governance Scan of Colombia*. <https://doi.org/10.1787/eeb81954-en>
- OECD. (2019a). *Fiscal resilience to natural disasters – Lessons from country experiences*. Organisation for Economic Co-operation and Development. <https://www.oecd-ilibrary.org/sites/737349eb-en/index.html?itemId=/content/component/737349eb-en>
- OECD. (2015). *Water resource allocation: Colombia*. Organisation for Economic Co-operation and Development. <https://www.oecd.org/colombia/Water-Resources-Allocation-Colombia.pdf>
- Ranasinghe, R., Ruane, A.C., Vautard, R., Arnell, N., Coppola, E., Cruz, F.A., Dessai, S., Islam, A.S., Rahimi, M., Ruiz Carrascal, D., Sillmann, J., Sylla, M.B., Tebaldi, C., Wang, W., & Zaaboul, R. (2021). 'Climate change information for regional impact and for risk assessment', in *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, eds. V. Masson-Delmotte, P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, et al. (Cambridge University Press). <https://www.ipcc.ch/report/ar6/wg1/chapter/chapter-12/>
- República de Colombia. (2010). *Segunda Comunicación Nacional Ante la Convención Marco de las Naciones Unidas Sobre Cambio Climático*. United Nations Framework Convention on Climate Change. <https://unfccc.int/sites/default/files/resource/Executive%20Summary%20English.pdf>
- Selvaraj, J.J., Guerrero, D., Cifuentes-Ossa, M.A., & Guzmán Alvis, Á.I. (2022). 'The economic vulnerability of fishing households to climate change in the south Pacific region of Colombia', *Heliyon*, 8(5), e09425. <https://doi.org/10.1016/j.heliyon.2022.e09425>
- Seneviratne, S.I., Zhang, X., Adnan, M., Badi, W., Dereczynski, C., Di Luca, A., Ghosh, S., Iskandar, I., Kossin, J., Lewis, S., Otto, F., Pinto, I., Satoh, M., Vicente-Serrano, S.M., Wehner, M., & Zhou, B. (2021). 'Weather and Climate Extreme Events in a Changing Climate', in *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, eds. V. Masson-Delmotte, P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, et al. (Cambridge University Press). <https://www.ipcc.ch/report/ar6/wg1/chapter/chapter-11/>
- Shultz, J., Garfin, D., Espinel, Z., Araya, R., Oquendo, M., Wainberg, M., Chaskel, R., Gaviria, S. L., Ordóñez, A., Espinola, M., Wilson, F., Muñoz García, N., Gomez, A., Garcia-Barcena, Y., Verdelli, H., & Neria, Y. (2014). 'Internally displaced "victims of armed conflict" in Colombia: The trajectory and trauma signature of forced migration', *Current Psychiatry Reports*, 16. <https://pubmed.ncbi.nlm.nih.gov/25135775/>
- The Nature Conservancy. (2020). *Solutions for climate change in Colombia: NCS for NDC robust science shows how natural climate solutions can boost Colombia's ambitions for the Nationally Determined Contributions*. [nature.org/en-us/about-us/where-we-work/latin-america/colombia/solutions-for-climate-change-ncs-for-ndc-colombia/](https://www.nature.org/en-us/about-us/where-we-work/latin-america/colombia/solutions-for-climate-change-ncs-for-ndc-colombia/)
- Tran, T., Mrad, S.O., & Mantilla, G.C. (2015). 'Climate change and health in Colombia' in *Handbook of climate change adaptation* (pp. 195–213). Springer Berlin Heidelberg. [https://doi.org/10.1007/978-3-642-38670-1\\_70](https://doi.org/10.1007/978-3-642-38670-1_70)
- UNDP. (2010). *Mainstream climate change adaptation in Colombia: Screening for risks and opportunities*. United Nations Development Programme. (<https://www.undp.org/content/dam/aplaws/publication/en/publications/environment-energy/www-ee-library/climate-change/mainstreaming-climate-change-in-colombia/CC%20risk%20Mainstreaming%20Climate%20Change%20in%20Colombia-EN.pdf>)

- UNHCR. (2024). *Country Operations: Colombia*. United Nations High Commissioner for Refugees. <https://reporting.unhcr.org/operational/operations/colombia>
- Unidad para las Víctimas (n.d.). Official website. <https://www.unidadvictimas.gov.co/es/>
- USAID. (2017). *Climate risk profile: Colombia*. United States Agency for International Development. <https://www.climatelinks.org/resources/climate-risk-profile-colombia>
- Water Aid Global. (n.d.). *Colombia*. <https://www.wateraid.org/where-we-work/colombia>
- World Bank. (2021). *Country profile: Colombia*. Climate Change Knowledge Portal. [https://climateknowledgeportal.worldbank.org/sites/default/files/2021-07/15520-WB\\_Colombia%20Country%20Profile-WEB%20%283%29.pdf](https://climateknowledgeportal.worldbank.org/sites/default/files/2021-07/15520-WB_Colombia%20Country%20Profile-WEB%20%283%29.pdf)
- World Bank. (2023). *Climate Risk Country Profile: Colombia*. [https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/16698-WB\\_Colombia%20Country%20Profile-WEB.pdf](https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/16698-WB_Colombia%20Country%20Profile-WEB.pdf)
- World Bank. (2012). *Analysis of disaster risk management in Colombia: A contribution to the creation of public policies*. <https://openknowledge.worldbank.org/handle/10986/12308>
- World Bank. (2019). *Trees and Cows Offer Path to Recovery in Colombia*. <https://www.worldbank.org/en/news/feature/2019/07/08/trees-and-cows-offer-path-to-recovery-in-colombia>
- WHO. (2016). *Health and climate change: Country profile 2015 – Colombia*. World Health Organization. <https://www.who.int/publications/i/item/health-and-climate-change-country-profile-2015-colombia>