Climate & Development Knowledge Network

# POLICY BRIEF

March 2017

## Key messages

- **Climate data and projections** that are relevant to the Caribbean region are available through the online CARIWIG portal.
- **Historical climate data and future projections** are available for a range of climate variables.
- **A suite of simulation tools,** including a weather generator, a tropical storm model and a regional drought analysis tool are also freely available.
- **These resources are useful for decision makers.** When combined with other data and information, they can help to build a picture of potential impacts to key economic sectors in the Caribbean.
- **A series of case studies** shows how these resources have been applied to real-world situations in Caribbean countries.
- **The Caribbean Community Climate Change Centre (CCCCC) is providing training and support** on how to use CARIWIG outputs.
- **CDKN-funded projects provide methods and tools** for decision makers to take proactive action to build climate resilience, despite the uncertainty that comes with future climate projections.

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# Climate data and projections: supporting evidence-based decision-making in the Caribbean

**Governments in the Caribbean recognise climate variability and change to be the most significant threat to sustainable development in the region.[1] Policies and strategies such as the regional framework for achieving development resilient to climate change[2] and its implementation plan[3] acknowledge the scale of the threat and provide a plan that aspires to safeguard regional prosperity and meet development goals. To do this, decision-makers need effective tools and methods to help integrate climate change considerations into their planning and investment processes. To build resilience, decision-makers can benefit from access to appropriate climate change data that are specific to their geographical location and relevant to their planning horizons.[4]**

The CARibbean Weather Impacts Group (CARIWIG)[5] project, funded by the Climate and Development Knowledge Network (CDKN), gives access to climate data that have been downscaled, making them relevant for use in the Caribbean region. The project also provides tools that allow decision-makers to better understand the potential impacts of drought, tropical storms, rainfall and temperature changes. Caribbean decision-makers, researchers and scientists can access this data freely, through the CARIWIG website.[6]

While these data are a useful aid for decision-making, they do not provide certainty about the scale or timing of climate impacts. The process of downscaling data makes them relevant to decisions taken at the national level in the Caribbean, but also increases the uncertainty. The data should therefore be used to inform decisions, but should not form the sole basis for action. Instead, decisions-makers should aspire to take adaptation measures that perform well over a wide range of conditions.[7]

This policy brief provides an overview of CARIWIG data and information and how they can be used, pointing to illustrative examples of how they have been applied in several Caribbean countries. It also provides decision-makers with the tools necessary to make effective climate decisions in the face of uncertainty.

CARIWIG tools covered by this policy brief include:

1. Historical climate data[8] from a network of weather stations across the region.
2. Regional climate change projections,[9] provided at a resolution relevant for

decision-makers at the national level in Caribbean countries.

3. Projections of how the climate may affect local weather at specific locations across the Caribbean region.
4. Simulations of historical tropical storms along user-defined paths.[10]
5. The Caribbean Assessment of Regional Drought (CARiDRO) tool.

## Climate data for the Caribbean

Technical experts and decision-makers in the Caribbean can access historical climate data and locally relevant climate change projections through CARIWIG's online data portal.[15] The portal, which is maintained by the Caribbean Community Climate Change Centre (CCCCC), provides:

- historical climate data[16]
- regional climate change projections[17]
- projections of how the climate may affect local weather
- simulations of hypothetical tropical storms.[18]

CARIWIG also offers the Caribbean Assessment of Regional Drought (CARiDRO) tool, which provides projections of future drought incidence. CARiDRO can be accessed through a separate online portal, also hosted by the CCCCC.[19]

This brief draws on the following CDKN-funded projects:

- **CARibbean Weather Impacts Group (CARIWIG):** The CARIWIG project provides access to historical climate data and regional climate projections via an open-access web portal. It also provides visualisation tools for future local weather, tropical storm tracks and drought incidence at the national level.[11]
- **The Caribbean Climate Online Risk and Adaptation TooL (CCORAL):**[12] CCORAL is a web-based decision support tool. It is aimed at policy-makers and other decision-makers, helping them to integrate climate change considerations into decision-making processes such as planning, programming and budgeting.
- **The Caribbean Research Call (RC):**[13] The RC funded research proposals that aligned with research needs identified in the CARICOM implementation plan for the regional framework for achieving development resilient to climate change.[14] The RC supported five research projects in Belize, Jamaica, Saint Lucia and Trinidad and Tobago.

## Historical climate data

CARIWIG provides 30 years' of historical climate data, covering monthly averaged rainfall, rainfall amount on wet days, the proportion of dry days, sunshine duration, daily maximum and minimum temperatures, vapour pressure and wind speed. These datasets are useful for providing baselines against which to measure future change and examples of previous weather conditions experienced in the Caribbean.

