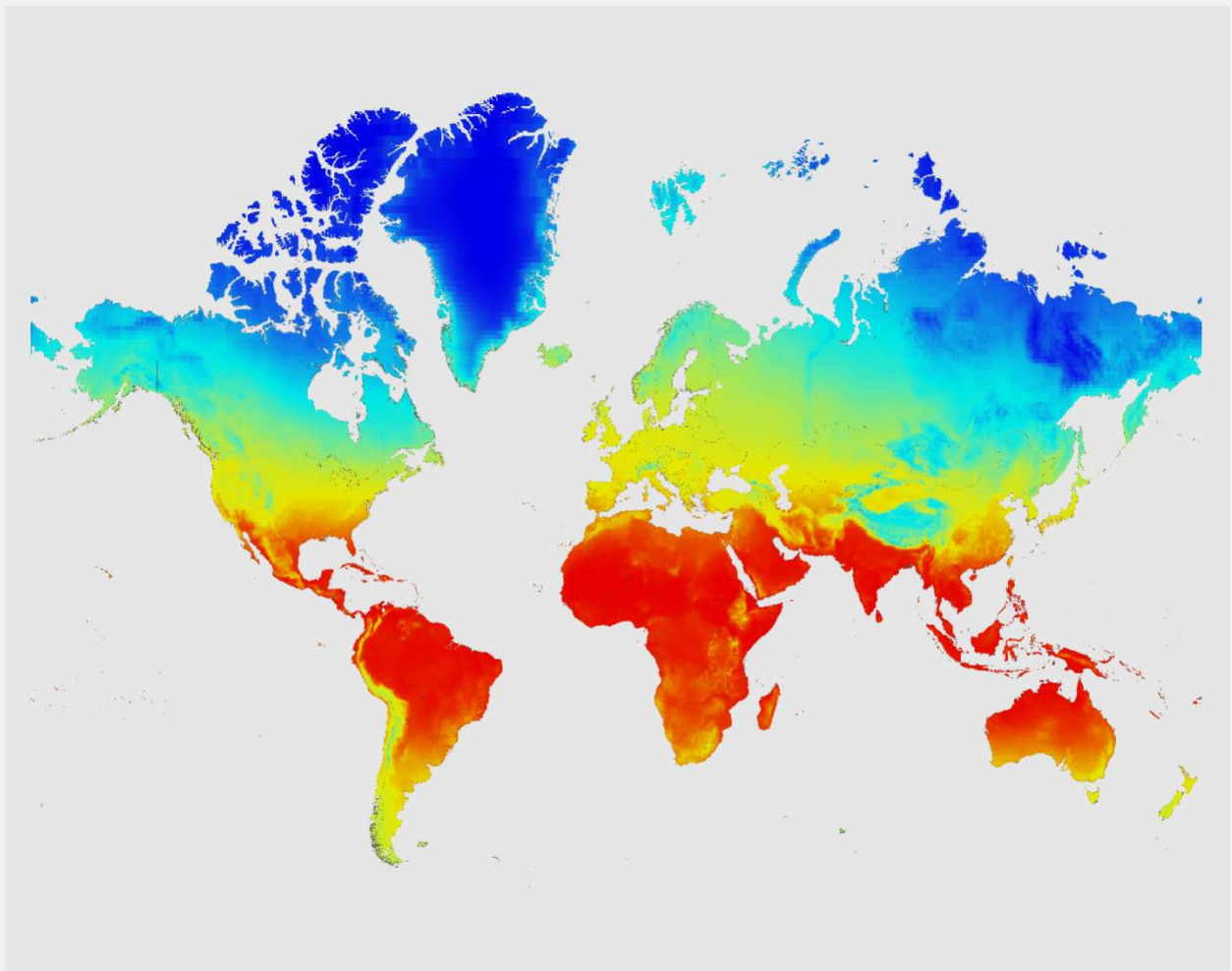


USER MANUAL

CLIMATE CHANGE

KNOWLEDGE PORTAL (CCKP)



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WORLD BANK GROUP

Climate Change Knowledge Portal
For Development Practitioners and Policy Makers

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CCKP STEP-BY-STEP USER MANUAL

1. BACKGROUND

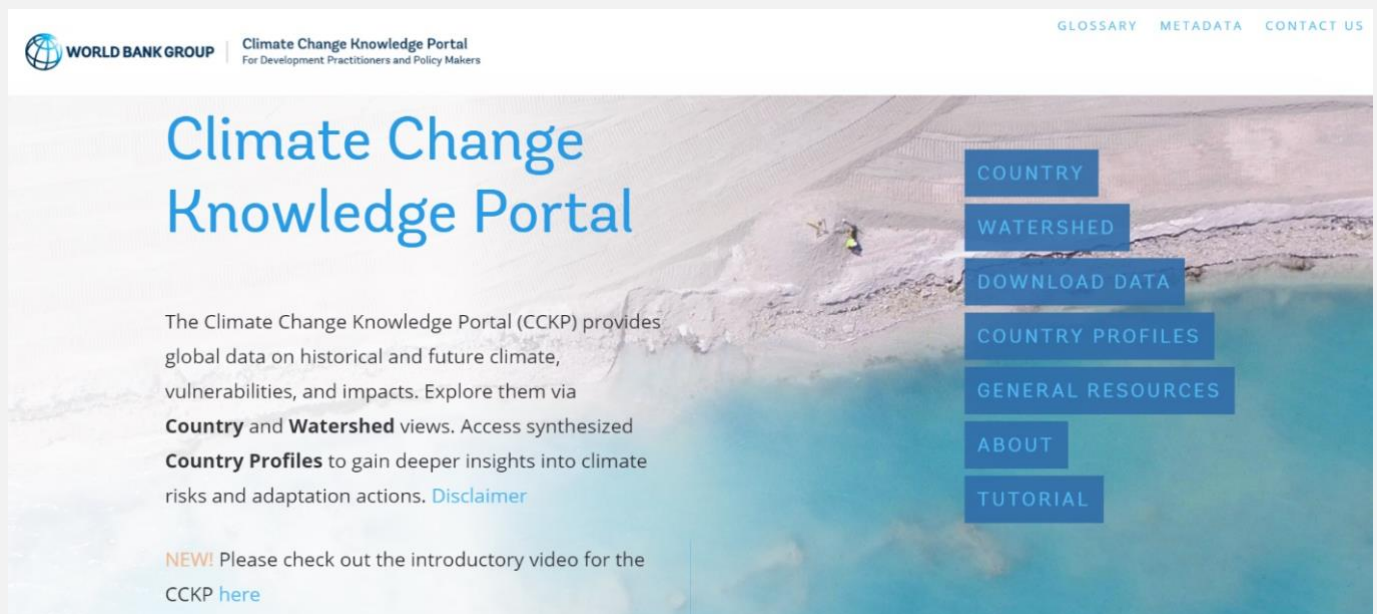
The Climate Change Knowledge Portal (CCKP) serves as a leading hub of global climate data, information, and tools to support decision making and improve the understanding of future climates and projected risks. The aim of the CCKP is to help provide policy makers, development practitioners and interested parties with a resource to explore and analyze climate and climate-related data to assess future scenarios, projected physical climate risks and vulnerabilities for national and sub-national contexts and across key sectors.

The CCKP was designed to provide open access to climate data and related information in order to help users better understand future climate scenarios and characterize potential risks and impacts with data aggregated at national, sub-national, and watershed levels. CCKP data is presented across multiple scales demonstrating historical contexts, climatological means, anomalies, trends, as well as inter-annual and inter-seasonal variability, which can be understood through a variety of interactive visualizations. Further guidance is provided regarding associated uncertainties of climate model outputs and model agreement, as appropriate. CCKP currently produces synthesized Climate Risk Country Profiles, which offer a further integration of climate information, adaptation, and climate-related disaster risk management for development planning.

This **Step-by-Step User Manual** provides a comprehensive overview of the CCKP by introducing key components and their associated functionality, and intends to support users to easily navigate through the platform. For additional supporting documents, please refer to CCKP's [Glossary](#) and [Metadata](#).

