

Climate Change Knowledge Portal

The Climate Change Knowledge Portal (CCKP) provides global data on historical and future climate, vulnerabilities, and impacts. Explore them via **Country**, **Region**, and **Watershed** views. Access synthesized **Country Profiles** to gain deeper insights into climate risks and adaptation actions.

COUNTRY

REGION

WATERSHED

DOWNLOAD DATA

COUNTRY PROFILES

ABOUT

GEF & WBG Climate Risk Screening & the Climate Change Knowledge Portal (CCKP)

<https://climateknowledgeportal.worldbank.org>

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Objectives

To share WBG approaches and tools to aide project teams in collecting best available information that can be used to perform climate screenings.

Agenda

1. WBG Risk Screening Process
2. GEF Screening Process
3. Project Example
4. Walk-through of the CCKP
5. Additional Resources

World Bank Group Risk Screening: 4-Logic Steps

Step 1

Hazard Exposure

Step 2

Potential Impact

Step 3

Adaptive Capacity

Step 4

Project Risk

World Bank Group Climate and Disaster Risk Screening Process

WBG resources embedded in the tools

CCKP:

Country Context

Sri Lanka is an island in the Indian Ocean, consisting of a mountainous area in the south-central part and a vast surrounding coastal plain. Over the last century, much of the country's expansive forest cover, rich in biodiversity, has been destroyed, with less than one third of the area still under forest cover. The economy is primarily driven by agriculture and the manufacturing sector. The coastal areas are important in meeting livelihood needs through agriculture and fisheries. As with many island nations, storm surges and coastal erosion are a problem. Changes in the frequency and intensity of extreme climatic events, sea level rise, and storm surges are the major concerns for Sri Lanka. These

GENERAL RESOURCES

- Sri Lanka Climate Risk Country Profile
- Action Plan on Climate Change, Adaptation and Resilience (WBG)
- Climate Change Action Plan (WBG)

ThinkHazard:

HAZARD LEVEL

- River flood **High**
- Urban flood **High**
- Cyclone **High**
- Wildfire **High**
- Coastal flood **Medium**
- Tsunami **Medium**
- Extreme heat **Medium**

Climate and Disaster Risk Screening Report

1. Exposure of the project location : This step assesses the current and future exposure of the project location to relevant climate and geophysical hazards.

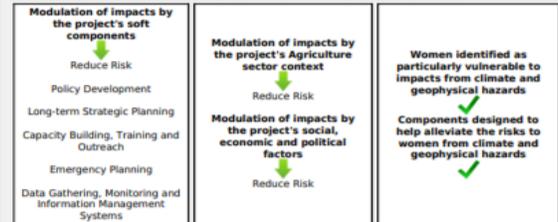
Exposure ratings for climate and geophysical hazards that are likely to be relevant to the project location both in the present and in the future:

	Climate Change Hazards						Geophysical Hazards
	Extreme Temperature	Extreme Precipitation and Flooding	Drought	Sea Level Rise	Storm Surge	Strong Winds	Landslides
Current	High	High	High	Medium	High	High	High
Future	High	High	High	Medium	High	High	High

2. Impacts on the project's physical components: This step assesses the current and future impacts of identified climate and geophysical hazards on the project's physical components as currently designed under relevant subsectors.

	Impact		
	Irrigation and Drainage	Crops and Land Management	Storage and Processing
Current	High	High	High
Future	High	High	High

3. Adaptive Capacity: modulating effect of the project's non-physical components and development context : This step assesses how the project's non-physical components, together with its broader development context, modulates potential impacts from climate and geophysical hazards. This step also considers particularly vulnerable groups, namely women, migrants and displaced populations.



4. Risk to the outcome/service delivery of the project : This step assesses the level of risk to

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the outcome/service delivery that the project is aiming to provide based on previous ratings.

	Outcome/Service Delivery		
	Irrigation and Drainage	Crops and Land Management	Storage and Processing
Current	High	High	High
Future	High	High	High

How this information can translate into action

After screening, the task team considered **moderate to high** exposure risks associated with **extreme heat, droughts, floods, landslides, storm surge and strong winds**.

Excerpts from the PAD:

“...exposure is rated **High**. The districts under this project are in the dry zone, and some are coastal. They are vulnerable to the impacts of floods, drought, high winds/cyclones, and storm surge. Droughts hit these districts every 3–4 years and create significant livelihood impacts. ... The rehabilitated irrigation infrastructure will follow improved designs taking account of the increased rainfall intensities. The rehabilitation of small tank systems will consider to the extent possible the potential impact of floods and droughts, and the designs will be undertaken accordingly. Climate-resilient farming practices, such as drought/flood-tolerant crop varieties, improved water management practices, catchment management, crop diversification, and so on, will reduce the impact of extreme events.

GEF Climate Risk Assessment

Steps in climate risk assessment



IPCC definitions

- **Risk:** potential for adverse consequences where something of value is at stake and associated with uncertainties.
- **Vulnerability:** propensity to be adversely affected encompassing sensitivity to harm and inability to cope.

Assessing Climate Vulnerability





STAP's Climate Risk Screening Question

- Has the **sensitivity to climate change**, and its impacts, been assessed?
- How will the project be affected by climate **risks over the period 2020 to 2050**, and have the impacts been addressed adequately?
- Have measures to **address the risks** been considered? How will these risks be dealt with?
- What **technical and institutional capacity**, and information is needed?



Integrated Coastal Watershed Conservation

Cross-sectoral and participatory conservation, and monitoring in the context of climate change in Mexico

PROJECT FULL NAME	COUNTRY & REGION	IMPLEMENTING AGENCY	World Bank
Conservation of Coastal Watersheds to Achieve Multiple Global Environmental Benefits in the Context of Changing Environments		EXECUTING AGENCIES	National Commission for Protected Areas (CONANP), National Forestry Commission (CONAFOR), National Institute of Ecology and Climate Change (INECC), and a private institution, the Mexican Fund for the Conservation of Nature (FMCN).
GEF PROJECT ID: 4792	FOCAL AREAS	09/09/2013 CEO Endorsement	06/28/2019 Project Closure
PROJECT TYPE: FSP	<ul style="list-style-type: none"> Biodiversity, Climate Change Mitigation Land Degradation Sustainable Forest Management 	06/01/2012 Project Approval	01/23/2017 Mid-Term Review
GEF PERIOD: GEF-5		GEF Project Grant \$39,518,181	Co-financing Total \$239,886,000

Summary

The project promotes integrated management of coastal watersheds to conserve biodiversity, contribute to climate change mitigation, and enhance sustainable land use in the Gulf of Mexico and Gulf of California, where impacts from climate change are significant and habitats of globally significant biodiversity are provided. Collaborating with three federal agencies and a private foundation, the project focused on improving sustainable management of protected areas and surrounding watersheds including the areas where local communities manage agroforestry systems. In addition, local communities were engaged through sub-projects that supported sustainable cattle ranching, honey production, adventure tourism and others. These

same stakeholders were involved in project monitoring and development of the Integrated Watershed Action Plans. The project achieved improvement of protected areas management covering 1,748,204.73 hectares, improved management of productive landscapes in the watersheds covering 35,784 hectares, and due to the emphasis on community participation, strengthened socio-ecological resilience of the watersheds to climate change and other potential future environmental and social perturbations. Community pride and ownership in the sustainable management of watersheds was a key outcome. Based on all these outcomes, an integrated watershed management approach is being scaled up at the local and national level.

GEF Project Example

Six Project Sites:



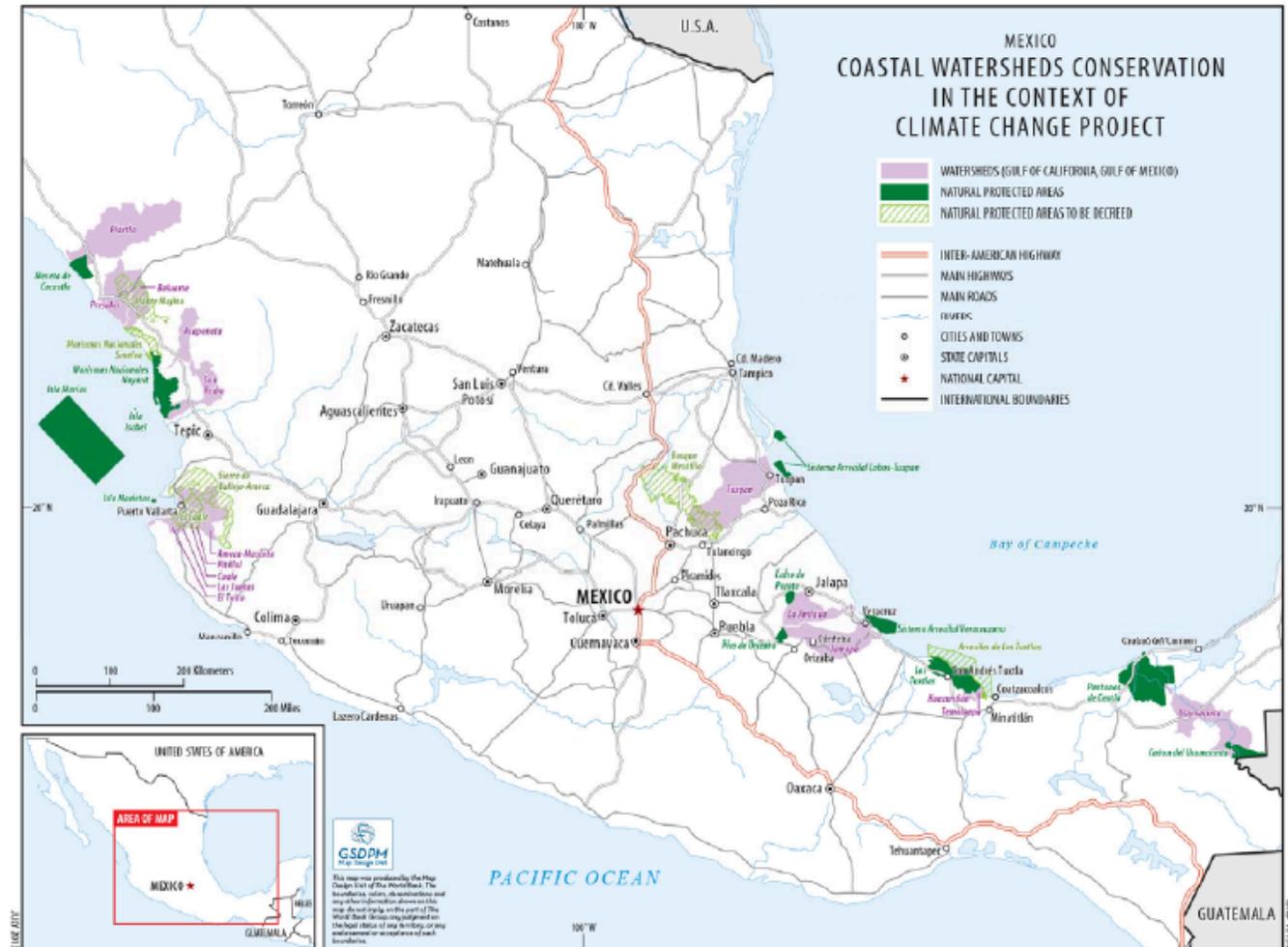
GEF Project Example

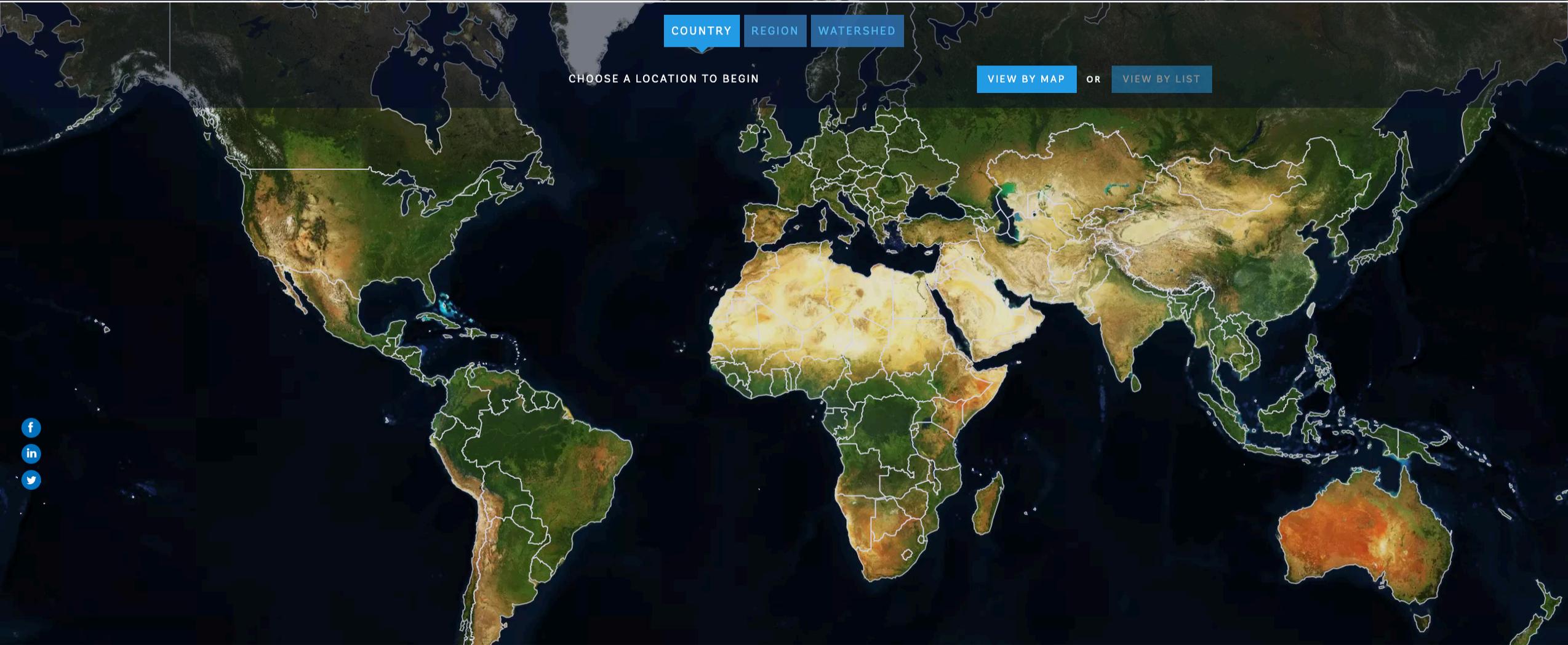
Project Objectives:

To promote integrated environmental management of selected coastal watersheds as a means to conserve biodiversity, contribute to climate change mitigation, and enhance sustainable land use.