The datasets are limited, however, by the number of weather stations on which they are based. There is considerable sub-regional variability in this regard (see Figure 1).[20] Countries with weather stations included in the CARIWIG portal include:

- Antigua and Barbuda
- Barbados
- Belize
- Cuba
- Dominica
- Grenada
- Guyana
- Jamaica
- Saint Lucia
- Trinidad and Tobago.

At present, where local meteorological observations are unavailable, CARIWIG offers an alternative: the 'gridded reanalysis dataset'. These data are produced by combining weather-forecasting models with other observations. The estimates are produced for all locations on earth, and their span can go

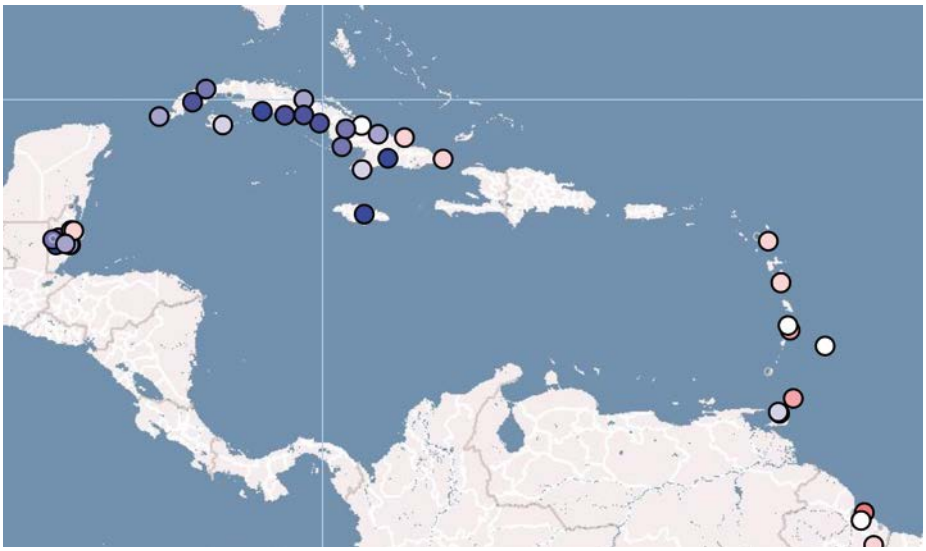

**Figure 1. Map showing distribution of weather stations recording daily minimum temperature (1971-2000)**

back decades and more, making them suitable to understanding climate. The CARIWIG reanalysis data are based on the ERA-Interim datasets (produced by the European Centre for Medium-Range Weather Forecasts, ECMWF), which provide information on mean daily temperature and rainfall from 1981-2010.[21]

The CCCCC has recently secured funding – under the USAID-funded Caribbean Climate Adaptation Programme (CCAP) – to enhance the existing network of weather stations covering the eastern and southern Caribbean regions. Once installed, these weather stations will improve the overall quantity of weather information available in the Caribbean.

## Future projections

A critical output from the CARIWIG project has been the online collation of regional climate change projections generated using a regional climate model known as 'Providing REgional Climates for Impacts Studies' (PRECIS). The CARIWIG data portal provides access to these projections for the Caribbean region, covering 12 climate variables (see Table 1).

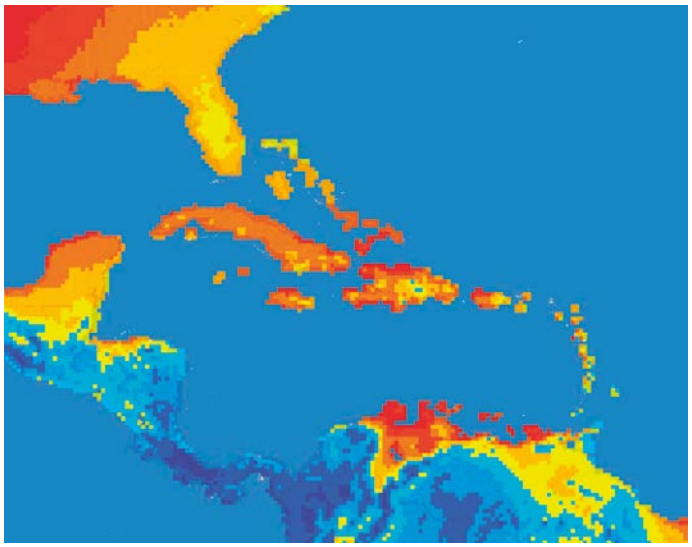

**Figure 2. CARIWIG regional climate model data visualisation: mean daily sunshine hours, July (ECHAM5, 2011-2040)[22]**

The PRECIS regional climate model provides projections at a resolution of 25 kilometres, making them useful for Caribbean policy-makers who, in many cases, are governing Small Island Developing States.[23] The relatively high spatial resolution of