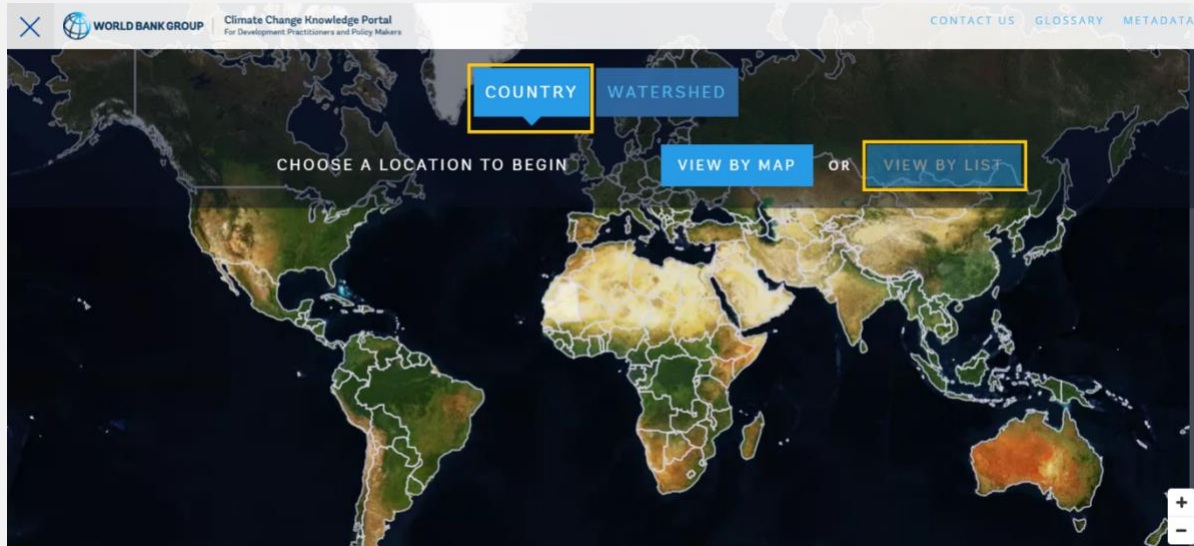
2. ENTERING THE PORTAL

To get started, visit the homepage of the CCKP at climateknowledgeportal.worldbank.org. To explore the data interactive visualization pages, begin by choosing a view of your interests (i.e. Country, Watershed). You can also directly access the Download Data, Climate Risk Country Profiles, General Resources, and Tutorial tabs.



3. SELECT A LOCATION

Narrow down your search by country or watershed. To select a specific country or watershed, click directly on the map or select view by the alphabetized list.

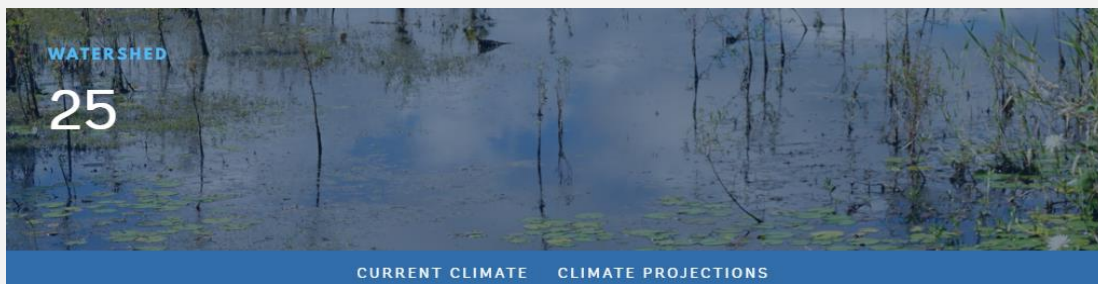


4. SELECT THE CONTENT

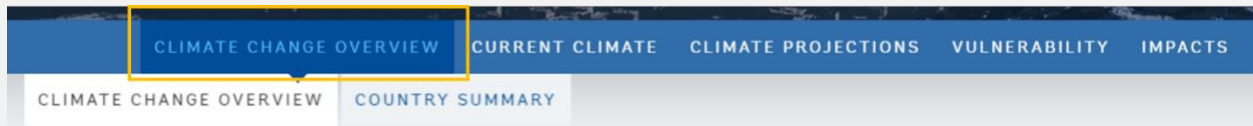
CCKP consists of geospatial and temporally referenced data. Therefore, maps and visualizations generated within the portal are a function of user selection. Within **Country view**, climate data is aggregated for both national and sub-national scales, and information is consolidated and arranged in tabs by the key aspects of understanding climate risk, namely: **Climate Change Overview** (climate change information, and country summary and its development context), **Current Climate** (climatology), **Climate Projections** (mean projections), **Vulnerability** (exposure to natural hazards), and **Impacts** (sectoral impacts and sea level rise); detailed below.



For *Watershed views*, Current Climate and Climate Projections tabs are available as below.



5. CLIMATE CHANGE OVERVIEW



CLIMATE CHANGE OVERVIEW

The **Climate Change Overview** page includes two tabs, which present *Climate Change Overview* and *Country Summary*. The *Climate Change Overview* tab provides information on our changing climate and how we should understand 'climate change'. This brief overview includes explanations and discussions of longer-term change understood through paleoclimate analysis and how recent emissions from the industrial and post-industrial age are impacting our global climate system. Additional background information is presented to support a stronger foundational understanding of 'climate change,' projected climate scenarios, models and ensembles, variability, and uncertainty. This is meant to provide CCKP Users with a stronger understanding of climate and the context of climate change in order to better engage with the data and information presented throughout CCKP. This page is consistent across all countries.

COUNTRY SUMMARY

The *Country Summary* tab provides information on a selected country's unique climate characteristics and broader development context, with information on general geographic and socio-economic contexts, and key vulnerabilities related to climate change. Country data is presented in two forms: (1) geospatial representation of climate zones according to the Köppen-Geiger Classification (**Figure A**); and (ii) the seasonal cycle of mean temperature and precipitation for the latest climatology, 1991-2020 (**Figure B**). The page also provides Country Specific Information and General Resources Toolboxes, which provides links to key country-specific climate policy documents, important climate related information, and access to other resources to better understand and interpret climate data (**Figure C**).

Figure A. Köppen-Geiger Climate Classification, 1991-2020 for China

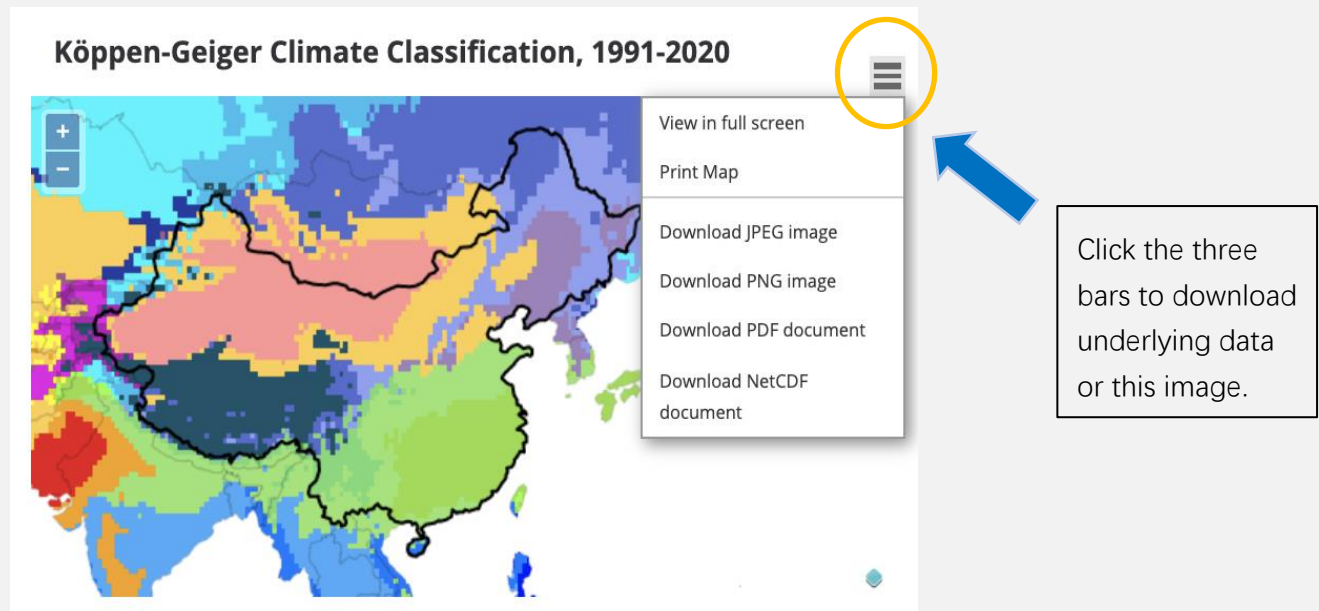


Figure B. Seasonal Cycle of Mean Temperature and Precipitation in Honduras from 1991-2020