Key Sectors:

Water Resources,
Biodiversity,
Forestry,
Agroforestry,
Environment Services

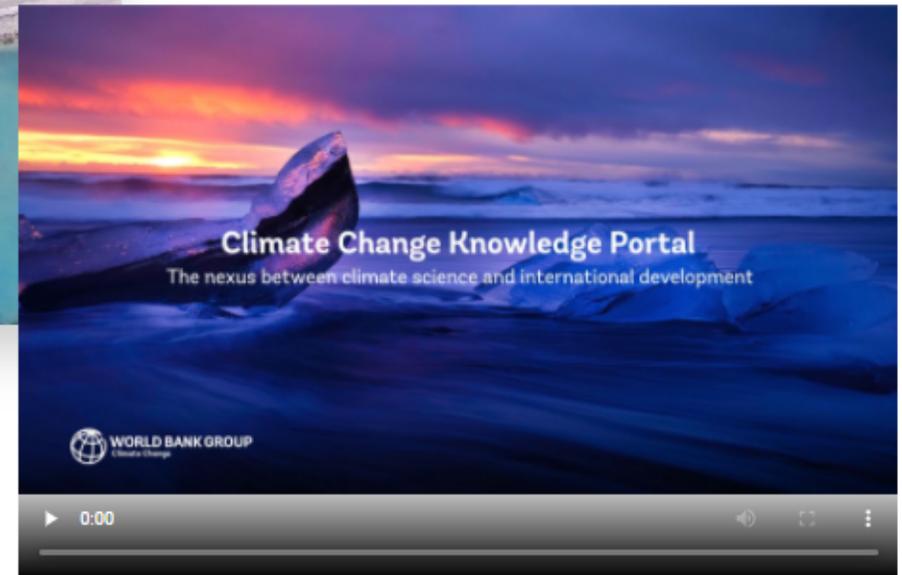




Using the CCKP for Climate Risk and Disaster Screening

Short video

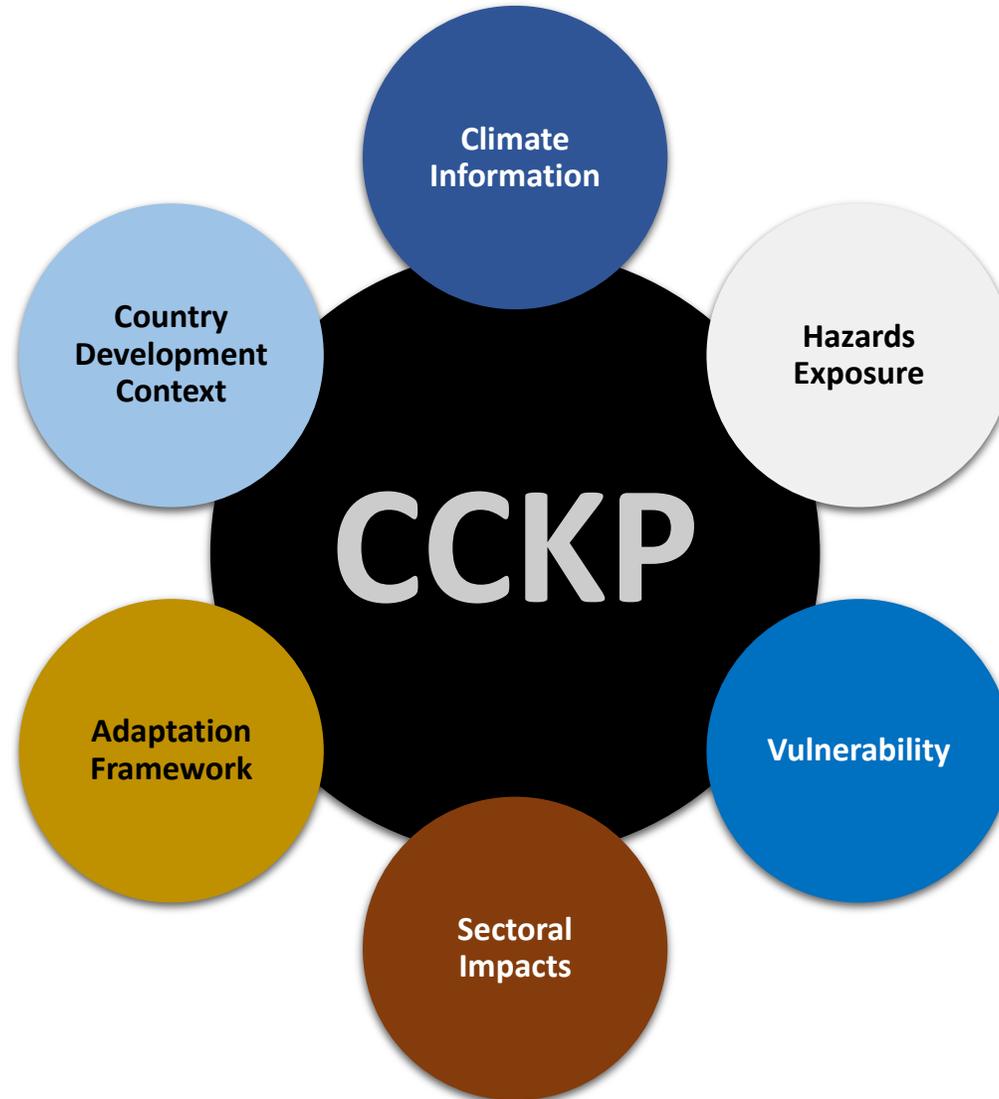
The World Bank created the Climate Change Knowledge Portal to solve a need

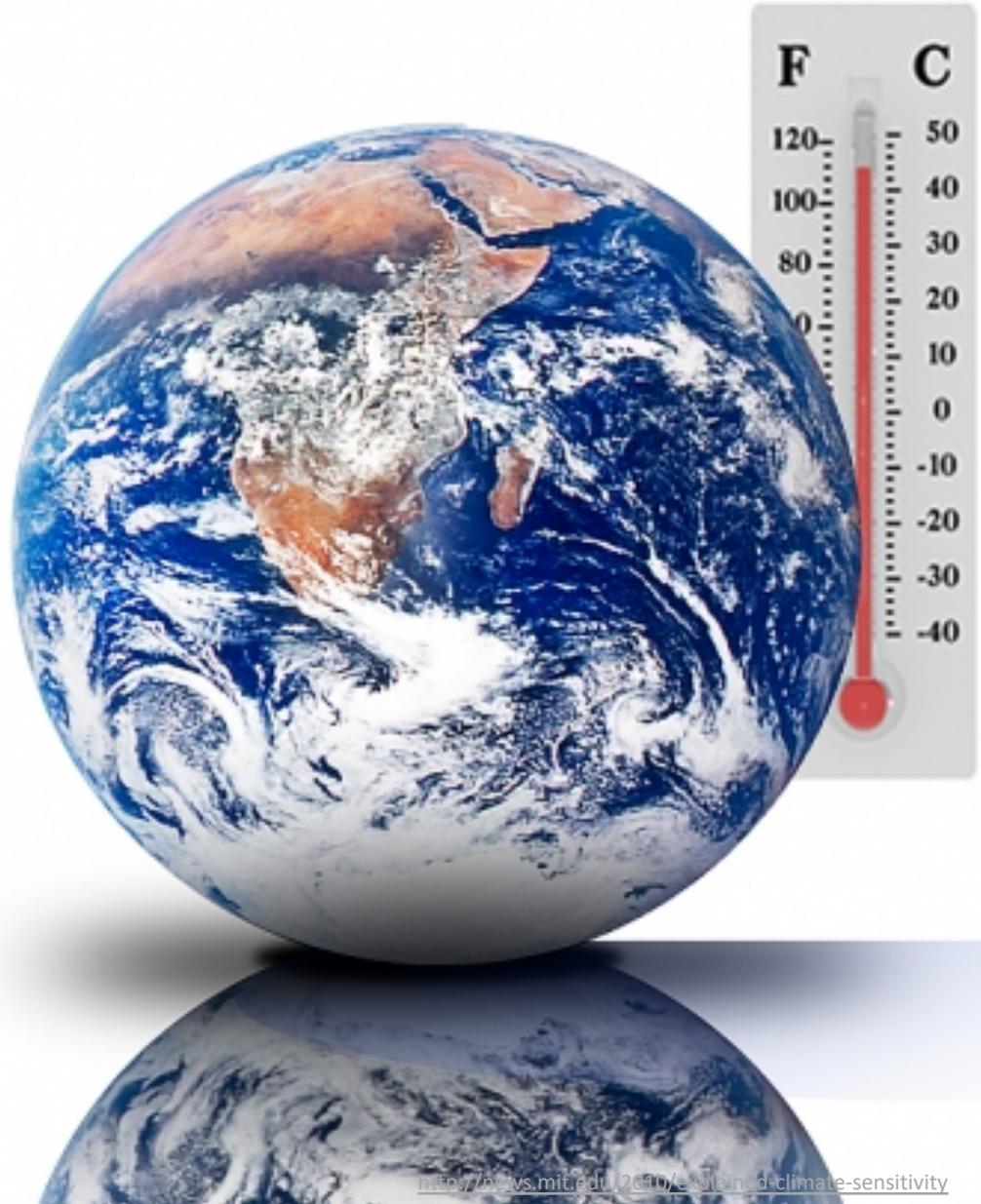


In an effort to serve as a 'one stop shop' for climate-related information, data, and tools, the World Bank created the Climate Change Knowledge Portal (or CCKP). The Portal provides an online tool for access to comprehensive global, regional, and country data related to climate change and development.

<http://climateknowledgeportal.worldbank.org>

Key Features of CCKP





STAP's Question 1

Has the sensitivity to climate change, and its impacts, been assessed?

are the current and projected climate vulnerabilities at the project location identified?

Information that would be useful includes:

- Historical and projected climatic conditions
- Information on vulnerability to project climatic conditions
- Is climate change a driver of the targeted problem?
- Interactions between climate and non-climate stressors

Climate Data: Historical

Tailored Narratives

OVERVIEW CLIMATE DATA CLIMATE BY SECTOR VULNERABILITY IMPACTS ADAPTATION

HISTORICAL PROJECTIONS

Climate Data > Historical

The climate in Mexico varies, largely by altitude, with some areas experiencing desert-like conditions and others experiencing a more tropical climate. The northern part of the country experiences cooler temperatures and peak rainfall during the winter months. The southeast of the country experiences a tropical rainy climate that ranges from no dry season to a short dry season. El Niño events typically bring cool, wet conditions to northern Mexico (in winter), and La Niña bring warmer, drier conditions during this same period.

Temperature

- Mean annual temperature has increased by 0.6°C since 1960, at a rate of approximately 0.13°C per decade. The rate of increase is most rapid in the dry seasons (March-May and December-February) at a rate of 0.18-0.2°C per decade and slower in the wet seasons (June-August and September-November).

Precipitation

- Mean rainfall over Mexico does not show any consistent increase or decrease since 1960.
- A particularly wet autumn in 2004 caused an apparent increasing trend in

DATA SNAPSHOTS

- Mean annual temperature is **20.57°C (1901-2016)**
- Mean annual precipitation is **724.64mm (1901-2016)**

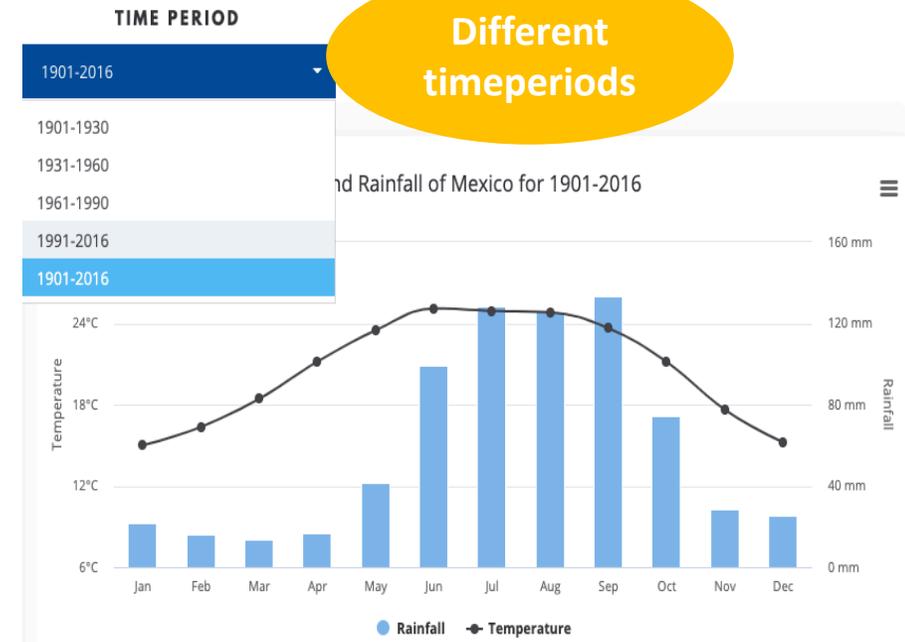
GENERAL RESOURCES

- [Tool: Climate Analysis, Monitoring and Forecasts \(IRI\)](#)
- [Tool: Climatic Research Unit Climate Data \(UEA\)](#)
- [Tool: Historical Climate Variability Tool \(WBG\)](#)

Aggregated country statistics

Historical Climate Trends

Different timeperiods



Climate Data: Historical

Choose from
Multiple
Variables

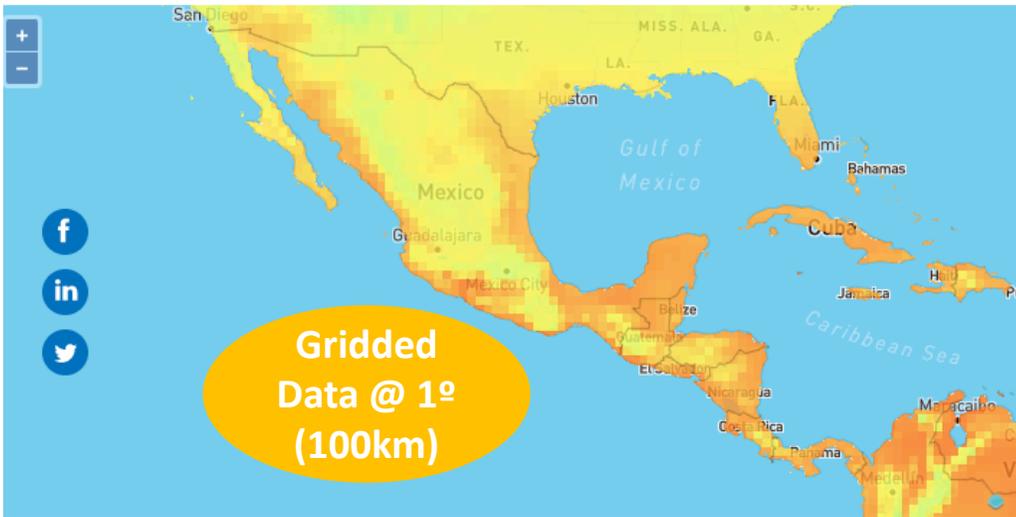
VARIABLE

Annual Temperature

TIME PERIOD

1991-2016

Annual Temperature of Mexico for 1991-2016



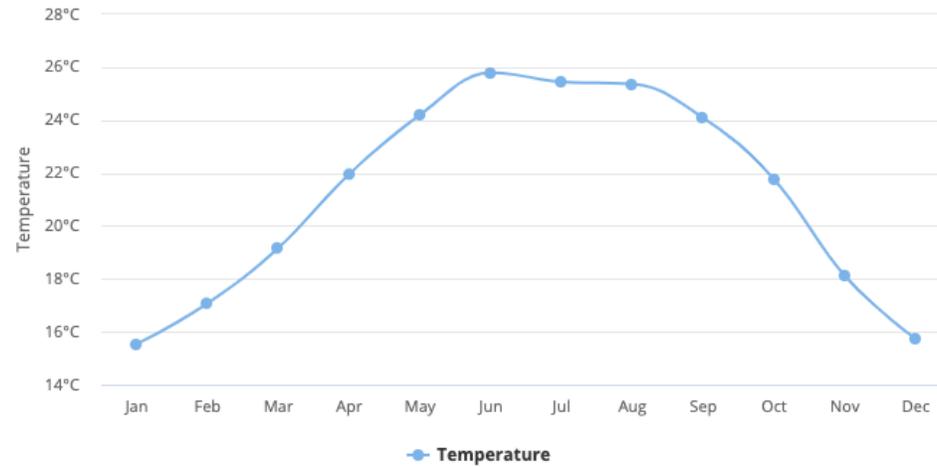
ANNUAL TEMPERATURE (°C)



METADATA

Historical data is derived from four sources, all quality controlled by leading institutions in the field.