**Box 1. Understanding uncertainty in regional climate model projections**

It may appear that regional climate projections (like those used in the CARIWIG data portal) are more accurate than those of global climate models. This is not the case. Regional climate model data are based on existing global ones. The global climate model data are 'downscaled' to make them relevant regionally. Therefore, regional climate model data include all the uncertainties of the global data and the additional uncertainty from the process of downscaling (see Figure 3).[24] While uncertainties increase, regional climate model data remain useful as they provide climate data at a scale that is relevant to decision-making at the national level. For Caribbean decision-makers, it is important to be aware of these uncertainties, and to be able to take adaptation action in spite of them.

The PRECIS regional climate model used by the CARIWIG portal is downscaled from two (ECHAM5 and HadCM3) of the possible 25 global climate models that make up the CMIP3 multimodel ensemble used by the Intergovernmental Panel on Climate Change's (IPCC) fourth assessment report.[25] This means that results are biased to the two global climate models chosen. When applying the PRECIS regional climate model to the Caribbean, CDKN-funded research has found, for example, that the projections do not fully account for unusual local weather phenomena such as the Caribbean low-level jet stream and the mid-summer drought. It also found that PRECIS has a tendency towards a negative precipitation bias.[26]

It is therefore advisable for technical experts and policy-makers to use the regional climate model projections as part of a wider suite of projections and tools to inform their decision-making.

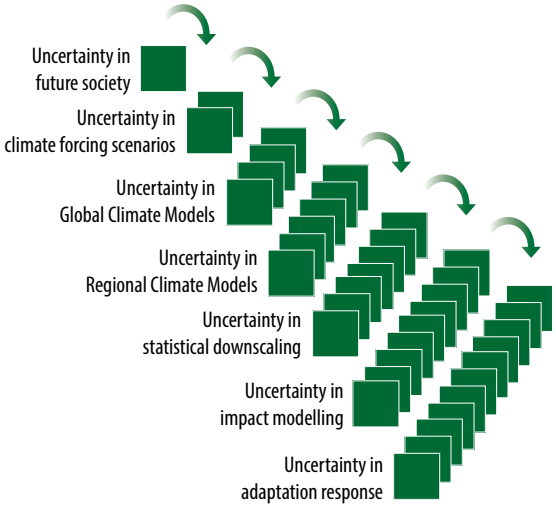


**Figure 3. The cascade of uncertainty in projecting future climate. Source: RiskChange[27]**

regional climate models enables more detailed representation of local processes, coastlines, land use and topography and may also better capture storms and extreme weather events, when compared with global climate models spatially resolved at 110 kilometres or more.[28]

Several real-world case studies have been developed to show how the regional climate model data can be used effectively. These case studies range from analysing the effect of climate change on water availability in Saint Lucia,[29] to coastal zone management in Barbados[30] and climate impacts on agriculture in Belize[31] (see Box 2). What these case studies have in common is that they combine the regional climate model data from CARIWIG with additional data and impact models to build a picture of climate risk. In Saint Lucia, for example, researchers studied potential river flows by combining the monthly change factors from the CARIWIG RCM projections with a specially designed hydrological model.

In Barbados, the regional climate model data were used to estimate wind speed and direction to inform coastal zone management. Researchers assessed the model performance of the projections by also using observed data from the Grantley Adams International Airport station. The researchers noted: "Ideally… [the study] would have used projections in sea level, storm surges and wave height/energy, as well as wind speed and direction. However, coastal and offshore parameters were not available from any of the CARIWIG tools".[32] This highlights an area for further development.

## Simulations and data visualisation

As well as downscaled climate projections, the CARIWIG data also power a set of tools to simulate future weather and extreme events. Specifically, the tools available are:

- weather generator and threshold detector[33]
- tropical storm model[34]
- regional drought tool.[35]

### The weather generator and threshold detector

The weather generator provides daily weather time series (usually at least 100) for use in impact assessments and impact models. It generates weather data for the future at single locations – at each of the existing weather stations (see Figure 1). The future weather time series

**Box 2. Case study: assessment of climate change impacts on agriculture in Cayo District, Belize[36]**

This case study used CARIWIG regional climate model data to investigate the potential impact of climate change on staple crops in the region of Cayo District, Belize. Researchers studied the potential climate impact on dry beans, maize and vegetables. A preliminary analysis of the impacts on breeding animals was also undertaken.

The researchers used the CARIWIG data portal to generate climate change scenarios for 15 grid squares of 25 kilometres covering the Cayo District. They then used the results to feed into several agricultural models. For crops, they used DSSAT 4.5,[37] a suite of biophysical crop models that provide thresholds and optimal growing conditions for various crop types. They also used the SPUR2 v2.2[38] model to assess the climate impact on grazing animals. The analysis projected that tomato yields would halve by the end of the century unless adaptation action was taken (see Figure 4).