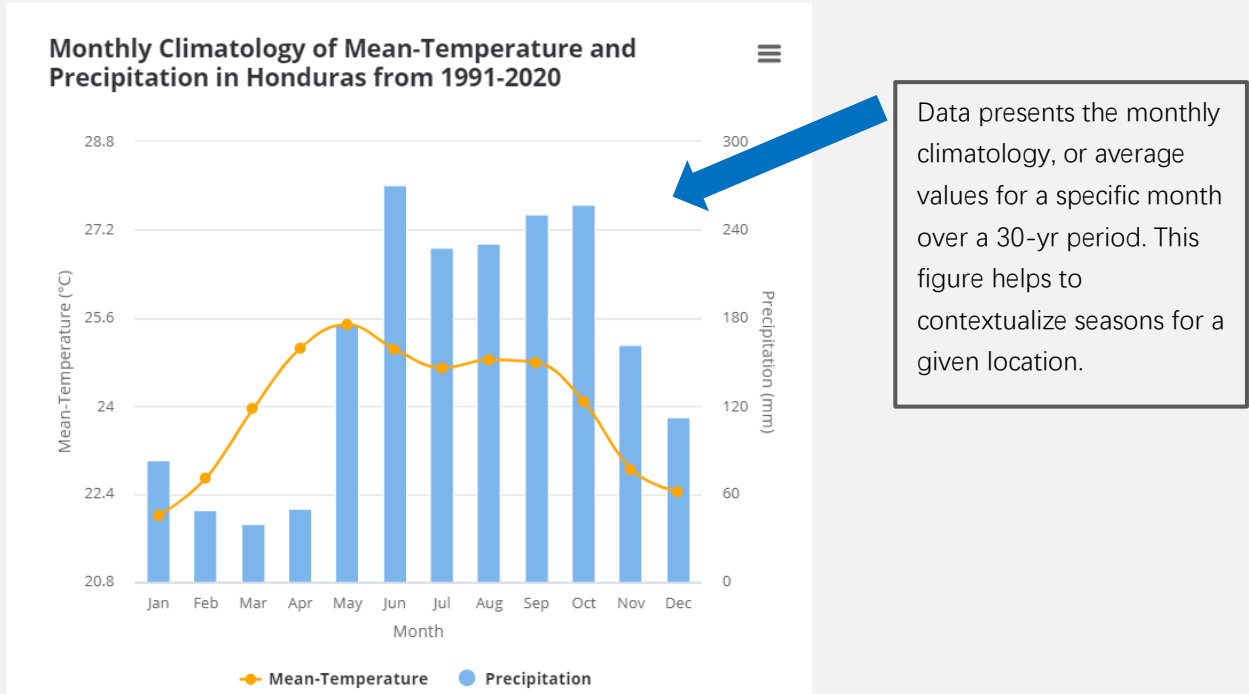


Figure C. Tailored Country Narratives and General Resources Toolbox

Located between latitudes 15°–23°S and longitudes 25°–34°E, Zimbabwe is a landlocked country neighboring Botswana, Zambia, Mozambique, and South Africa. It is endowed with abundant natural resources with total land area of 390,757 square kilometers, and a population of over 14.6 million in 2019. According to the World Bank estimations, the Gross Domestic Product (GDP) of the country reached \$21.4 billion in 2019. The annual GDP growth peaked at 11.9% in 2011 and has been decreasing since: in 2019 the annual GDP growth rate was at –8.1%, well below the average annual GDP growth of low-income countries (4.4%). Zimbabwe is subject to a complex physical and climatic structure. According to Köppen-Geiger Climate Classification, northern Zimbabwe experiences subtropical climate with dry winter and hot summer; and southern area faces hot arid and steppe climate.

The country's economy is largely dependent on services sector, followed by industry, agriculture, and manufacturing). As indicated in its first Nationally Determined Contribution (NDC), the key sectors to boosting Zimbabwe's economy – including agriculture, water, energy, forestry, tourism, and industry, among others – are also susceptible to abrupt climate variability. Climate change is likely to adversely impact Zimbabwe's key economic sectors as well as its livelihoods. With climatic variability increasing, natural disasters will occur more frequently and have the potential to hit the most vulnerable parts of the population, the poor, in a disproportionate way since poor people are often overexposed to these hazards. In other words,

ZIMBABWE - COUNTRY SPECIFIC INFORMATION

- [Zimbabwe Climate Risk Country Profile \(New\)](#)
- [First Nationally Determined Contribution \(2017\)](#)
- [Third National Communication \(2017\)](#)

GENERAL RESOURCES

- [Zimbabwe Climate Risk Country Profile \(New\)](#)
- [Köppen-Geiger Climate Classification](#)
- [Tool: Climate and Disaster Risk Screening \(WBG\)](#)
- [Tool: NDC Platform \(WBG\)](#)

Country Specific Information with links to documents

General Resources with links to access other resources to better understand and interpret climate data