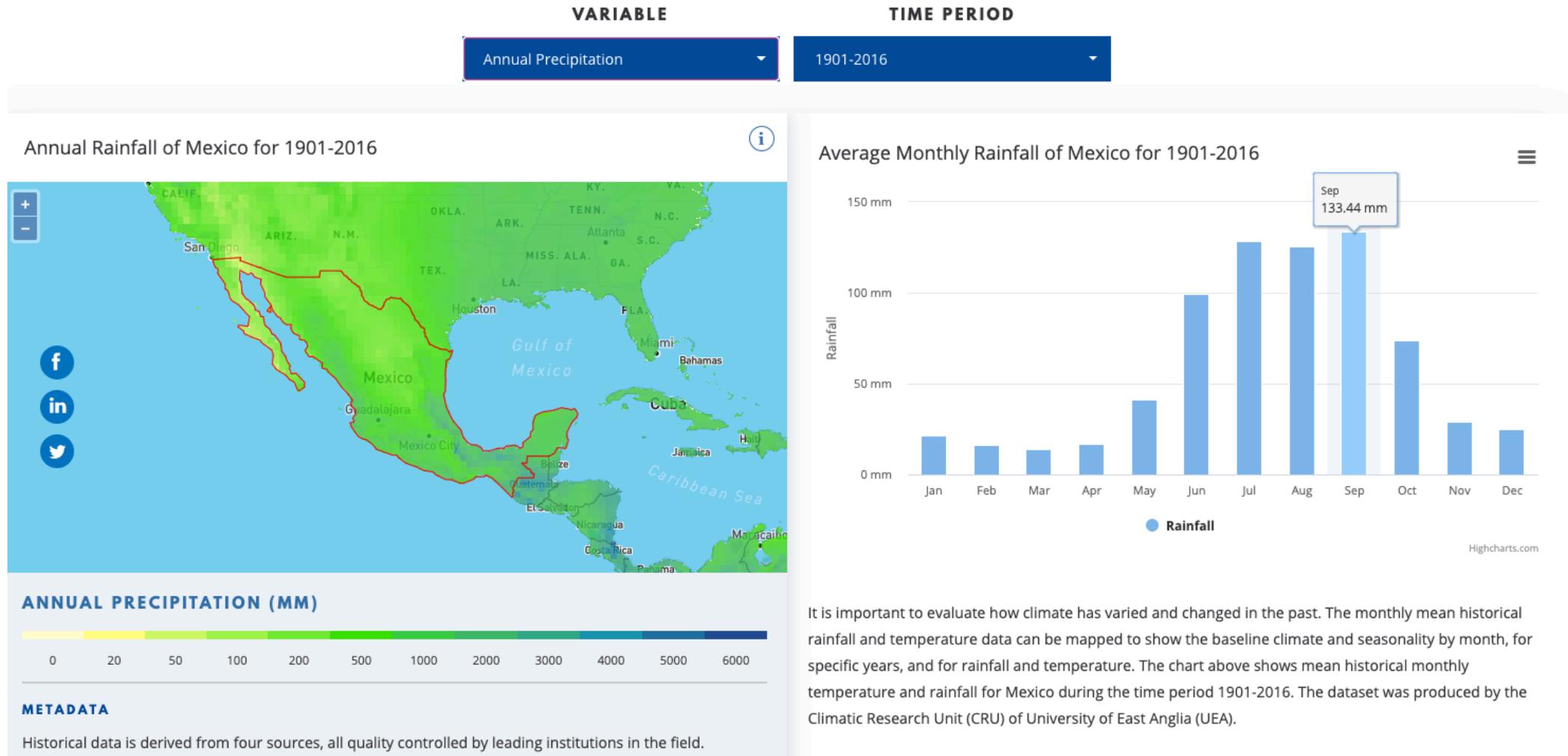
Average Monthly Temperature of Mexico for 1991-2016



Highcharts.com

It is important to evaluate how climate has varied and changed in the past. The monthly mean historical rainfall and temperature data can be mapped to show the baseline climate and seasonality by month, for specific years, and for rainfall and temperature. The chart above shows mean historical monthly temperature and rainfall for Mexico during the time period 1991-2016. The dataset was produced by the Climatic Research Unit (CRU) of University of East Anglia (UEA).

Climate Data: Historical



Climate Data: Projections

OVERVIEW CLIMATE DATA CLIMATE BY SECTOR VULNERABILITY IMPACTS ADAPTATION

HISTORICAL PROJECTIONS

Climate Data > Projections

The climate science community sources a suite of global climate models to help decision makers understand the projections of future climate change and related impacts, among the most widely used are the [Coupled Model Intercomparison Project, Phase 5 \(CMIP5\)](#) models included in the [IPCC's Fifth Assessment Report \(AR5\)](#). Climate projections can be presented via individual models or through multi-model ensembles. The Climate Change Knowledge Portal (CCKP) supports the analysis of climate impacts using multi-model ensembles, as they represent the range and distribution of the most plausible projected outcomes when representing expected changes.

Temperature

- Mean temperature is projected to increase by 1.1 to 3°C by the 2060's and by 1.3 to 4.8°C by the 2090's. The projected rate of warming is similar in all seasons, but more rapid in the north and central regions of the country.
- Annually, projections indicate that 18%-34% of days will be "hot" by the 2060's, and on 22%-54% of days by the 2090's.
- All projections indicate decreases in the frequency of days and nights that are considered "cold" in the current climate.

Precipitation

Aggregated Country Statistics

Projected Climate Trends

39 Unique Climate Indices

Climate Change Knowledge Portal
For Development Practitioners and Policy Makers

Monthly Temperature

Essential Climate Variables

Monthly Temperature

Monthly Maximum Temperature

Monthly Minimum Temperature

Monthly Precipitation

Temperature Indicators

- Maxima of Daily Tmax
- Minima of Daily Tmin
- Summer Days (Tmax>25°C)
- Tropical Nights (Tmin>20°C)
- Frost Days (Tmin<0°C)
- Ice Days (Tmax<0°C)
- Hot Day (Tmax>35°C)
- Hot Day (Tmax>40°C)
- Heat Index 35

Precipitation Indicators

- Days with Rainfall > 20mm
- Maximum Monthly Rainfall (10-yr RL)
- Maximum Monthly Rainfall (25-yr RL)
- Days with Rainfall > 50mm
- Rainfall of Very Wet Days
- Maximum Daily Rainfall
- Maximum 5-day Rainfall
- Maximum Daily Rainfall (10-yr RL)
- Maximum 5-day Rainfall (10-yr RL)
- Maximum Daily Rainfall (25-yr RL)
- Maximum 5-day Rainfall (25-yr RL)

Agriculture Indicators

- Growing Season Length
- Days of Consecutive Dry Spell
- Days of Consecutive Wet Spell
- Rainfall Seasonality

Drought/Water Indicators

- Mean Drought Index
- Severe Drought Likelihood
- Monthly Rainfall Range
- Annual Rainfall Range

Energy Indicators

- Heating Degree Days
- Cooling Degree Days

Climate Data: Projections

Define time period, statistic, scenario, model for tailored climate information

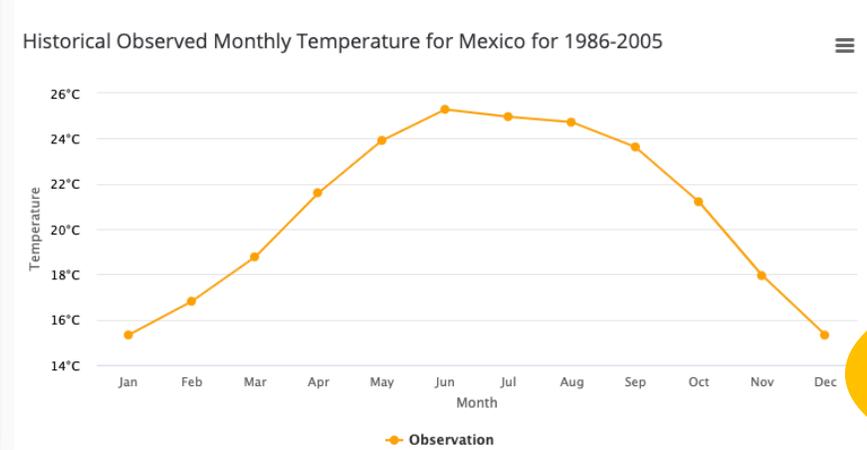
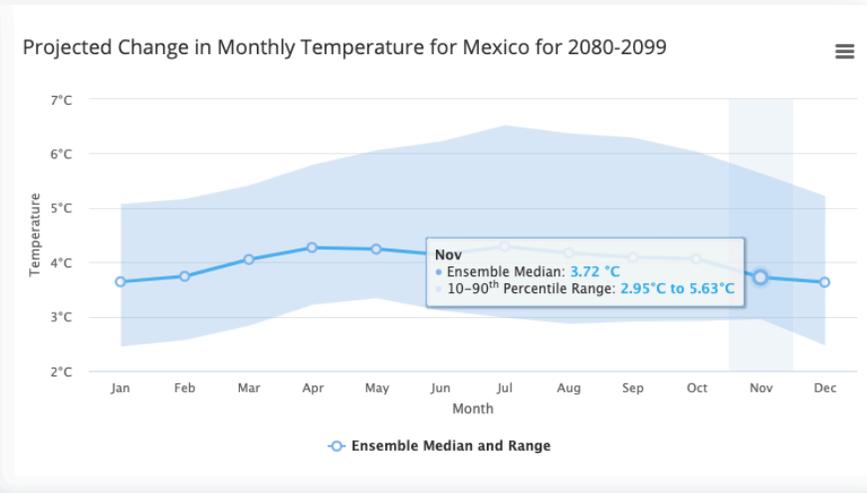
VARIABLE: Monthly Temperature |
 TIME PERIOD: 2080-2099 |
 STATISTIC: Change (anomaly) |
 SCENARIO: RCP 8.5 (High emission) |
 MODEL: ensemble

Projected Change in Monthly Temperature of Mexico for 2080-2099 (Compared to 1986-2005)

MONTHLY TEMPERATURE (°C)

METADATA
 Future climate information is derived from 35 available global circulation models (GCMs) used by the Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report. Data is presented at a 1°x1° global grid spacing, produced through bi-linear interpolation. [+ Source \(PDF\)](#)

DATA DESCRIPTION
 Mean or change in monthly temperature compared to the reference period (1986-2005). In general, value of monthly temperature change varies between 0 and 4 degrees. Zero value indicates there is no change in projected monthly temperature compared to historical mean.

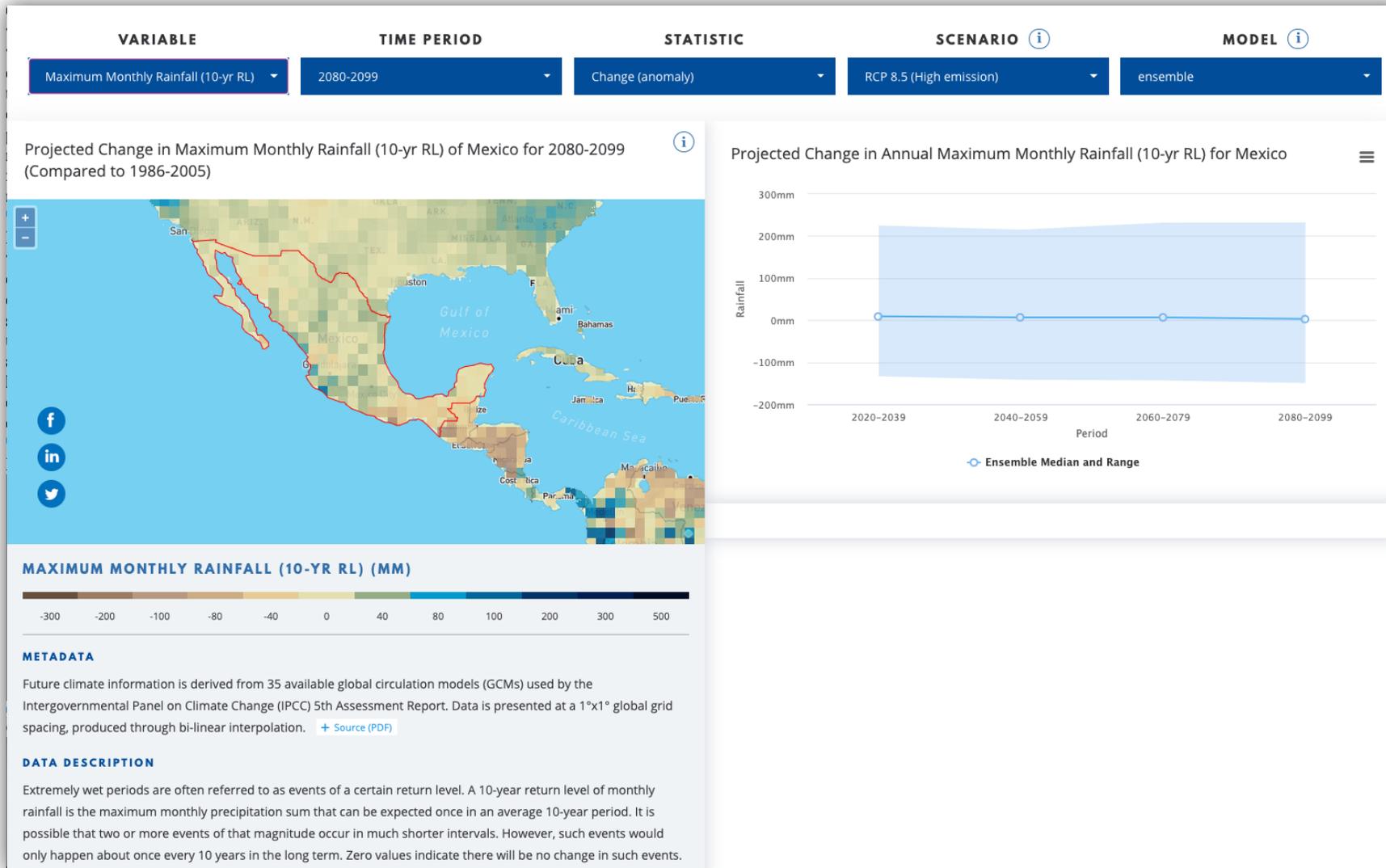


Change in Monthly Temperatures:

- Projections for increasing temperatures expected to occur most significantly and rapidly in northern arid zones, central and coastal regions
- Higher rates of evapotranspiration, impacts to aridity and drought and water supply

Compare Against Historical Trends

Climate Data: Projections



Change in Maximum Daily Rainfall (10yr RL):

- Implications of changing precipitation patterns will impact the rates of surface water infiltration and the recharge rates for groundwater.
- Low-water storage capacity increases dependence on unreliable rainfall patterns.

Climate Data: Projections

VARIABLE: Days of Consecutive Dry Spell | TIME PERIOD: 2080-2099 | STATISTIC: Change (anomaly) | SCENARIO: RCP 8.5 (High emission) | MODEL: ensemble

Projected Change in Days of Consecutive Dry Spell of Mexico for 2080-2099 (Compared to 1986-2005)



DAYS OF CONSECUTIVE DRY SPELL



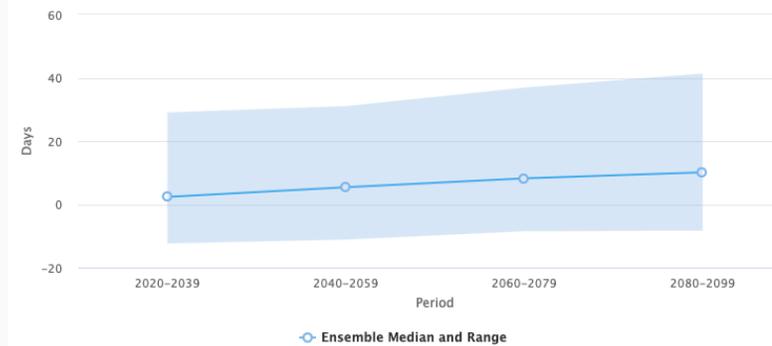
METADATA

Future climate information is derived from 35 available global circulation models (GCMs) used by the Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report. Data is presented at a 1°x1° global grid spacing, produced through bi-linear interpolation. [+ Source \(PDF\)](#)

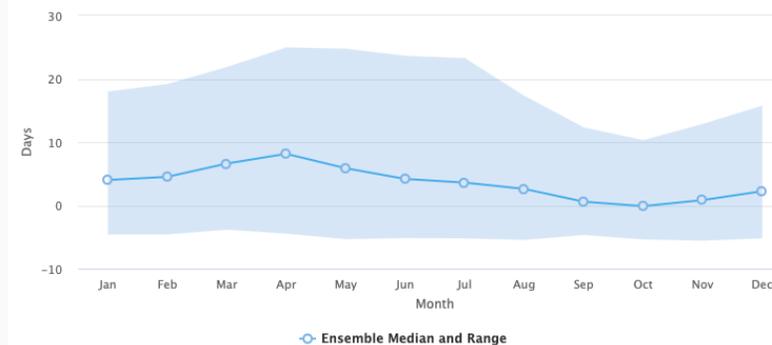
DATA DESCRIPTION

The maximum length of consecutive dry spell is the number of days in the longest period without significant rainfall of at least 1mm. This is a critical measure for rain-fed agriculture. If the gaps between rainfall episodes are too long, crop yields could be damaged or destroyed. In many mid-latitude locations, the intensification of dry conditions comes along with longer intervals without rainfall. Zero values indicate there will be no change in such events. For example, a consecutive dry spell of 95 days for May indicates that the dry conditions have lasted more than three months by the end of May. If that value increases in June to 105, then an additional 10 days of dry conditions should be expected in June. In very rare occasions, the dry conditions can last even longer than a year because this indicator

Projected Change in Days of Consecutive Dry Spell for Mexico



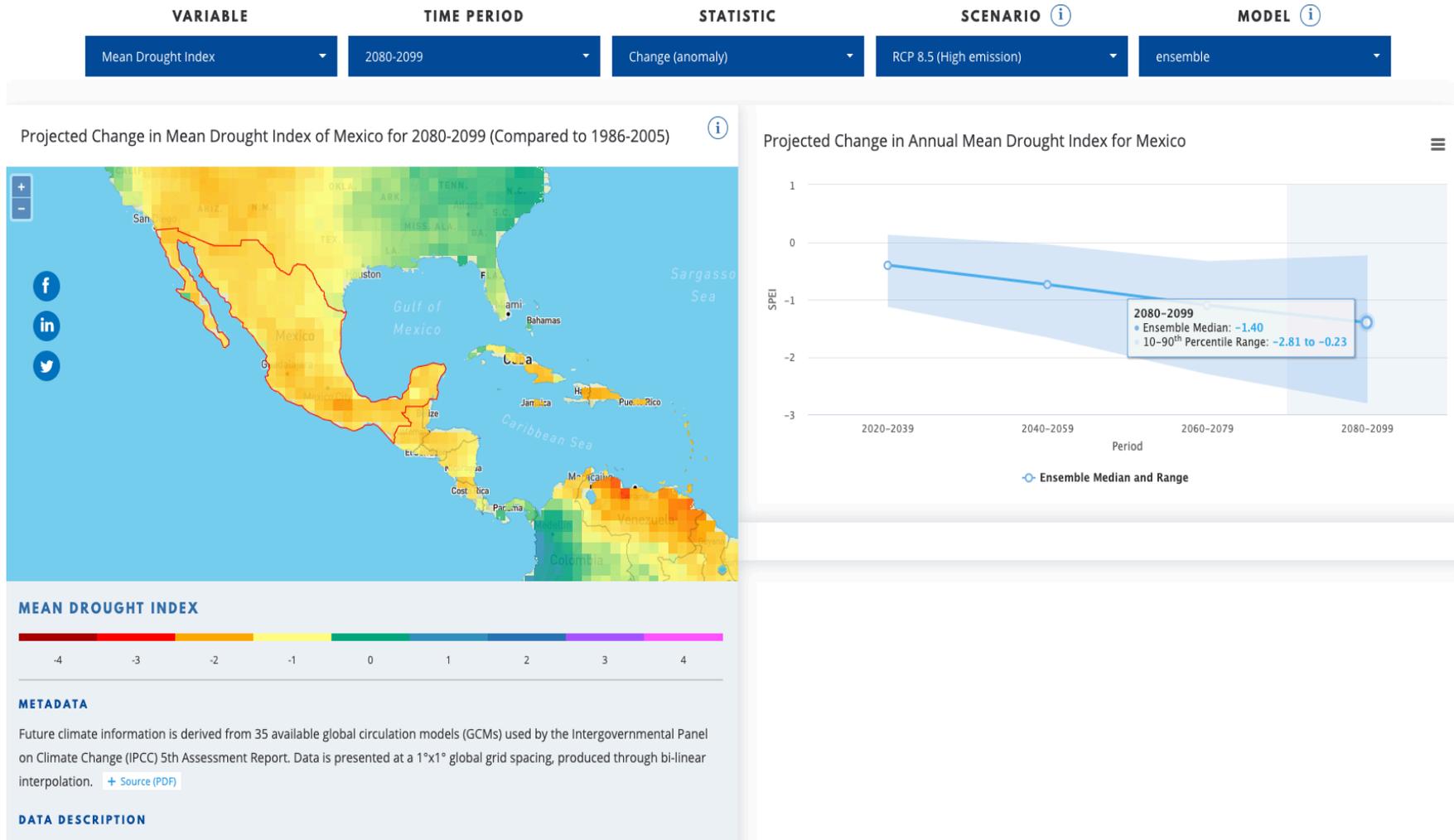
Projected Change in Days of Consecutive Dry Spell for Mexico for 2080-2099



Change in Consecutive Dry Days:

- Implications for surface water and aquifer recharge
- Water quality and water quantity expected to reduce; impacts to humans, ecosystems, habitats

Climate Data: Projections



Change in Mean Drought Index:

- Increasing aridity for Mexico's central and southern regions and southern coast, exacerbates existing issues around water scarcity and drought periods
- Consecutive dry days are expected to increase, while extreme rainfall events may also increase, which will impact surface water runoff

Climate by Sector: Water

The screenshot shows the 'Climate Change Knowledge Portal' website. At the top, there is a navigation bar with links for 'GLOSSARY' and 'METADATA'. Below this, a secondary navigation bar includes 'COUNTRY', 'REGION', 'WATERSHED', 'DOWNLOAD DATA', 'COUNTRY PROFILES', and 'AGRICULTURE PROFILE'. The main header area features a large image of a mountain landscape with the text 'COUNTRY Mexico' and a descriptive paragraph: 'Explore historical and projected climate data, climate data by sector, impacts, key vulnerabilities and what adaptation measures are being taken. Explore the overview for a general context of how climate change is affecting Mexico.' Below the header is a blue navigation bar with tabs for 'OVERVIEW', 'CLIMATE DATA', 'CLIMATE BY SECTOR', 'VULNERABILITY', 'IMPACTS', and 'ADAPTATION'. Under 'CLIMATE BY SECTOR', there are sub-tabs for 'ENERGY', 'WATER', 'AGRICULTURE', and 'HEALTH', with 'WATER' highlighted in a yellow box. The main content area is titled 'Climate by Sector > Water' and contains a paragraph explaining that water supply is affected by weather and climate, and that demand is expected to increase under climate change. A 'GENERAL RESOURCES' sidebar on the right lists three items: 'Tool: Interactive Climate Indicator Dashboard - Water (WBG)', 'Tool: Global Forecast Drought Tool (WBG)', and 'Working Paper: Physical Impacts of Climate Change on Water Resources (WBG)'. A bolded note at the bottom states: 'This section provides the visualization of four climate indices that are most relevant for water sector.'

Climate Change Knowledge Portal
For Development Practitioners and Policy Makers

GLOSSARY METADATA

COUNTRY REGION WATERSHED DOWNLOAD DATA COUNTRY PROFILES AGRICULTURE PROFILE

COUNTRY
Mexico

Explore historical and projected climate data, climate data by sector, impacts, key vulnerabilities and what adaptation measures are being taken. Explore the overview for a general context of how climate change is affecting **Mexico**.

OVERVIEW CLIMATE DATA **CLIMATE BY SECTOR** VULNERABILITY IMPACTS ADAPTATION

ENERGY **WATER** AGRICULTURE HEALTH

Climate by Sector > Water

The supply of water is directly affected by weather and climate. Next to the critical water input through precipitation at daily, monthly and seasonal scales, also the loss through evapotranspiration should be taken into consideration. Particularly high temperatures, low humidity and high winds can efficiently remove water from the land surface. Equally, the demand for water is expected to evolve under climate change, particularly as they relate to often rapidly changing demographic and economic settings. These changes generally increase the operational challenges and risk for the water sector.

This section provides the visualization of four climate indices that are most relevant for water sector.

GENERAL RESOURCES

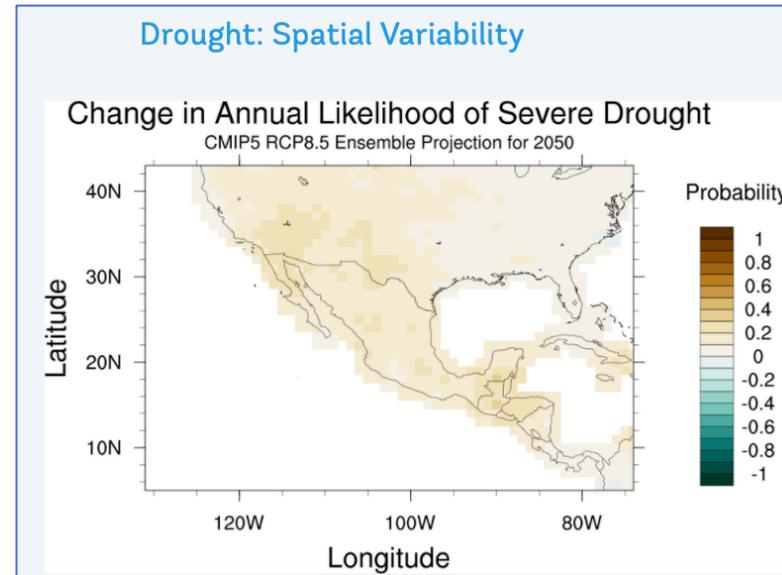
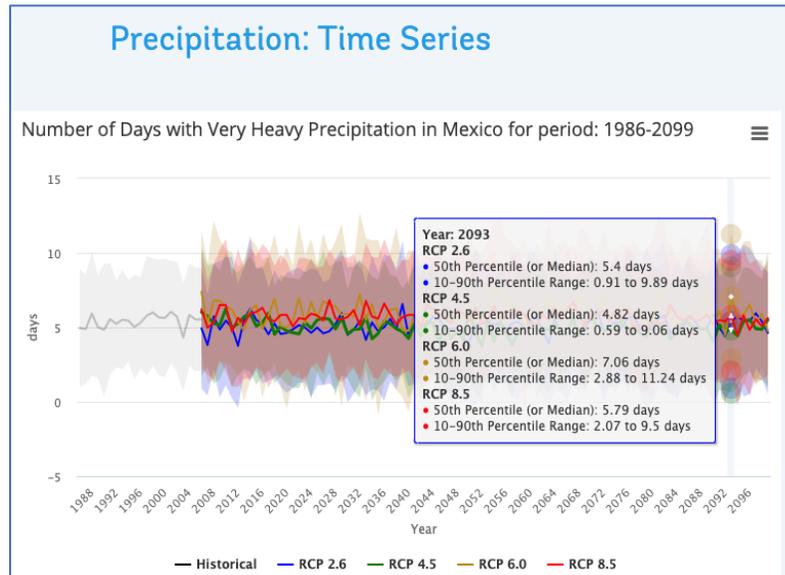
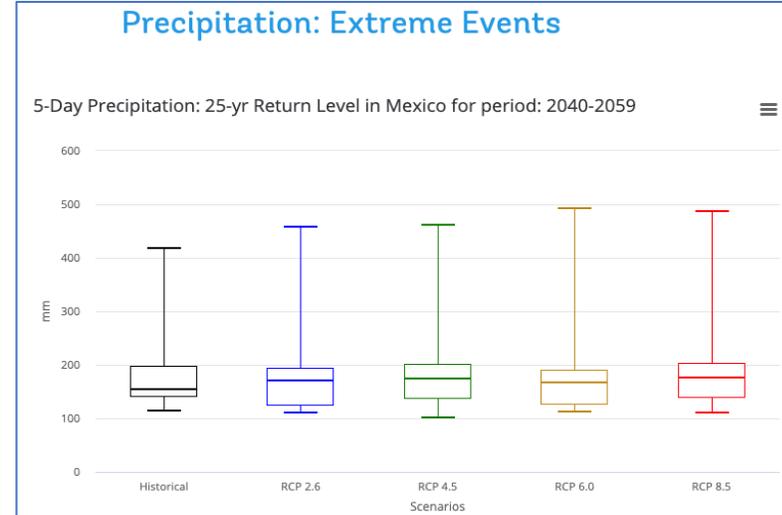
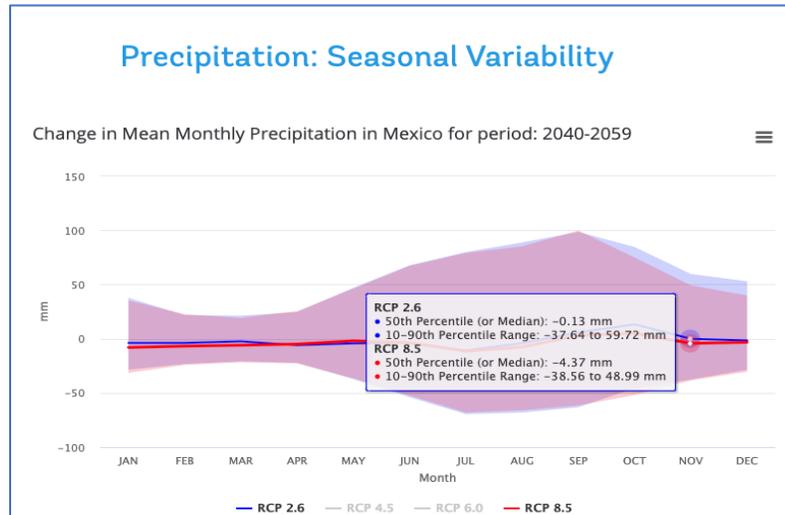
[Tool: Interactive Climate Indicator Dashboard - Water \(WBG\)](#)

[Tool: Global Forecast Drought Tool \(WBG\)](#)

[Working Paper: Climate Change, Water, and the Economy \(WBG\)](#)

[Working Paper: Physical Impacts of Climate Change on Water Resources \(WBG\)](#)

Climate by Sector: Water



Sector specific indicators present a high-level summary of potential future climate change impacts.

Climate variability and change impose different problems for different sectors. While general trends can be used to outline emerging challenges, the dominant factors affecting ecosystems and people vary strongly on a case-by-case basis.

The selection and visualization of key climate indicators per sector was conducted through a participatory consultation process with sector specialists and development project leaders.

Interactive Sector Dashboards: Water

The screenshot displays the 'Climate Change Knowledge Portal' for Mexico, specifically the 'Water' sector dashboard. The page features a navigation bar with options like 'COUNTRY', 'REGION', 'WATERSHED', 'DOWNLOAD DATA', 'COUNTRY PROFILES', and 'AGRICULTURE PROFILE'. The main content area is titled 'Mexico' and includes a descriptive paragraph about exploring historical and projected climate data. A secondary navigation bar highlights 'CLIMATE BY SECTOR', with sub-options for 'ENERGY', 'WATER', 'AGRICULTURE', and 'HEALTH'. The 'Water' section is active, showing a detailed text block about water supply and demand, and a 'GENERAL RESOURCES' sidebar with links to various tools and working papers. The link 'Tool: Interactive Climate Indicator Dashboard - Water (WBG)' is highlighted with a yellow border.

Climate Change Knowledge Portal
For Development Practitioners and Policy Makers

GLOSSARY METADATA

COUNTRY REGION WATERSHED DOWNLOAD DATA COUNTRY PROFILES AGRICULTURE PROFILE

COUNTRY

Mexico

Explore historical and projected climate data, climate data by sector, impacts, key vulnerabilities and what adaptation measures are being taken. Explore the overview for a general context of how climate change is affecting **Mexico**.

OVERVIEW CLIMATE DATA CLIMATE BY SECTOR VULNERABILITY IMPACTS ADAPTATION

ENERGY WATER AGRICULTURE HEALTH

Climate by Sector > Water

The supply of water is directly affected by weather and climate. Next to the critical water input through precipitation at daily, monthly and seasonal scales, also the loss through evapotranspiration should be taken into consideration. Particularly high temperatures, low humidity and high winds can efficiently remove water from the land surface. Equally, the demand for water is expected to evolve under climate change, particularly as they relate to often rapidly changing demographic and economic settings. These changes generally increase the operational challenges and risk for the water sector.