6. CLIMATE DATA: CURRENT CLIMATE

CLIMATE CHANGE OVERVIEW

CURRENT CLIMATE

CLIMATE PROJECTIONS

CLIMATE BY SECTOR

VULNERABILITY

IMPACTS

ADAPTATION

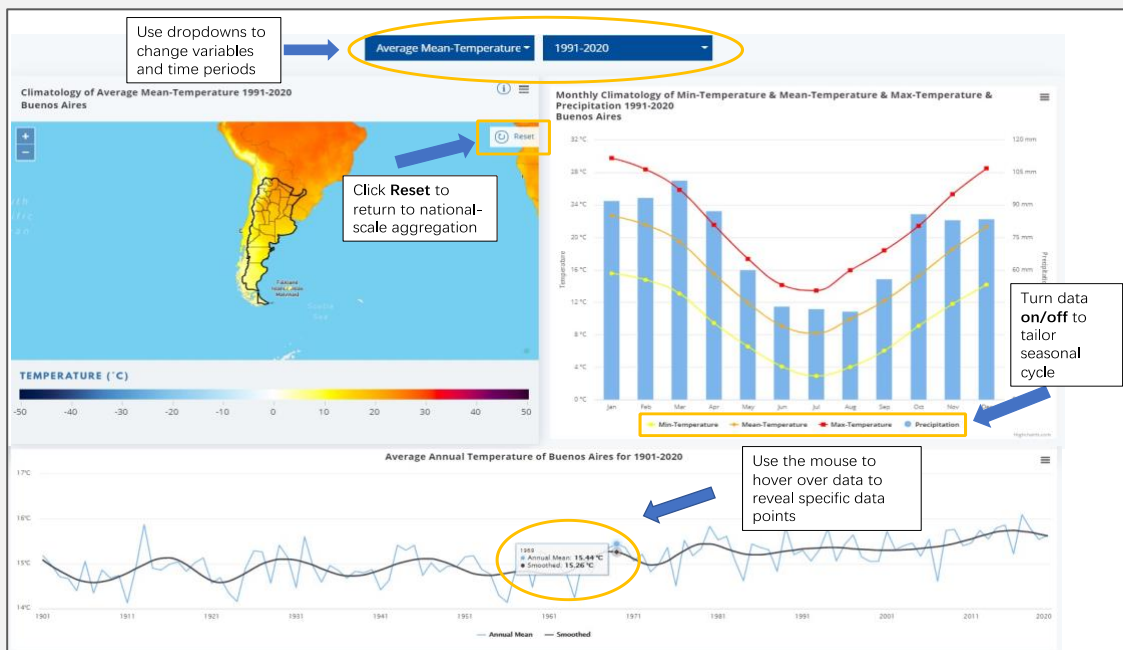
CLIMATOLOGY

CLIMATOLOGY

The **Current Climate - Climatology** tab presents observed, historical data. Historical data originates from observational datasets and allow users to understand past and current climate contexts. Observed, historical climate data is generated from thousands of weather stations worldwide, which are collecting temperature and rainfall data in a continuous manner. Observed data presents mean, minimum and maximum temperatures and precipitation. Users can view annual and seasonal climate information: December-January-February, March-April-May, June-July-August, and September-October-November. Observational data is sourced from the Climatic Research Unit (CRU) of the University of East Anglia. CRU provides gridded historical datasets derived from observational data and quality-controlled temperature and rainfall data as well as derivative products such as monthly and long-term historical climatologies. CRU data is widely accepted as reference datasets in climate research. Observed data is presented at a spatial resolution, $0.5^\circ \times 0.5^\circ$ (50km x 50km). The *Climatology* tab allows users to explore historical data for annual and seasonal temperature and precipitation for selected climatologies. Data is aggregated at the national- and sub-national level for each variable.

By default, data is presented at national aggregation for the current climatology: 1991-2020. Users have the ability to add and subtract variables in order to tailor the seasonal cycle visualization. Historical data visualizations are also presented geospatially, showing the climatological average of a selected indicator or as a long-term time series, 1901-2020 (**Figure D**). Information can be tailored by location, variable and time period through the dropdown lists. Sub-national aggregations can be shown by clicking on a specific unit, in which all other visuals will automatically populate. Information can be viewed easily by hovering the mouse over a specific unit, as shown below.

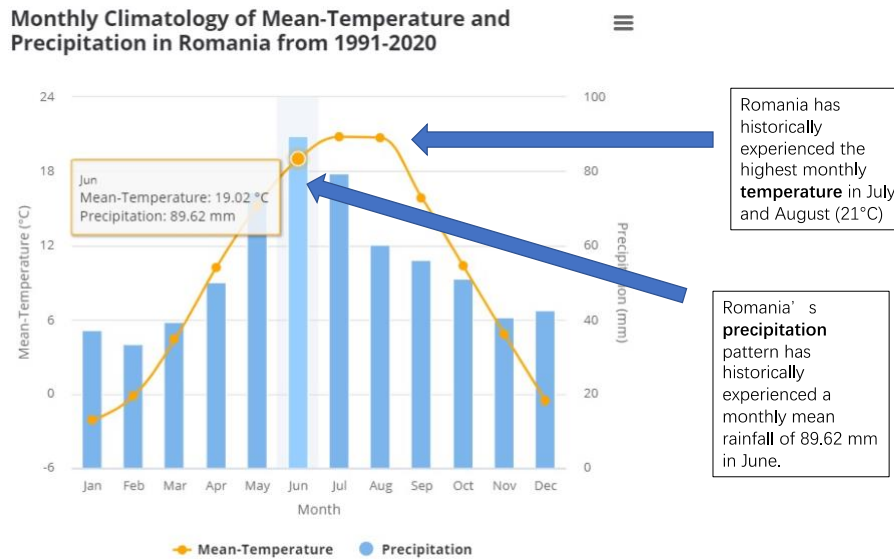
Figure D. Observed, Historical Climate Data Presentations



Example: Analyzing the Seasonal Cycle. Understanding Observed Data for Romania

Romania has historically experienced the most rain in June (89.62 mm). The country experiences the least amount of rain in February (33.58 mm). As seen in **Figure E**, temperatures start to decrease after August, with the coldest temperatures experienced between December to February. The coldest month is February (-0.16°C). The hottest months are in July and August (21°C).

Figure E. Seasonal Cycle of Monthly Mean Temperature and Precipitation in Romania (1991-2020)



7. CLIMATE DATA: CLIMATE PROJECTIONS



MEAN PROJECTIONS – GENERALIST PAGE

The **Climate Projections – Mean Projections - Generalist** tab provides users the opportunity to investigate climate projections across smoothed climatological averages. CCKP's Mean Projections – Generalist page provides the most commonly used indicators, presented as multi-model ensembles. Climate projection data is modeled data, derived from the Coupled Model Inter-comparison Projects. CCKP's General page presents the latest CMIP collection: CMIP6, initially released August 2021. CMIP data is the foundational data used in the IPCC Assessment Reports; CMIP6 supports the IPCC's Sixth Assessment Report, initial release August 2021. Projection data is presented at a spatial resolution, 1° x 1° (100km x 100km).

The scientific community uses scenarios to characterize the range of plausible climate futures and to illustrate the consequences of different pathways (policy choices, technological changes, etc). They are chosen to span a wide range without any tie to likelihood. The scenarios serve as 'what if' cases. The approach to formulating the different 'scenarios' has evolved from a climate-centric to an increasingly societal development-centric concept, albeit with the same underlying goal of providing insight into a range of plausible climate outcomes.

The Shared Socioeconomic Pathways (SSPs) are used in CMIP6 and replace the Representative Concentration Pathways (RCPs) which were presented in CMIP5.

In CMIP6, future climate scenarios are presented through five SSPs: SSP1-1.9, SSP1-2.6, SSP2-4.5, SSP3-7.0, and SSP5-8.5, which present different societal development pathways. The total radiative forcing level by 2100 (the cumulative measure of GHG emissions from all sources) is presented at the end of each pathway (i.e., -1.9, -2.6, -4.5, 7.0, 8.5, etc.).

SSP1-1.9 is the most optimistic scenario and global emissions are cut to net-zero around 2050. This is the only scenario that aligns with the Paris Accord of keeping global warming to 1.5°C by the end of the century.

SSP1-2.6 supports increasing sustainability with global emissions cut severely, but reach net-zero after 2050.

SSP2-4.5 presents a 'middle of the road' scenario in which emissions remain around current levels, before starting to fall around mid-century, but do not reach net-zero by 2100.

SSP3-7.0 presents a pathway in which countries are increasingly competitive and emissions continue to climb, roughly doubling from current levels by 2100.

SSP5-8.5 presents a future based on an intensified exploitation of fossil fuel resources where global markets are increasingly integrated leading to innovations and technological progress.

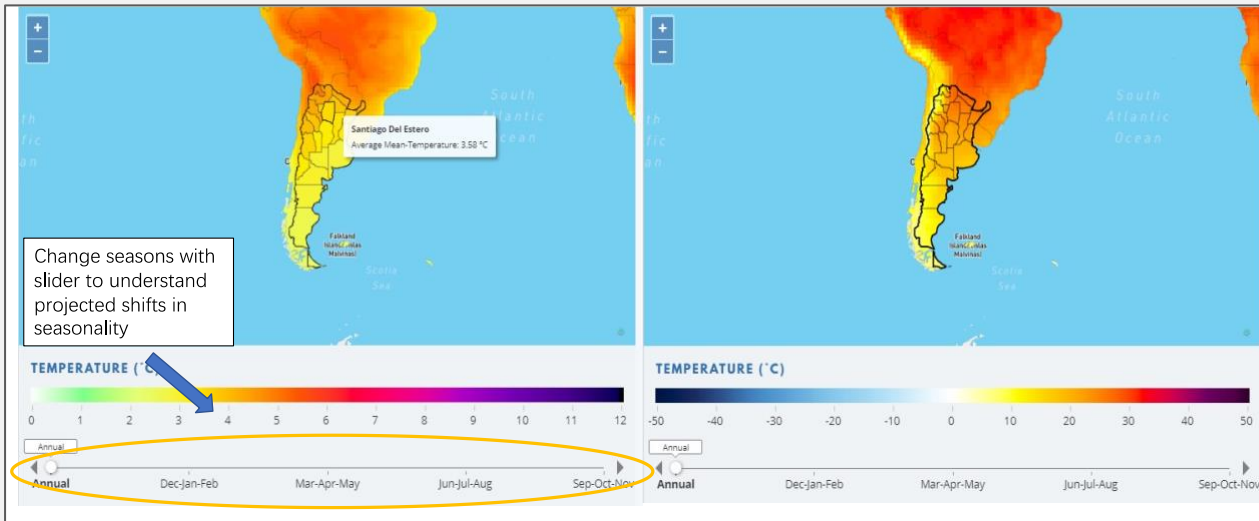
CCKP enables users to explore future climate scenarios and projected physical climate risks through a wide variety of indicators, for different SSPs, and across different projected climatologies (2020–2039, 2040–2059, 2060–2079, and 2080 – 2099). Projected change is calculated against the modeled, CMIP6 Historical Reference Period, 1995-2014. Data is presented at national and sub-national aggregations, as annual and seasonal climatologies and as either mean or anomaly (change), which can be viewed by sliding the Mean/Anomaly toggle the right (mean) and left (change) (**Figure F**).