This section provides the visualization of four climate indices that are most relevant for water sector.

GENERAL RESOURCES

- [Tool: Interactive Climate Indicator Dashboard - Water \(WBG\)](#)
- [Tool: Global Forecast Drought Tool \(WBG\)](#)
- [Working Paper: Climate Change, Water, and the Economy \(WBG\)](#)
- [Working Paper: Physical Impacts of Climate Change on Water Resources \(WBG\)](#)

Interactive Sector Dashboards: Water

Use sub-sector dashboards to gather tailored information

Pre-loaded variables most suited for identifying and understanding sector and sub-sector contexts

WORLD BANK GROUP Climate Change Knowledge Portal
For Development Practitioners and Policy Makers

Water

LAND USE / WATERSHED MANAGEMENT | DAMS & RESERVOIRS | WATER SUPPLY | WASTEWATER | SANITATION

Country and Time Period Selector

Country selected on the CCKP site. But the pulldowns allow the user to select a different country and / or different 20-year time period for exploring the projected changes

Latin America | Mexico | 2080-2099

Temperature

- Average Temperature
- Average Daily Max-Temperature
- Number of Frost Days (Tmin < 0°C)
- Number of Summer Days (Tmax > 25°C)
- Warm Spell Duration Index
- Cold Spell Duration Index

Flooding

- 10-yr return level of 5-Day Precipitation
- 25-yr return level of 5-Day Precipitation
- Days with Precipitation >20mm
- Max number of consecutive wet days

Drought

- Average Precipitation
- Number of Summer Days (Tmax > 25°C)
- Annual SPEI drought index

Water Quality

- Number of Tropical Nights (T-min > 20°C)
- Maximum of Daily Max-Temperature
- Average largest 1-Day Precipitation
- Average largest 5-day cumulative rainfall
- Max number of consecutive dry days
- Max number of consecutive wet days**

Projected Change 2080-2099 in Spatial Variation

Reference Period:1986-2005. Country: Mexico

on period, climate scenario relevant for climate-induced hazards through the drop-down menu. Some information is available from dual models, but it is recommended to primarily focus on the Multi-Model Ensemble

Scenario: Model Source:

This series measures the maximum length of a wet spell, computed sequentially for the entire time series, then taking the maximum value during each month in the data period (a wet day is defined as any day in which the daily accumulated precipitation \geq 1 mm).

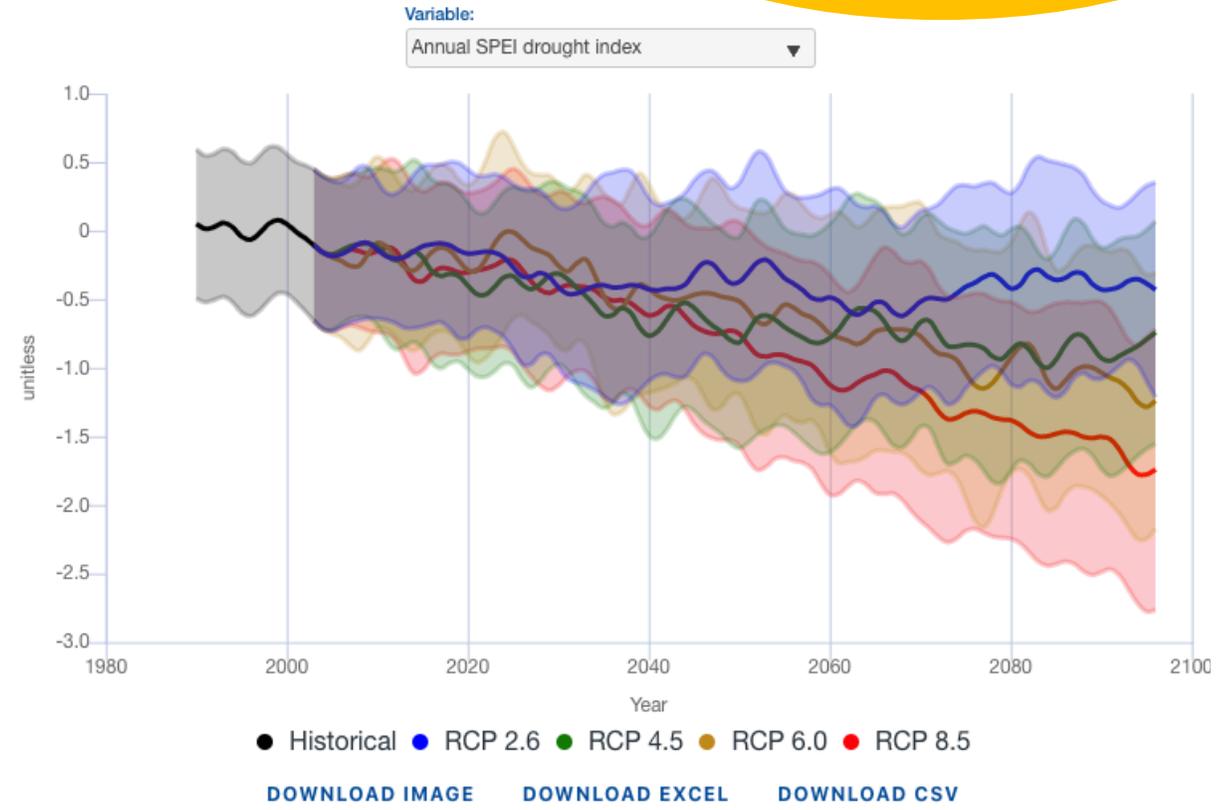
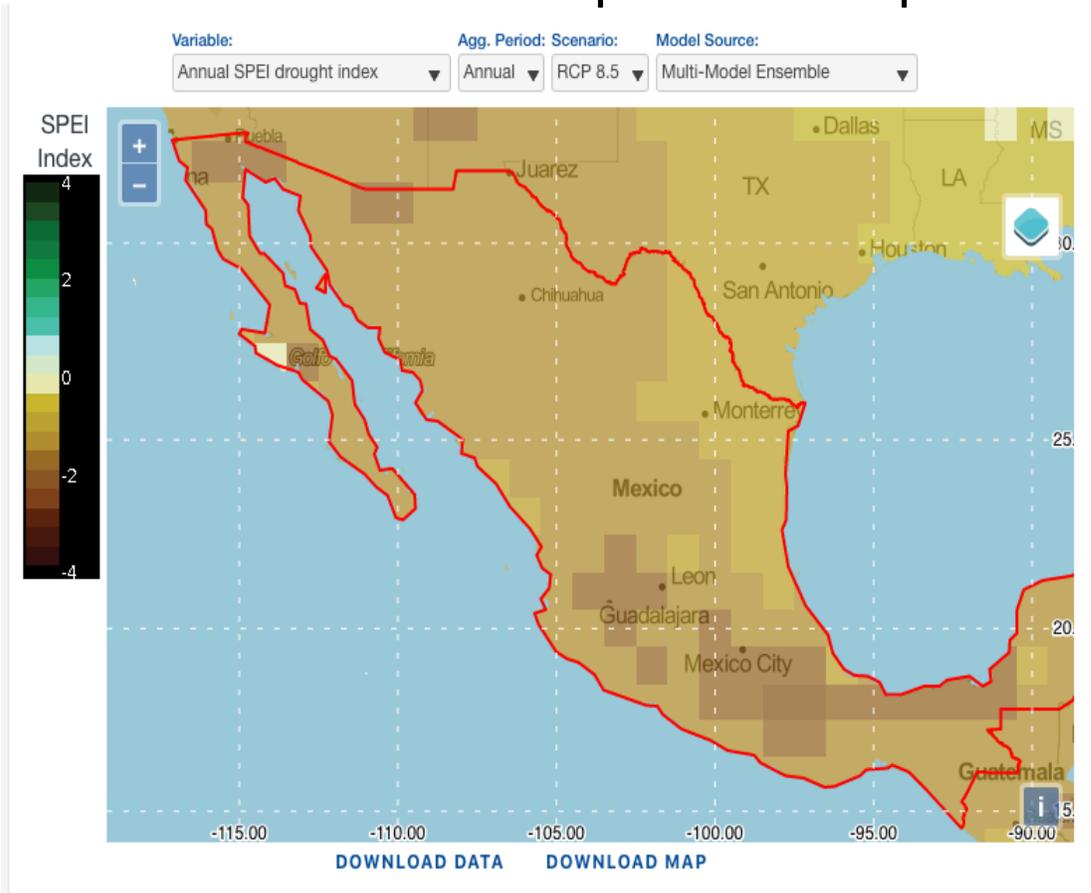
- + HAZARD OVERVIEW FOR THE SUB-SECTOR
- + GUIDE TO THE MAP / SPATIAL VIEW
- + CAVEATS AND UNCERTAINTIES

Interactive Sector Dashboards: Water

Example:

Standardized Precipitation Evapotranspiration Index (SPEI)

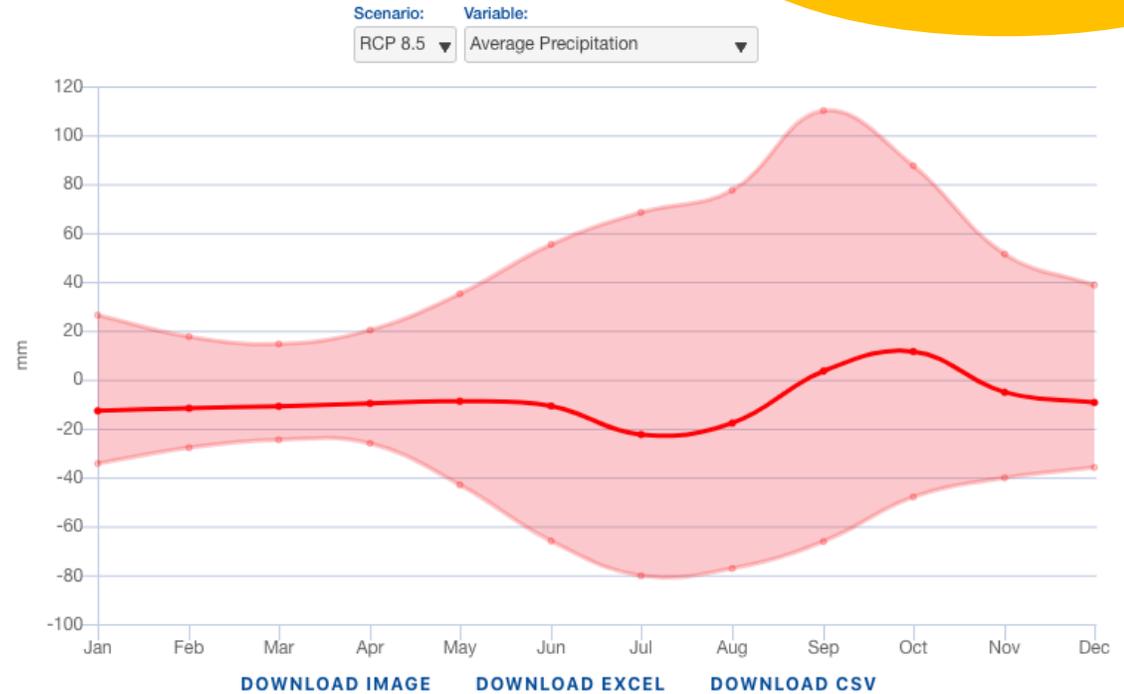
Compare spatial variation to nationally aggregated projection trends



Interactive Sector Dashboards: Water

Example:
Average Precipitation

Compare change
across the seasonal
cycle



STAP's Question 2

How will the project be affected by climate risks over the period 2020 to 2050, and have the impacts been addressed adequately?

have drivers of the climate vulnerabilities been analyzed for the project and planned interventions?

Information that would be useful includes:

- **Expected climate impacts and level of severity** on targeted components at project location.
- Impacts on the efficacy of proposed interventions.
- Will proposed intervention reduce or decrease climate vulnerability?
- Potential for maladaptation.



Vulnerability: Natural Hazards

COUNTRY

Mexico

Explore historical and projected climate data, climate data by sector, impacts, key vulnerabilities and what adaptation measures are being taken. Explore the overview for a general context of how climate change is affecting **Mexico**.

Vulnerability

Overall risks from climate-related impacts are evaluated based on the interaction of climate-related hazards (including hazardous events and trends) with the vulnerability of communities (susceptibility to harm and lack of capacity to adapt), and exposure of human and natural systems. Changes in both the climate system and socioeconomic processes -including adaptation and mitigation actions- are drivers of hazards, exposure, and vulnerability ([IPCC Fifth Assessment Report, 2014](#)).

This section provides a summary of key natural hazards and their associated socioeconomic impacts in a given country. And it allows quick evaluation of most vulnerable areas through the spatial comparison of natural hazard data with development data, thereby identifying exposed livelihoods and natural systems.

GENERAL RESOURCES

[Tool: Global Forecast Drought Tool \(WBG\)](#)

[Global Risk Data Platform \(UNEP, UNISDR\)](#)

[Report: Shock Waves \(WBG\)](#)

[The International Disaster Database \(CRED\)](#)

[Tool: Think Hazard \(WBG, GFDRR\)](#)

[Report: Unbreakable \(WBG\)](#)

Vulnerability: Natural Hazards

Natural Hazard Statistics

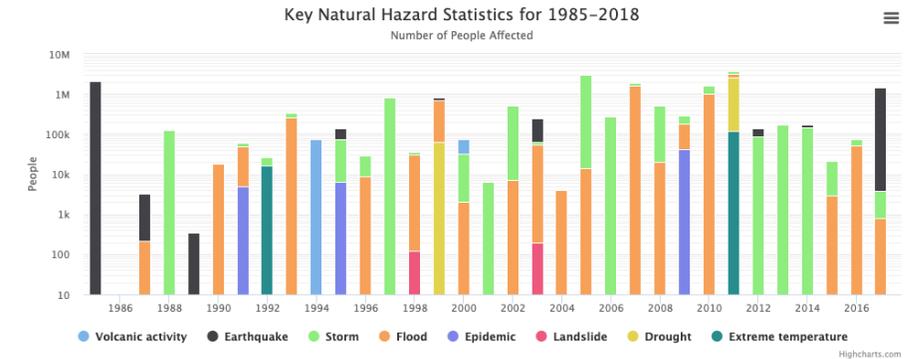
The charts provide overview of the most frequent natural disaster in a given country and understand the impacts of those disasters on human populations.

Overview

- Over 40% of the country's territory and nearly one-third of the population is exposed to hurricanes, storms, floods, earthquakes, and volcanic eruptions.
- Mexico's coastlines are vulnerable to tropical cyclones and hurricanes from both the Atlantic and Pacific Oceans.

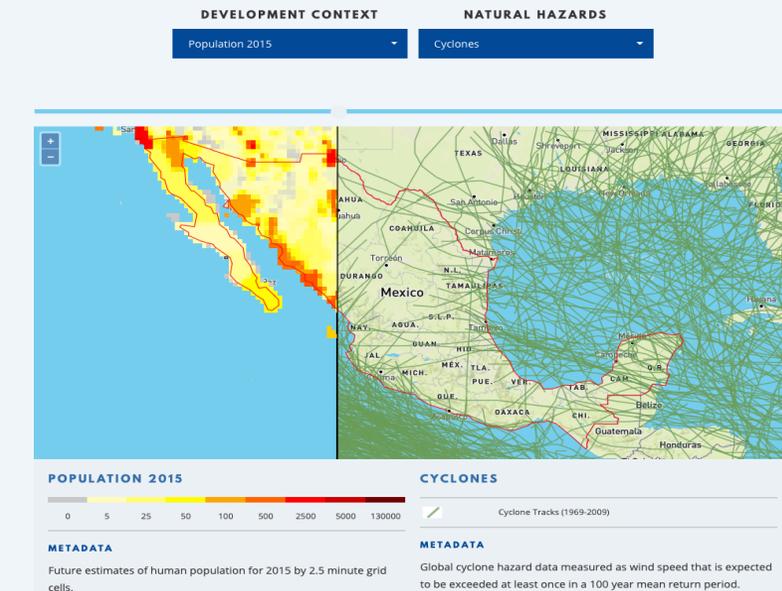
Climate Change Impacts

- Extreme rainfall events may result in soil erosion, mudslides and watershed degradation
- higher temperatures and drought threatens to reduce water storage capacity
- Urbanization and increasing population pressures exacerbated competing demands of natural environment, consumption needs and other water uses such as crop irrigation



Natural Hazard / Development Nexus

This tool allows the overlay of different natural hazard maps with social economic datasets by sliding the bar horizontally, which provides a broad sense of vulnerable areas.



Impacts: Mexico's Coastal Zones

The screenshot shows the 'Climate Change Knowledge Portal' website. The main navigation bar includes 'COUNTRY', 'REGION', 'WATERSHED', 'DOWNLOAD DATA', 'COUNTRY PROFILES', and 'AGRICULTURE PROFILE'. The 'COUNTRY' section is active, displaying 'Mexico' with a description: 'Explore historical and projected climate data, climate data by sector, impacts, key vulnerabilities and what adaptation measures are being taken. Explore the overview for a general context of how climate change is affecting Mexico.' Below this is a secondary navigation bar with 'OVERVIEW', 'CLIMATE DATA', 'CLIMATE BY SECTOR', 'VULNERABILITY', 'IMPACTS', and 'ADAPTATION'. Under 'IMPACTS', there are sub-categories: 'AGRICULTURE', 'WATER', and 'SEA LEVEL RISE', which is highlighted with a yellow box. The main content area is titled 'Impacts > Sea Level Rise' and contains a detailed paragraph about sea level rise (SLR) and its impacts on coastal ecosystems and communities. To the right, there is a 'GENERAL RESOURCES' section with links to 'Tool Sea Level Change Data Analysis (NASA)', 'Tool: Sea Level Rise Data (NOAA)', 'Report: Shock Waves (WBG)', and 'Report: Unbreakable (WBG)'. A 'SEE ALL' link is also present. At the bottom, a summary statement reads: 'The section facilitates the exploration of spatial variability and trends in historical sea level anomaly and sea surface temperature.'

Climate Change Knowledge Portal
For Development Practitioners and Policy Makers

GLOSSARY METADATA

COUNTRY REGION WATERSHED DOWNLOAD DATA COUNTRY PROFILES AGRICULTURE PROFILE

COUNTRY
Mexico

Explore historical and projected climate data, climate data by sector, impacts, key vulnerabilities and what adaptation measures are being taken. Explore the overview for a general context of how climate change is affecting Mexico.

OVERVIEW CLIMATE DATA CLIMATE BY SECTOR VULNERABILITY IMPACTS ADAPTATION

AGRICULTURE WATER **SEA LEVEL RISE**

Impacts > Sea Level Rise

Sea level rise (SLR) is the sum of oceanic thermal expansion, ice melt from glaciers and small ice sheets, melt and ice loss from Greenland and Antarctica, and changes in terrestrial water storage. SLR is accelerating in response to climate change and is producing significant impacts already being felt by coastal ecosystems and communities. SLR and other oceanic climate change will result in salinization, flooding and erosion and affect human and ecological systems, including health, heritage, freshwater, biodiversity, agriculture, fisheries and other services. Increased heat in the upper layers of the ocean is also driving more intense storms and greater rates of inundation, which, together with SLR, are already driving significant impacts to sensitive coastal and low-lying areas. By the end of the 21st century, it is very likely that sea level will rise in more than about 95% of the ocean area and about 70% of the coastlines worldwide are projected to experience a sea level change within $\pm 20\%$ of the global mean (IPCC Global Warming of 1.5 °C Report, 2018).

GENERAL RESOURCES

- [Tool Sea Level Change Data Analysis \(NASA\)](#)
- [Tool: Sea Level Rise Data \(NOAA\)](#)
- [Report: Shock Waves \(WBG\)](#)
- [Report: Unbreakable \(WBG\)](#)

SEE ALL

The section facilitates the exploration of spatial variability and trends in historical sea level anomaly and sea surface temperature.

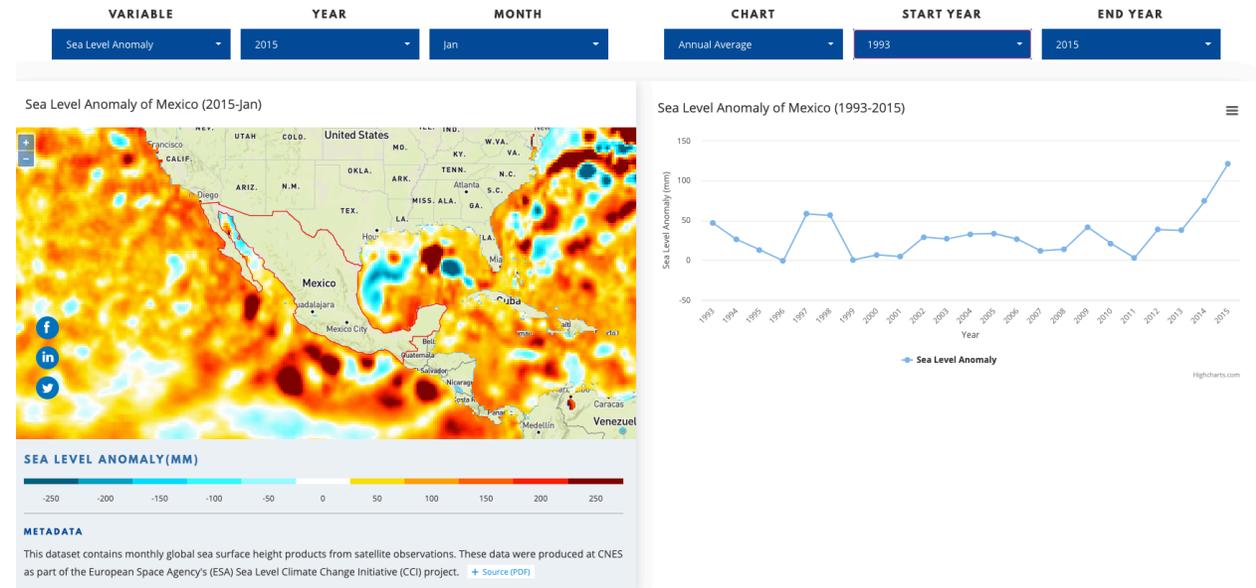
Impacts: Mexico's Coastal Zones

Overview

- Coastal zone is vulnerable to a range of climate stressors, including rising sea surface temperatures, ocean acidification, changes in ocean circulation and changes in patterns of extreme weather, including hurricanes.

Climate Change Impacts

- Fishing and port activities are also disrupted by coastal storms that bring heavy rainfall, storm surge and strong winds.
- The states of Veracruz, Tabasco, Campeche and Quintana Roo in the south are major tourist destinations but also are some of the most vulnerable states to severe weather
- An increase in the frequency and intensity of extreme storms will damage coastal infrastructure and ecosystem services and erode beaches.
- Sea level rise will increase salinity, damaging coastal aquifers, agricultural land, wetlands, and ecosystems



Impacts: Mexico's Water Sector

The screenshot shows the 'Climate Change Knowledge Portal' website. The main navigation bar includes 'COUNTRY', 'REGION', 'WATERSHED', 'DOWNLOAD DATA', 'COUNTRY PROFILES', and 'AGRICULTURE PRO'. The 'COUNTRY' section is active, displaying 'Mexico' with a description: 'Explore historical and projected climate data, climate data by sector, impacts, key vulnerabilities and what adaptation measures are being taken. Explore the overview for a general context of how climate change is affecting Mexico.' Below this is a secondary navigation bar with 'OVERVIEW', 'CLIMATE DATA', 'CLIMATE BY SECTOR', 'VULNERABILITY', 'IMPACTS', and 'ADAPTATION'. The 'IMPACTS' section is active, showing 'AGRICULTURE', 'WATER', and 'SEA LEVEL RISE'. The 'WATER' option is highlighted with a yellow box. The main content area is titled 'Impacts > Water' and contains a paragraph about water stress and a 'GENERAL RESOURCES' sidebar with links to reports and working papers.

Climate Change Knowledge Portal
For Development Practitioners and Policy Makers

COUNTRY REGION WATERSHED DOWNLOAD DATA COUNTRY PROFILES AGRICULTURE PRO

COUNTRY
Mexico

Explore historical and projected climate data, climate data by sector, impacts, key vulnerabilities and what adaptation measures are being taken. Explore the overview for a general context of how climate change is affecting **Mexico**.

OVERVIEW CLIMATE DATA CLIMATE BY SECTOR VULNERABILITY **IMPACTS** ADAPTATION

AGRICULTURE **WATER** SEA LEVEL RISE

Impacts > Water

Over the past century, substantial growth in population, industrial and agricultural activities, and living standards have exacerbated water stress in many parts of the world, especially in semi-arid and arid regions. Climate change, however, will regionally exacerbate or offset the effects of population pressure for the next decades. It is projected to reduce renewable surface water and groundwater resources significantly in most dry subtropical regions. In contrast, water resources are projected to increase at high latitudes. Proportional changes are typically one to three times greater for runoff than for precipitation. Furthermore, Climate change is projected to reduce raw water quality, posing risks to drinking water quality even with conventional treatment ([IPCC Fifth Assessment, 2014](#)).

This section provides insights into projected climate change impacts on various hydrological indicators.

GENERAL RESOURCES

- [Report: Groundswell \(WBG\)](#)
- [Working Paper: Climate Change, Water, and the Economy \(WBG\)](#)
- [Working Paper: Physical Impacts of Climate Change on Water Resources \(WBG\)](#)

SEE ALL

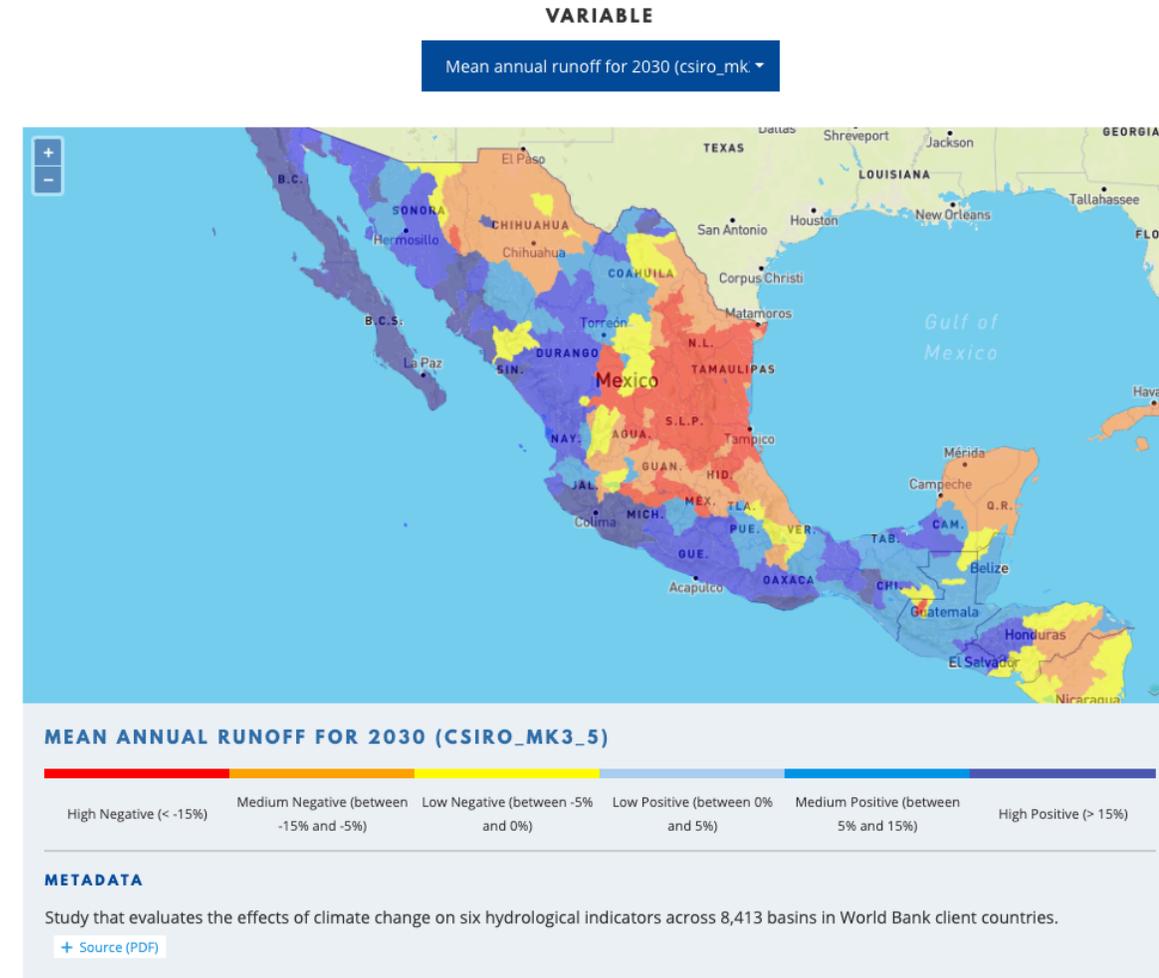
Impacts: Mexico's Water Sector

Overview

- Rainfall decline will affect runoff in rivers, water stored in dams and aquifer recharge. Saltwater intrusion into coastal aquifers from rising seas will further deplete freshwater supplies.

Climate Change Impacts

- Projections suggest reductions in surface water and groundwater supplies as well as decreased groundwater recharge from reduced precipitation.
- Increased periods of drought and the reduction in rainfall will reduce the country's hydro-power potential and may lead to disruption in energy supplies; especially in the increasing heat of the summer periods at times of peak demand.



Impacts: Mexico's Water Sector

Overview

- The majority of inland Mexico is projected to experience reduced rainfall, including an increase in consecutive dry days, particularly in the country's northern areas; likely lead to reductions in surface waters and the supply of freshwater.

Climate Change Impacts

- By the 2050s, Mexico City is projected to experience a reduction of between 10% to 17% in its per capita water supply.
- Increased periods of drought and the reduction in rainfall will reduce the country's hydro-power potential and may lead to disruption in energy supplies; especially in the increasing heat of the summer periods at times of peak demand.