Figure F. Analysis Options for Future Climate Projections, CMIP6 data

VARIABLE	TIME PERIOD	SCENARIO	CALCULATION
Mean-Temperature	2020-2039	SSP1-1.9	Anomaly (Change)

Future climate projections are presented through four primary visualizations: (i) geospatial representation (**Figure G**); (ii) seasonal cycle showing either anomaly and mean, the mean is presented against the historical reference period, 1995-2014 (**Figure H**); (iii), time series showing *mean* projections across each RCP through the end of the century (**Figure I**); and (iv) heatplot showing *anomaly* projections, which present seasonality across longer-term time horizons (**Figure J**).

Figure G. Spatial Variation and Change; anomaly (left) and mean (right)



Data is shown as both anomaly and mean. As seen above, anomaly (left) is presented through block colors to present the projected median anomaly value, gridded data color gradation is kept for surrounding region to demonstrate regional change. Mean data (right) shows the color gradation across the sub-national units to reflect conditions across an area; the data values presented reflect aggregation for sub-unit or country.

When analyzing and interpreting climate change projections from multi-model ensembles, outputs are presented as a range, which represents model spread. CCKP identifies the range of 10th and 90th percentiles, and median (or 50th percentile). The 10th percentile indicates that just 10% of simulation outputs fall below this result. The 90th percentile means that 90% of all simulation outputs fall below this result.

Figure H. Seasonal Cycle, shown as anomaly (left) and mean (right)

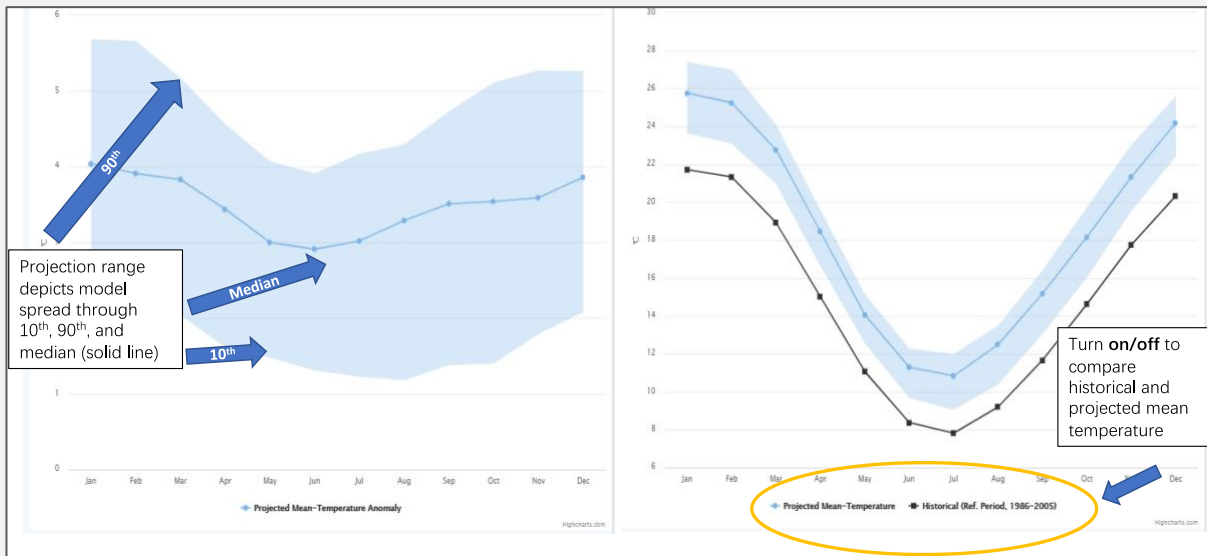


Figure I. Projected Time Series

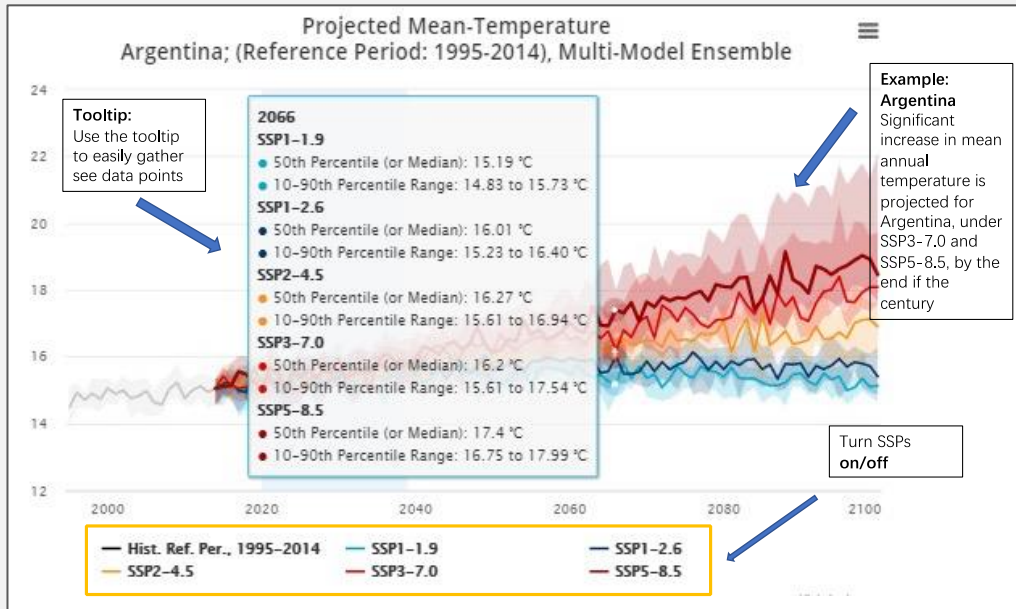
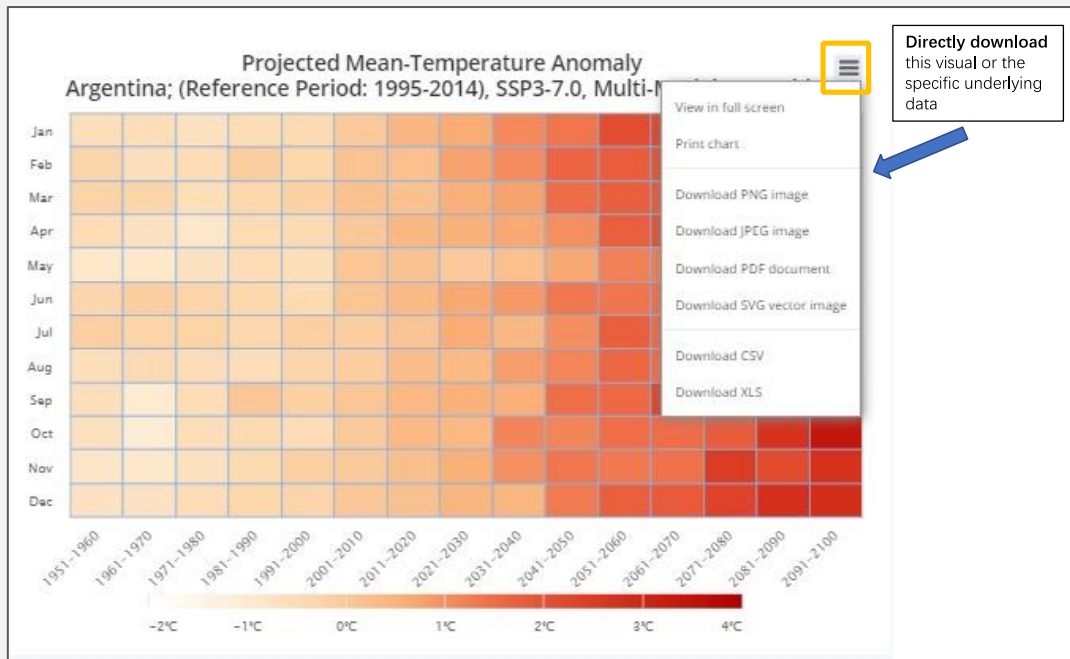