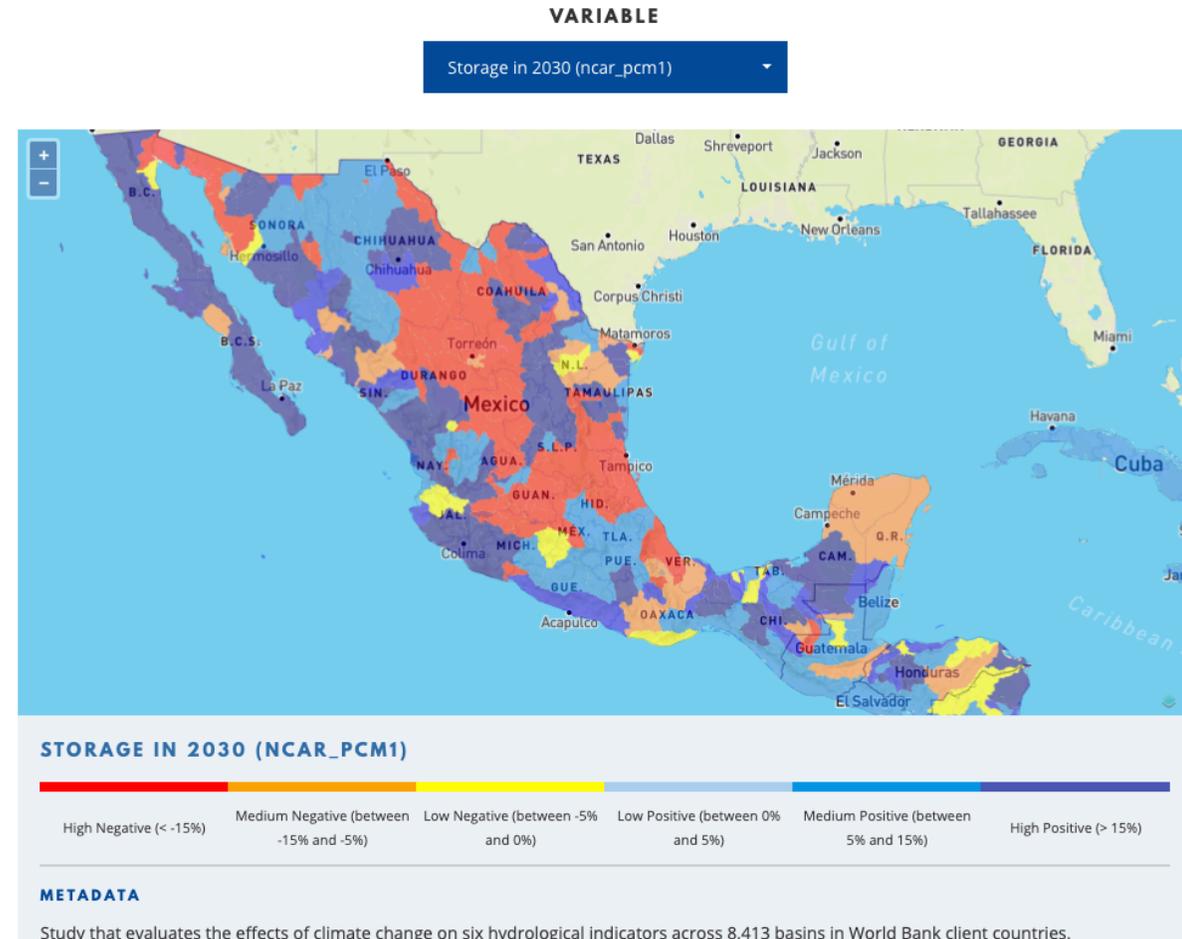
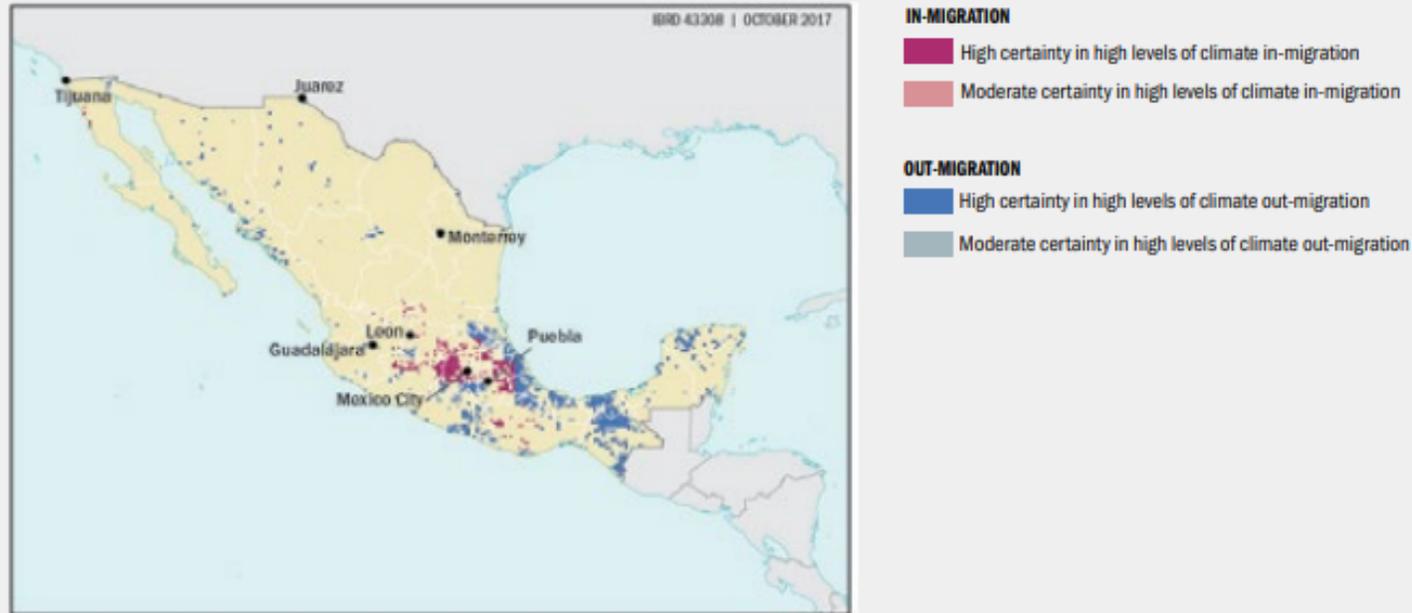


Figure 5.24: Hotspots projected to have high levels of climate in-migration and climate out-migration in Mexico, 2030 and 2050



Note: High certainty reflects agreement across all three scenarios modeled, and moderate certainty reflects agreement across two scenarios. In- and out-migration hotspots are thus areas in which at least two scenarios concur on density changes in the top 10th percentile of the density distribution, which in Mexico and Central America represents an increased population density in 2050 of about 3.3 to 6.8 people per square kilometer, depending on the scenario. For decreased population density, it is about minus 1.8 to minus 3 people per square kilometer.

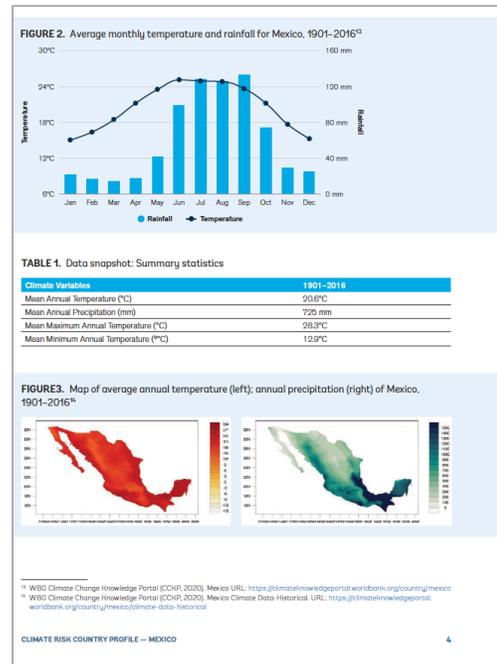
Impact on Livelihoods and internal Migration

Groundswell Report

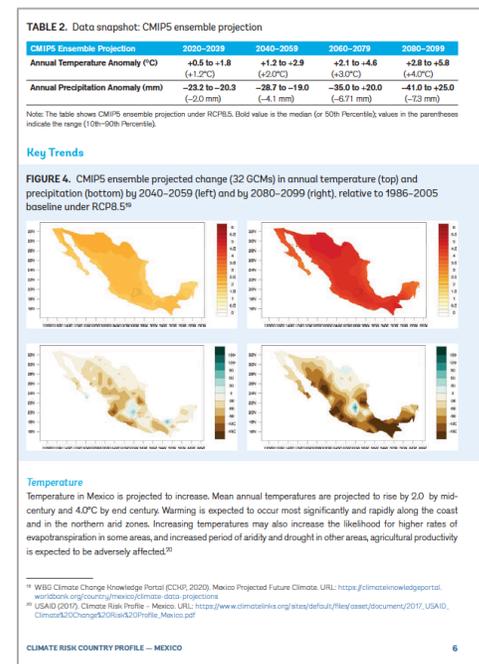
CCKP Climate Risk Country Profile - MEXICO



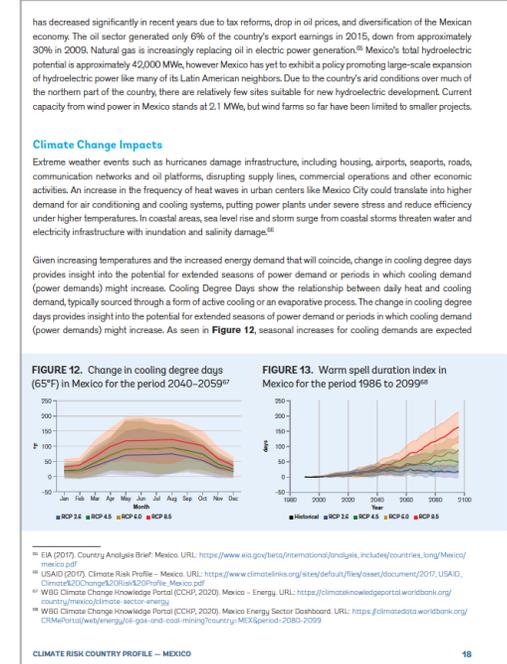
Historical Data



Future Projections



Key Sector Analysis



Additional Tools and Resources

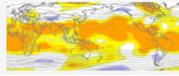
Climate: Analysis, Monitoring and Forecasts

Historical, current, and future climate conditions around the globe.

Maproom | Climate | Global

Atmospheric Circulation

Daily, pentad, monthly and seasonal measures and analyses of atmospheric circulation.



Heat Waves

Analyses associated with heat waves over North America



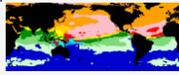
Atmospheric Temperature

Daily, monthly, and seasonal measures and analyses of atmospheric temperature.



Ocean Chem

Weekly, monthly and season measures and analyses of ocean chem.



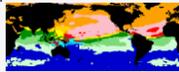
Bulletins

Climate Bulletins from around the world



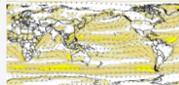
Ocean Temperature

Weekly, monthly and season measures and analyses of ocean temperature.



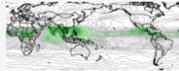
Climatologies

These climatologies give the monthly (or seasonal) behavior in an average year for temperature, precipitation, and wind.



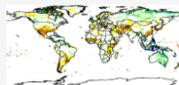
Precipitation

Monthly to seasonal measures and analyses of precipitation.



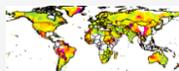
Drought

Drought forecast and analysis tools for North America and the Globe



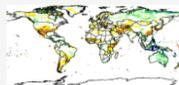
Time Scales

This maproom presents an approximate decomposition by time scale of twentieth-century precipitation variations.



Seasonal Forecasts

Seasonal forecasts of temperature and precipitation.



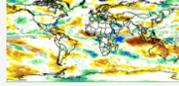
World Bank

Working in collaboration with the World Bank, IRI has developed a map tool that enables a user to examine the components of variability of historical precipitation and temperature data at various time scales (interannual, decadal, and linear trend) during the 20th century. The tool was developed to serve as a component of the World Bank Climate Change Data Portal.



Subseasonal Forecasts

Subseasonal forecasts of precipitation and temperature.



Overview | Climate Data | Climate by Sector | Vulnerability | Impacts | Adaptation

Energy | Water | Agriculture | Health

Climate by Sector > Water

The supply of water is directly affected by weather and climate. Next to the critical water input through precipitation at daily, monthly and seasonal scales, also the loss through evapotranspiration should be taken into consideration. Particularly high temperatures, low humidity and high winds can efficiently remove water from the land surface. Equally, the demand for water is expected to evolve under climate change, particularly as they relate to often rapidly changing demographic and economic settings. These changes generally increase the operational challenges and risk for the water sector.

This section provides the visualization of four climate indices that are most relevant for water sector.

GENERAL RESOURCES

Tool: Interactive Climate Indicator Dashboard - Water (WBG)

Tool: Global Forecast Drought Tool (WBG)

Working Paper: Climate Change, Water, and the Economy (WBG)

[SEE ALL](#)

Climate Forecasting | World Bank | Global Forecast Drought Tool | Region | Map Type | Drought Severity Levels

Description | How to Use | Rationale | Dataset Documentation | Instructions | Contact Us

Global Forecast Drought Tool

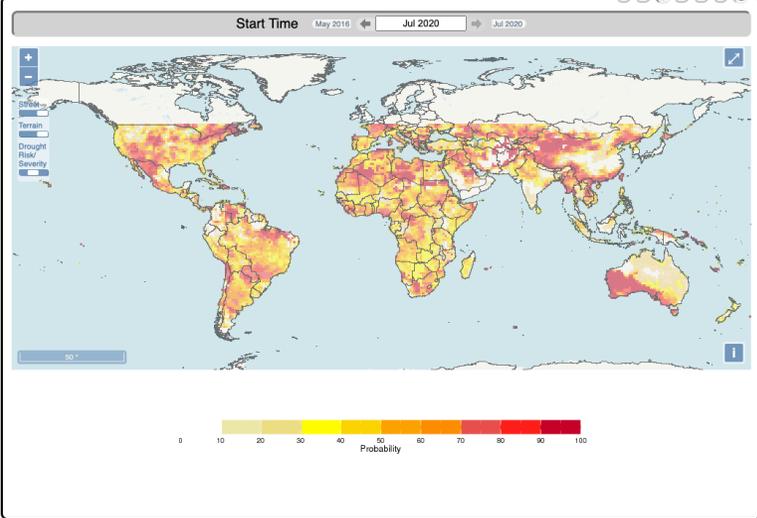
This tool displays maps of meteorological drought risk using the standardized precipitation index SPI. It allows the user to choose between maps of either the predicted drought severity for a user-specified likelihood or the risk of a certain magnitude of drought level happening.

The timescale presented here for demonstration is the 6-month Standardized Precipitation Index (SPI6). The SPI6 drought forecast combines the prior 3 months of observed precipitation and forecasted upcoming 3 months of seasonal rainfall. The menu *Map Type* presents two options of display: Drought Severity or Drought Risk.

- For example, the *Forecasted Drought Severity SPI6* for a six-month period ending in March is based on the observations of rainfall during the months of October to December and on the forecast rainfall totals made at the end of December, for the period of January to March. For this type of map, the user can choose a *Probability of Drier Conditions* (for example: 90%) and the map will represent the SPI6 value forecast. It is 90% likely that the SPI6 observed over that 6-month period will be drier than the value presented in the map. This information can help decision-makers by providing them the probability of rainfall deficit or surplus. It also can be used in conjunction with recent drought observations (*Standardized Precipitation Index for multiple monthly accumulation periods*) to indicate whether drought conditions are likely to develop, worsen or improve. This can be valuable information particularly for agricultural and water resources planning.
- The *Drought Risk* map shows the probabilities that the forecast SPI6 value will be equal to or lower than a user-selected drought severity level. Probabilities are displayed on a scale between 0% and 100%. The user can select a value of *Drought Severity Levels* in the dropdown menu. This level of drought corresponds to a SPI Threshold as described in the table below. The map will display the likelihood of a drought as severe or worse than the level selected, according to the SPI threshold chosen.

SPI6 Value	Drought Severity	Frequency
2.0	Severe Wetness	1 in 43-year event
1.5	Intermediate Wetness	1 in 23-year event
1.0	Moderate Wetness	1 in 11-year event
0.0	Normal	2 in 3-year event
-1.0	Moderate Dryness	1 in 11-year event
-1.5	Intermediate Dryness	1 in 23-year event
-2.0	Severe Dryness	1 in 43-year event

Start Time: May 2016 | Jul 2020 | Jul 2020



Probability: 0 10 20 30 40 50 60 70 80 90 100

These two versions of the information are complementary. In one case, the consideration is what is the drought severity indicated at a given level of confidence. In the other case, the consideration is what is the likelihood that drought will be at a given level of severity or worse.

Additional Tools and Resources

ThinkHazard!

Identify natural hazards in your project area and understand how to reduce their impact



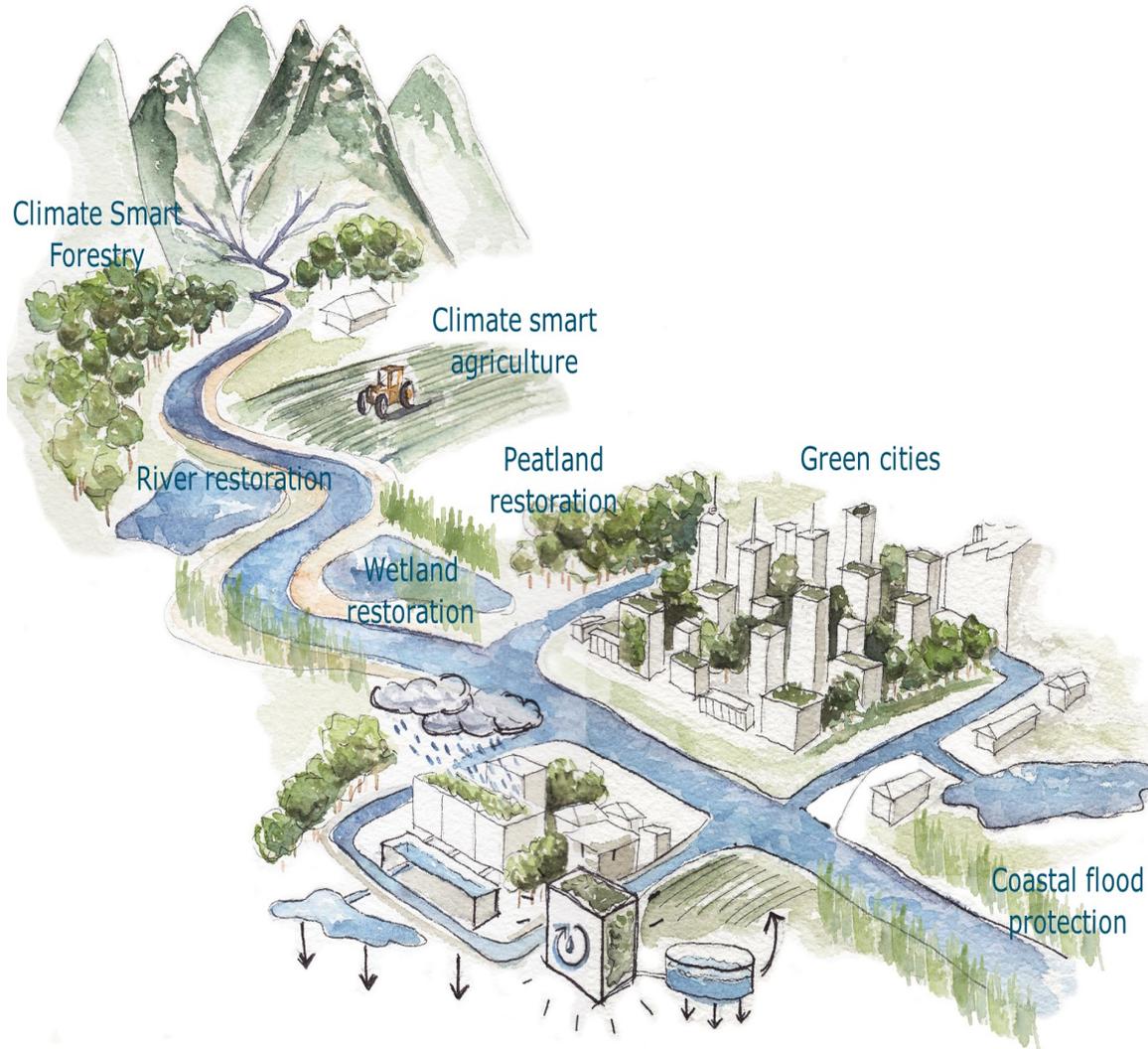
Hazard	Risk Level
River flood	High
Urban flood	High
Coastal flood	High
Earthquake	High
Landslide	High
Tsunami	High
Volcano	High
Cyclone	High
Water scarcity	High
Extreme heat	High
Wildfire	High

<https://thinkhazard.org/en/>

STAP's Question 3

Have measures to address the risks been considered? How will these risks be dealt with?

have options for adaptive management to ensure durability of outcomes been considered?



<https://www.wur.nl/en/show-longread/Nature-as-the-inspiration-for-climate-solutions.htm>

Information that would be useful includes:

- What are the climate risk management measures?
- How will the measure address the identified vulnerabilities?
- Evaluation of how to manage adaptively
- Feasibility, effectiveness, economic cost, tradeoffs, and co-benefits.

STAP's Question 4

What technical and institutional capacity, and information is needed?

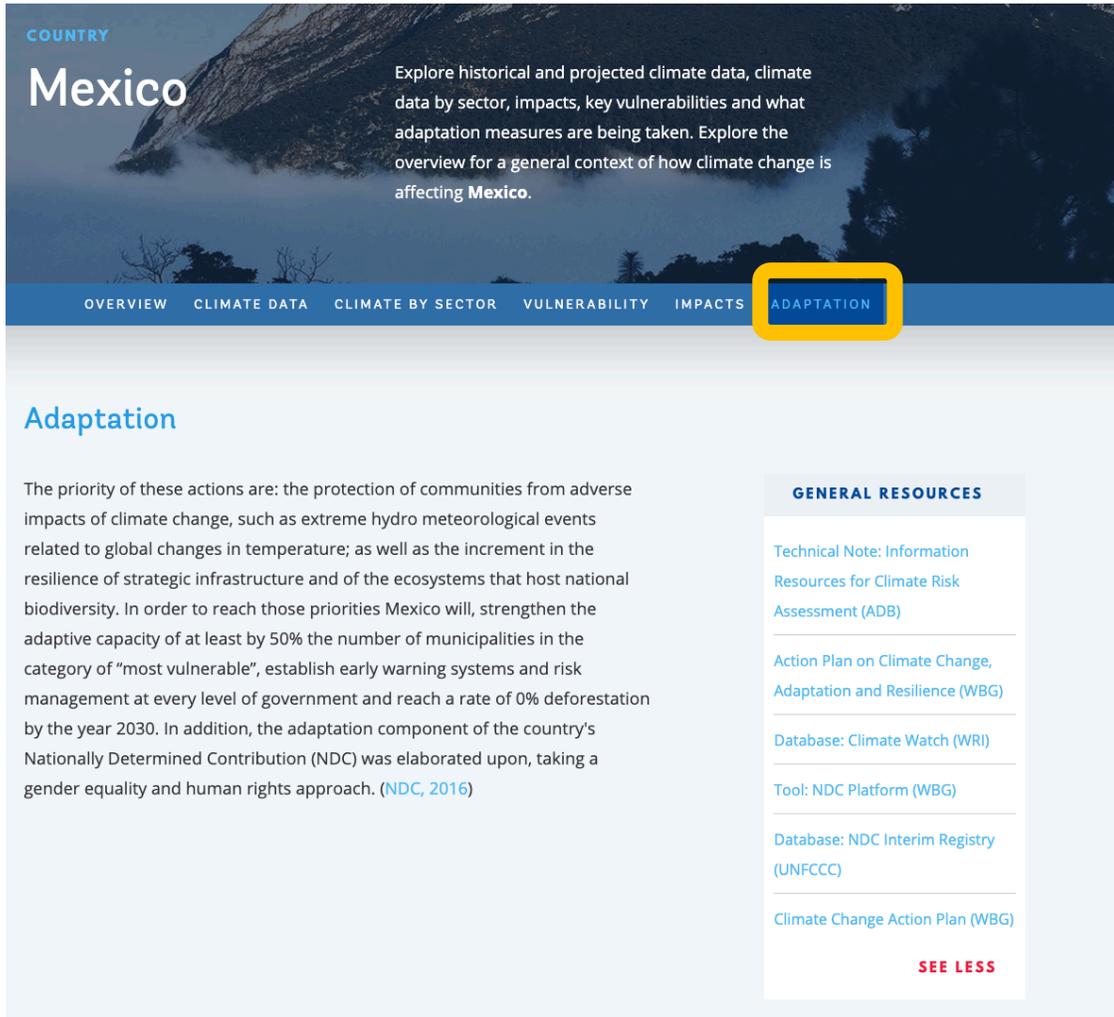
is there a monitoring, evaluation and learning strategy for the selected climate vulnerability management options?

Information that would be useful includes:

- What are the needed technical and institutional capacities?
- Financial implications of climate vulnerability management options.
- Mechanisms for monitoring, evaluation and learning.



Adaptation and Key National Policies



The screenshot shows the 'Mexico' page on a climate data website. The 'ADAPTATION' tab in the navigation bar is highlighted with a yellow box. The main content area is titled 'Adaptation' and contains a paragraph about the priority of these actions. To the right, there is a 'GENERAL RESOURCES' section with several links.

COUNTRY
Mexico

Explore historical and projected climate data, climate data by sector, impacts, key vulnerabilities and what adaptation measures are being taken. Explore the overview for a general context of how climate change is affecting Mexico.

OVERVIEW CLIMATE DATA CLIMATE BY SECTOR VULNERABILITY IMPACTS **ADAPTATION**

Adaptation

The priority of these actions are: the protection of communities from adverse impacts of climate change, such as extreme hydro meteorological events related to global changes in temperature; as well as the increment in the resilience of strategic infrastructure and of the ecosystems that host national biodiversity. In order to reach those priorities Mexico will, strengthen the adaptive capacity of at least by 50% the number of municipalities in the category of "most vulnerable", establish early warning systems and risk management at every level of government and reach a rate of 0% deforestation by the year 2030. In addition, the adaptation component of the country's Nationally Determined Contribution (NDC) was elaborated upon, taking a gender equality and human rights approach. ([NDC, 2016](#))

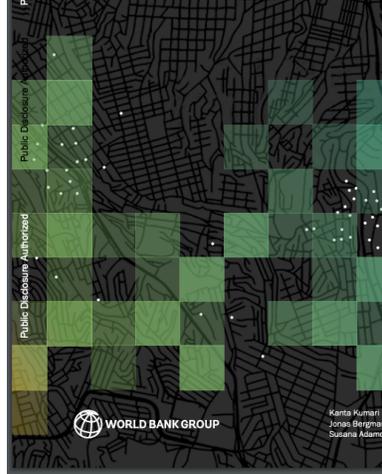
GENERAL RESOURCES

- [Technical Note: Information Resources for Climate Risk Assessment \(ADB\)](#)
- [Action Plan on Climate Change, Adaptation and Resilience \(WBG\)](#)
- [Database: Climate Watch \(WRI\)](#)
- [Tool: NDC Platform \(WBG\)](#)
- [Database: NDC Interim Registry \(UNFCCC\)](#)
- [Climate Change Action Plan \(WBG\)](#)

SEE LESS

- [First Nationally-Determined Contributions \(2016\)](#)
- [Climate Change Mid-Century Strategy \(2016\)](#)
- [Sixth National Communication on Climate Change \(2019\)](#)
- [Fifth National Communication on Climate Change \(2012\)](#)
- [Fourth National Communication on Climate Change \(2009\)](#)
- [Third National Communication on Climate Change \(2006\)](#)

Additional Tools and Resources

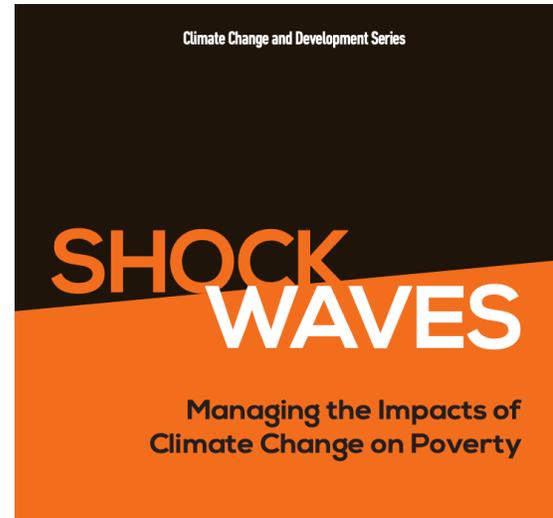


WORLD BANK GROUP

STRENGTHENING CLIMATE-RELATED ACTIVITIES

LESSONS FOR IMPROVED DESIGN OF WATER PROJECTS

Water GP
Global Climate Change Unit
September 1, 2020



Climate-Smart Agriculture in Mexico

Climate-smart agriculture (CSA) considerations

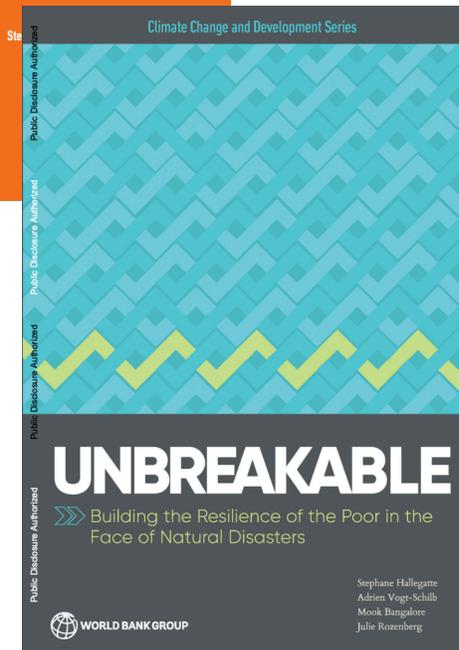
- A** Mexico is a diverse country with multiple agro-ecosystems and socio-economic conditions. CSA practices need to be tailored to local and regional contexts.
- M** Fertilizer use, especially high in the north, can be made more efficient by using soil nutrient tests, precision fertilization, and use of organic or less impactful inputs.
- A** Adaptation to fire and heat is needed in the northern irrigated regions. This can be done by converting to more protected agriculture (greenhouses), drip irrigation, and agriculture insurance.
- A** High biodiversity and environmental services, such as in Mexico's maize-bean region, can be maintained through activities, such as agroforestry and alleycropping, that support diversity and provide means for secure livelihoods, disabling tradeoffs between development and conservation.
- M** Conservation Agriculture, a bundle of CSA practices that can be applied to maize, wheat, sorghum, or even tomatoes in the case of Sinaloa, could increase crop productivity and prevent soil degradation.
- P** Dair management, system intensification, waste management, and biogas are CSA technologies that could mitigate the amount of greenhouse gas emissions (GHG) from livestock production, increase profitability and provide alternative sources of electricity in rural Mexico.
- A** Climate risk management strategies such as early weather notifications, warning systems, and agricultural insurance along with capacity building and extension services can help farmers adapt to different climate extremes and related challenges, such as floods and pest infestations, which are challenges in the maize-bean region of the south.
- K** Knowledge exchange strategies are essential for increasing the productivity and resilience of Mexico's agricultural sector. A formalized knowledge system with public, private, and academic actors is important for knowledge generation, collection, and dissemination.
- I** The identification of viable adaptation and mitigation options can be enhanced by development and access to integrated Decision Support Systems that compile and analyze weather, agronomic, and market information, and deliver results to a range of stakeholders and decision makers.
- P** Strengthening governance and democratic landscape management of farmer associations, cooperatives, and communities can help increase productivity by creating economies of scale that bring connectivity to the fragmented land tenure in Mexico dominated by small farm plots.
- F** Initiatives that facilitate agricultural loans and guarantees with the promotion of farmer innovation and entrepreneurship could generate farmer-led investment that is sustainable in the long term.

A Adaptation **M** Mitigation **P** Productivity **I** Institutions **F** Finance

The climate-smart agriculture (CSA) concept reflects an ambition to improve the integration of agricultural development and climate responsiveness. It aims to achieve food security and broader development goals under a changing climate and increasing food demand. CSA initiatives sustainably increase productivity, enhance resilience, and reduce/avoid greenhouse gases (GHGs), and require planning to address tradeoffs and synergies between these three pillars: productivity, adaptation, and mitigation [1]. The priorities of different countries and stakeholders are reflected to achieve more efficient, effective, and equitable food systems that address challenges in environmental, social, and economic dimensions across productive landscapes. While the concept is new and still evolving, many of the practices that make up CSA already exist worldwide and are used by farmers to cope with various production risks [2]. Mainstreaming CSA requires critical stocktaking of ongoing and promising practices for the future, and of institutional and financial enablers for CSA adoption. This country profile provides a snapshot of a developing baseline created to initiate discussion, both within countries and globally, about entry points for investing in CSA at scale.

* An ejido is an area of communal land used for agriculture, on which community members individually possess and farm a specific parcel. Regularly land-use decisions are made by community consensus.

WORLD BANK GROUP **CGIAR** **CCAFS** **CIAT** **CATIE**



GENERAL RESOURCES

[Mexico Climate Smart Agriculture Profile](#)

[Technical Note: Information Resources for Climate Risk Assessment \(ADB\)](#)

[Report: Groundswell \(WBG\)](#)

[Book: Climate Smart Agriculture \(FAO\)](#)

[Sourcebook: Climate-Smart Agriculture \(FAO\)](#)

[Tool: Crop Explorer \(USDA\)](#)

[Report: Shock Waves \(WBG\)](#)

[Report: Unbreakable \(WBG\)](#)

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