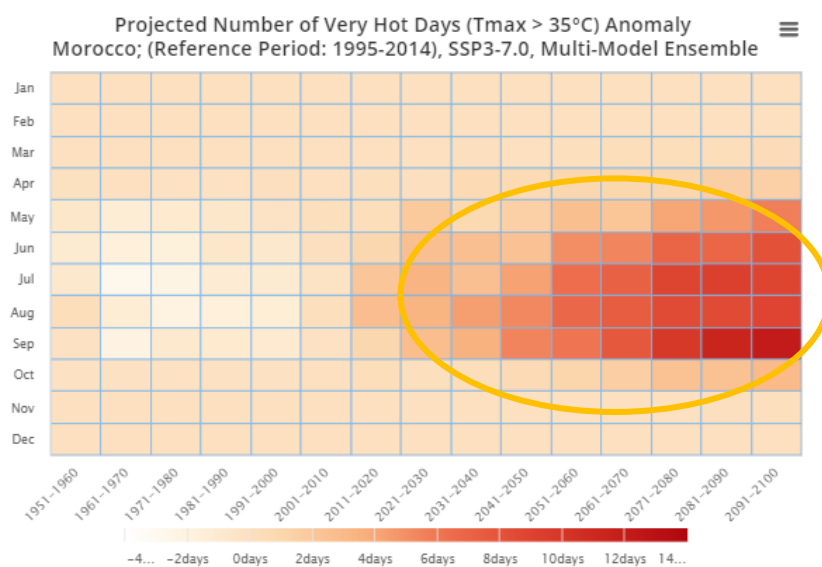
Figure J. HeatPlot



Example: Morocco – Projected Seasonal Anomaly, Number Of Hot Days (Tmax>35°C)

Under high-emission scenario SSP3-7.0, average temperatures in Morocco are expected to increase rapidly by mid-century, with continued significant, rapid increase through the end of the century. An increase is also expected in the number of very hot days, defined as days surpassing an average maximum threshold of 35°C. As seen in **Figure K**, increased thresholds are resulting in an emergence of a significantly hotter summer season due to the increase in the number of hot day anomalies in July, August, and September, starting in by mid-century. This hot period extends from May to September by 2100. 'Traditional hot seasons' are expected to start earlier, last longer and become more intense. Increased heat conditions will result in significant implications for human and animal health, agriculture, ecosystems as well as energy generation.

Figure K. Projected Change in Number of Hot Days in Morocco

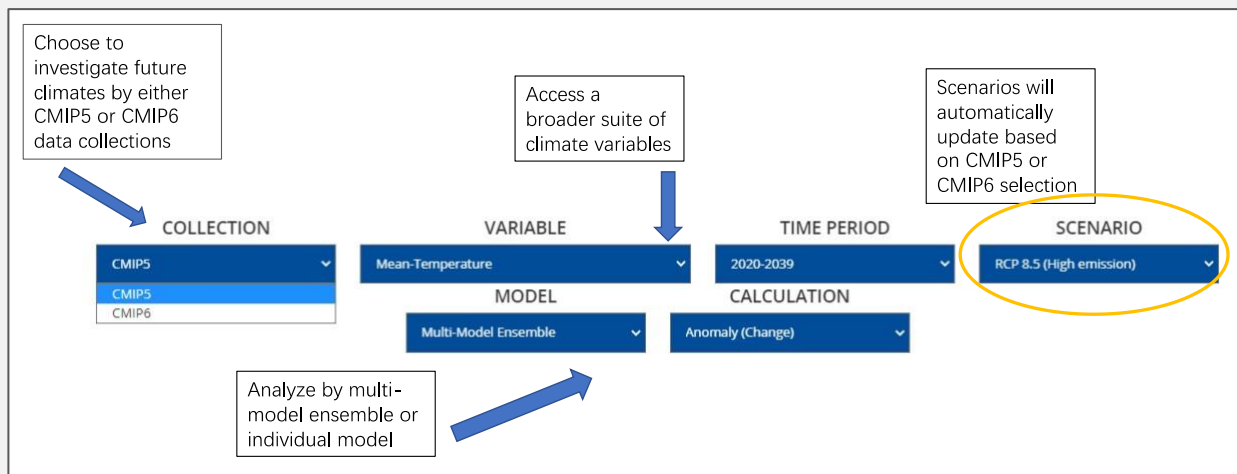


MEAN PROJECTIONS – EXPERT TAB

Data presented on the *Mean Projections – Generalist* tab offers a streamlined collection of indicators and indicators are presented as multi-model ensembles. The *Mean Projections – Expert* tab presents CCKPs full suite of climate indicators; new data products continue to be added as we are able to produce them. Data on the *Expert* tab can be investigated by either the multi-model ensemble or by individual model. CCKP prioritizes multi-model ensemble. Unless a strong understanding of individual model bias and underlying assumptions, CCKP recommends always using the multi-model ensemble for analysis. All visualizations and data presentations remain the same as the Generalist tab.

The Expert tab also enables users to investigate different data collections for either CMIP5 and CMIP6. *CMIP5* presents scenarios based on the Representative Concentration Pathway (RCPs) [RCP2.6, RCP4.5, RCP6.0, RCP8.5] and *CMIP6* by the Shared Socioeconomic Pathways (SSPs) [SSP1-1.9, SSP1-2.6, SSP2-4.5, SSP3-7.0, SSP5-8.5].

Figure L. Using CCKP *Mean Projections – Expert* tab



8. VULNERABILITY



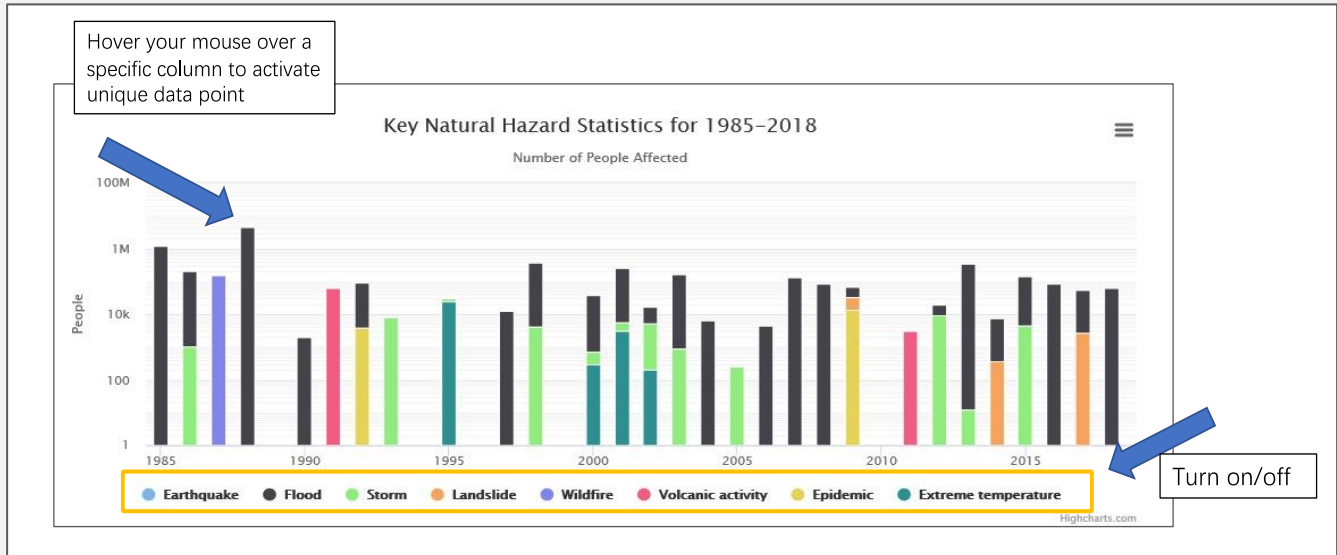
VULNERABILITY

The **Vulnerability** page provides a brief review on country specific climate-related hazards and facilitates the understanding of the relationship between hazards and socioeconomic development. The page includes the following sections:

- Vulnerability;
- Natural Hazard Statistics;
- Natural Hazard / Development Nexus; and
- Key Vulnerabilities

This page presents an overview of how climate change may affect the country. It includes information on country specific climate-related hazards and risks as well as most stressed regions. Data on key natural hazard statistics for 1985 – 2018 (**Figure M**) and average annual natural hazard occurrence for 1900 – 2018 are presented. Data presentation on climate-related hazards and risks allows users to understand country's historical vulnerability to specific natural hazards. This also provides users another key element of information to further develop and understand a country's context when accessing climate data. It is important to recognize that while climate change is expected to impact natural hazards most likely through increasing intensity and duration, frequency of occurrence is not linear.

Figure M. Key Natural Hazard Statistics for 1985 – 2018



The page also provides users information on links between Natural Hazards and the Development Nexus with the opportunity to explore the susceptibility of livelihoods and natural systems to impacts of historical climate conditions.

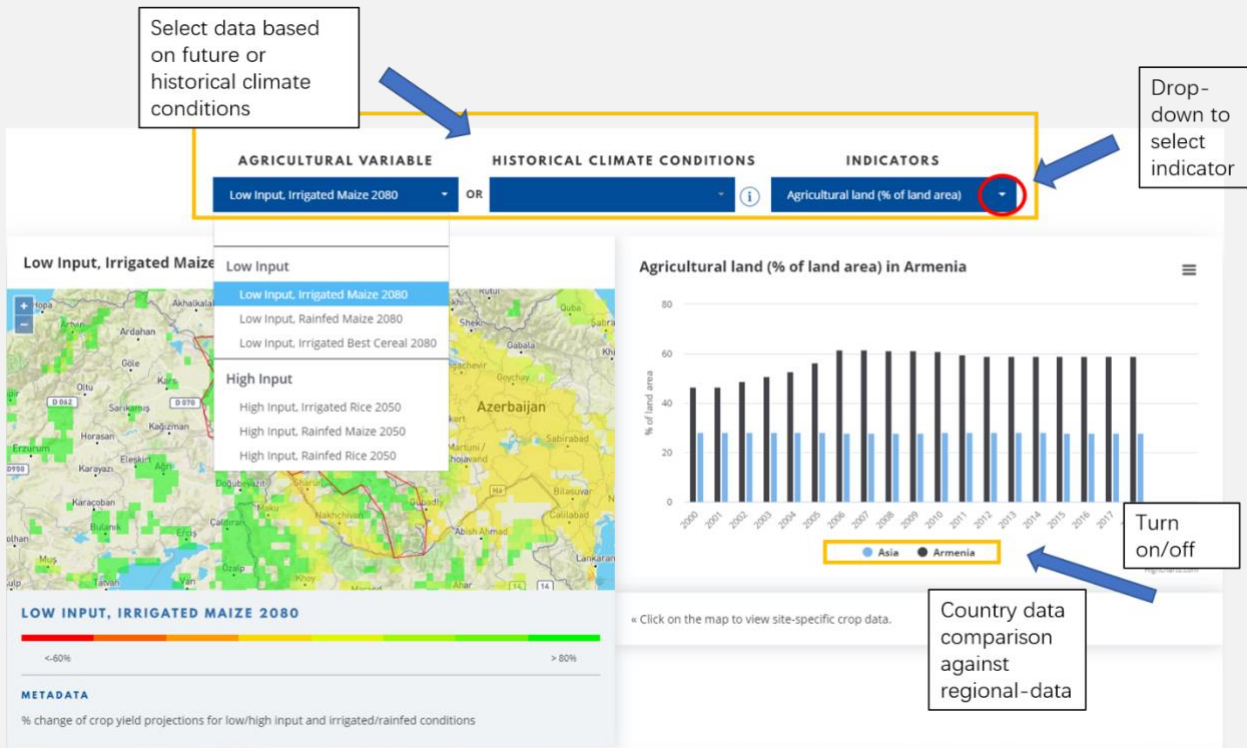
9. IMPACTS



AGRICULTURE AND WATER

CCKP provides country specific climate-related impact overviews on: (i) *Agriculture* tab; (ii) *Water* tab; and (iii) *Sea Level Rise* tab. Users can access this information by clicking on each sub-tab. Each sub-tab provides a summary of the climate change projected impacts on the sector for a country under review. Visuals offer comparisons between Agricultural Variables, Historical Climate Conditions and Development Indicators. Data are presented in two main forms: (i) spatial representation on the geographical map; and (ii) graphically, through a chart that compares the country data to its regional average (**Figure N**).

Figure N. Climate Change Impacts on Agriculture Indicators Uruguay (Agricultural Variable)



SEA LEVEL RISE

The *Sea Level Rise* tab on sea level rise provides users information on historical sea level anomaly, projected sea level rise, and observed sea surface temperature. Sea level data are presented (i) spatially; (ii) graphically, presenting observed data on mean annual cycle; and (iii) as a time series, presenting historical monthly observed data for comparison with annual trendlines. Historical sea level anomaly is presented monthly (**Figure O**) and projected sea level rise is presented over climatologies: 2007-2019, 2020-2039, 2040-2059, 2060-2079, and 2080-2099 (**Figure P**). Sea level rise data is valuable in understanding vulnerability along the coast of a country under review. This is especially applicable to countries where the majority of the population resides in coastal regions or where coastal regions contribute to key economic activities, such as fisheries and coastal tourism.

CCKP Sea Level products were processed by the Climate Resilience Cluster of the European Space Agency's (ESA) Earth Observation for Sustainable Development (EO4SD) initiative. *Projected Sea Level Rise* dataset is formed by combining 10 geophysical sources of long-term changes in relative SSH. These include 5 ice components (Greenland dynamic ice and surface mass balance, Antarctic dynamic ice and surface mass balance, and glaciers), 3 ocean-related components, all of which are derived from CMIP5 models (dynamic SSH, global thermosteric SSH anomaly, and the inverse barometer effect from the atmosphere), land water storage (also called terrestrial water), and glacial isostatic adjustment (as a change in sea level relative to land). Data is provided at a spatial resolution of 1°x1°. *Historical Sea Level Anomaly* dataset contains monthly aggregated global sea surface height products from satellite altimetry observations; data is provided at a spatial resolution of 0.25°x 0.25°. *Observed Sea Surface Temperature* data have been generated from satellite observations, derived in near-real time from observations by sensors on meteorological satellites overseen by

several agencies globally. The data presented shows monthly average aggregations, provided at a spatial resolution of $0.25^\circ \times 0.25^\circ$.

Figure O. Observed Sea Level Anomaly for Coastal Costa Rica; observed anomalies relative to mean of 1993-2012

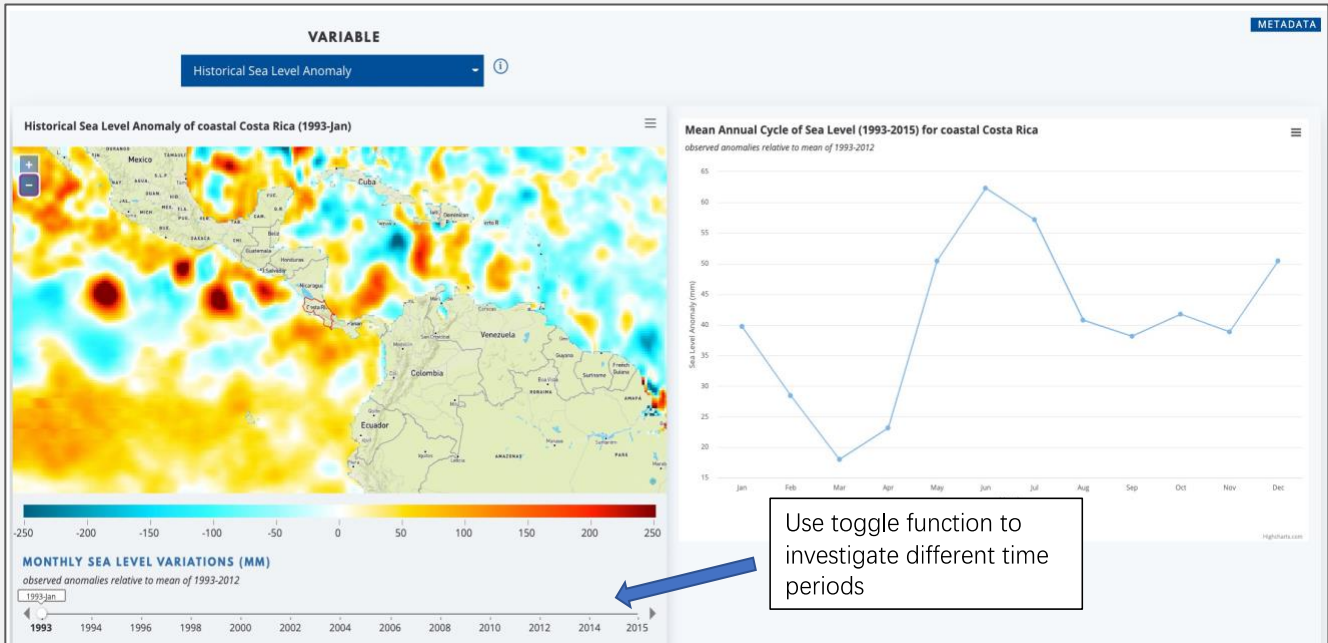
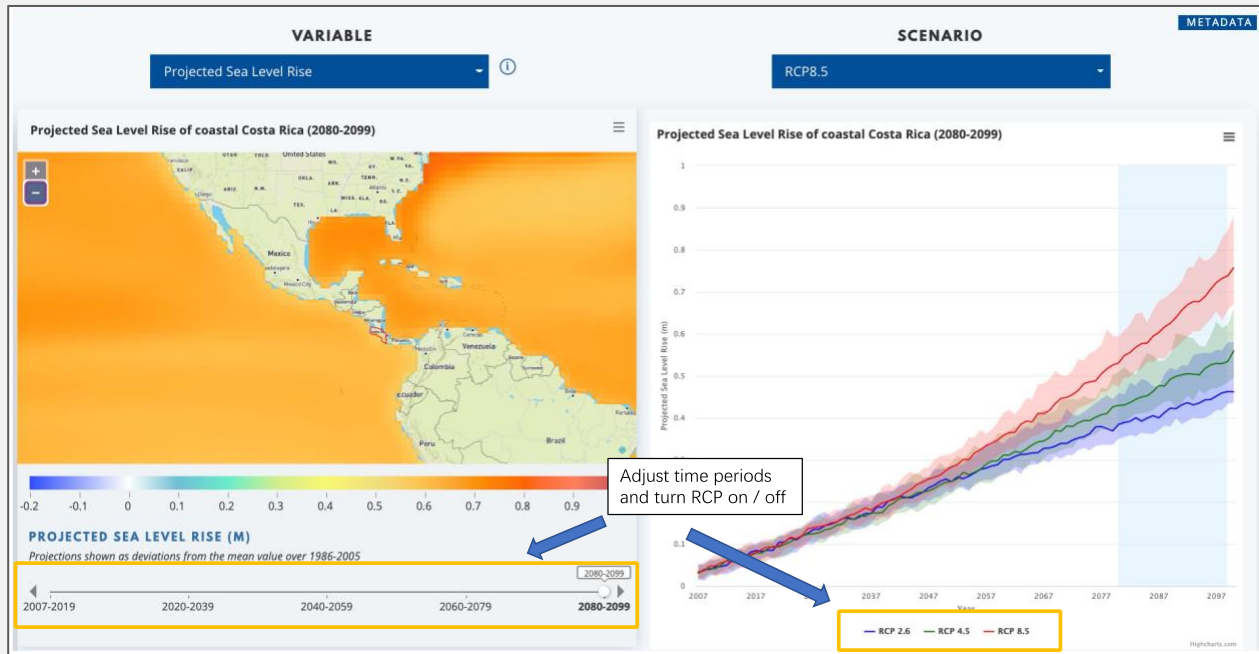


Figure P. Projected Sea Level Rise, Coastal Costa Rica; projection values as deviations from mean value 1986-2005



Example: Coastal Costa Rica – Historical Sea Level Rise

Costa Rica is highly vulnerable to changes in sea level. Its low-lying coastal regions are impacted by sea level rise and, most recently, by increased severe weather events. Average annual anomaly has increased substantially over the years, with increase observed since 2013. **Figure Q** presents average monthly anomaly in comparison to average annual anomaly as well as seasonality by highlighting the sea level occurrence in the month of January over the years. The figure provides visual and information on the seasonality and changes associated with sea level rise in Costa Rica. Data presents increasing impacts from sea level rise, further increasing risk of Costa Rica's key economic sectors, such as tourism and agriculture.

Figure Q. Historical Sea Level Rise



10. DOWNLOAD DATA

All CCKP data is freely and publicly available and can be downloaded directly from the *Download Data* link. Users can tailor specific download needs by completing the requests for each download tab. Data can be selected for download in four forms: (i) Map; (ii) Climatology; (iii) Timeseries; and (iv) Heatplot. Spatial data is provided as a global NetCDF file, with Climatology, Timeseries and Heatplot data is provided as a CSV file. Tailored data can be downloaded by country, sub-national unit or coordinates.

Please cite all data used from the Climate Change Knowledge Portal.

FIGURE R. Download Data

Download Data

The CCKP is committed to transparency and data availability. All data presented on the site is freely available for download. You can tailor your specific download needs by completing the requests for each download tab. Spatial data is provided as a global NetCDF file, with Climatology, Timeseries and Heatplot data is provided as a CSV file. We are working to complete sub-national aggregation as well as seasonal data for all offered variables and continue to update as new offerings are produced.

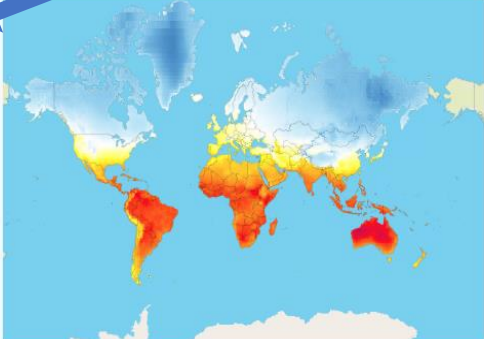
Data is not intended for commercial purposes. Please [contact us](#) if you have any questions.

Please properly cite any data used from the CCKP. *World Bank Group, Climate Change Knowledge Portal.*

MAP CLIMATOLOGY TIMESERIES HEATPLOT

COLLECTION	Projections Data (CMIP6) ▼
VARIABLE	Observed data (CRU) Projections Data (CMIP6) Projections Data (CMIP5)
CLIMATOLOGY	2080-2099 ▼
AGGREGATION	Seasonal ▼
CALCULATION	Climatology (mean) ▼
SCENARIO	SSP3-7.0 ▼
MODEL	Multi-Model Ensemble ▼

DOWNLOAD NETCDF



Tailor your data downloads to meet your specific needs.

Downloadable data files are built for easy plug-n-play into analysis.