While the outputs are useful, the researchers emphasise that this is only a preliminary study, and acknowledge several limitations (for example, they were able to assess only the impact of climate change on grazing animals on rangeland – other factors like thermal conditions of indoor reared animals were not accounted for).

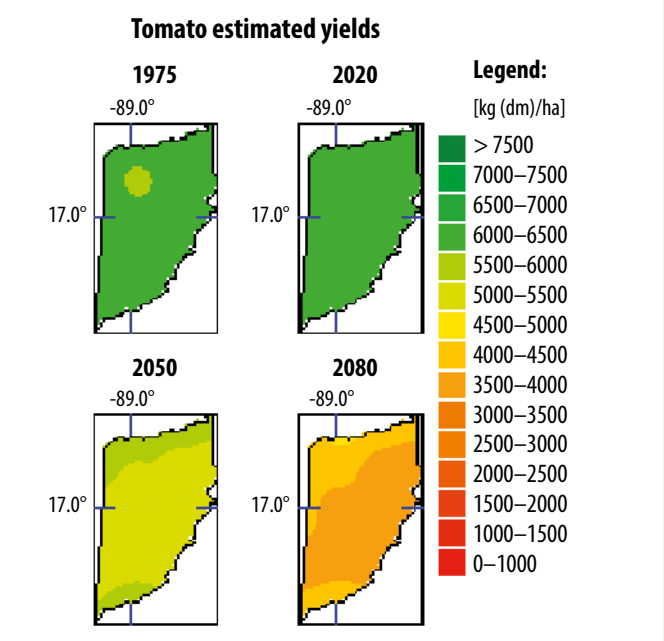


**Figure 4. Yield spatial distribution for tomato under HadCM3 climate change scenario. Yields are expressed in kg/ha. Source: Rivero et al.[39]**

can therefore be compared directly with historical weather observations at each weather station location. This also means, however, that the simulations are limited by the number of weather stations installed across the region.

The threshold detector can be used to investigate a particular aspect of the weather generator outputs. For example, it can indicate how many times temperatures exceed 36°C in future weather simulations, and how this compares with the past.

The tool is useful for a number of different sectors, including water, agriculture and health. The weather generator was used in Belize to investigate potential climate change impact on dengue fever, for example.[40] Here, the outputs showed an increase in the number of days on which the minimum temperature exceeded 18°C, creating more favourable conditions for dengue fever.[41]

### The tropical storm model

The tropical storm model allows users to draw their own storm tracks across different Caribbean countries. The tool then runs a simulation of memorable past storms (such as Hurricane Dean) along the predefined track. The model generates precipitation rates and wind speeds on grids at 15-minute intervals.[42,43] The tool does not provide future projections of hurricane or tropical storm risk; instead, it offers 'what if' scenarios to be explored by taking storms previously experienced in the Caribbean and determining what might have happened had they tracked over a particular island (see Figure 5).

### The Caribbean Assessment of Regional Drought (CARiDRO) tool

While this tool is not available through the CARIWIG data portal, it is still based on the same RCM data.

CARiDRO[44] is an online tool that allows users to process observed and modelled climate data based on two drought indices: the Standardized Precipitation Index (SPI) and the Standardized Precipitation-Evaporation Index (SPEI). In this way it allows users to assess both atmospheric and hydrological drought.

CDKN case studies show how CARiDRO has been applied to assess the likelihood of drought events in Cuba[45] and in the eastern Caribbean sub-region.[46] In Belize, the CARiDRO tool was also used to investigate the relationship between drought incidence and agricultural forest fires.[47] The study showed that CARiDRO's projections of dry/wet conditions could be a useful tool for anticipating the incidence of such fires, giving more certainty than by relying on rainfall rates alone.

Table 1 gives a summary of what the CARIWIG-based resources cover, and the variables and scales used.

## The limits of climate models: making decisions in the face of uncertainty

The CARIWIG regional climate model projections are a useful resource for decision-makers. Climate models are not able to predict future climate conditions precisely, however. Downscaling climate projections to a higher resolution (as with CARIWIG) can be misinterpreted as providing more precise data, whereas the downscaling process actually increases the overall uncertainty.

Given the uncertainties, Caribbean decisions-makers should focus on identifying and implementing adaptation actions that perform well over a wide range of conditions. This represents a shift in emphasis from identifying optimal actions to finding robust ones. This means identifying 'no regret' and 'low regret' options that can deliver benefits in the near term as well as laying the foundations for addressing future climate challenges. CDKN research is instructive in providing guidance for identifying such options.[48]

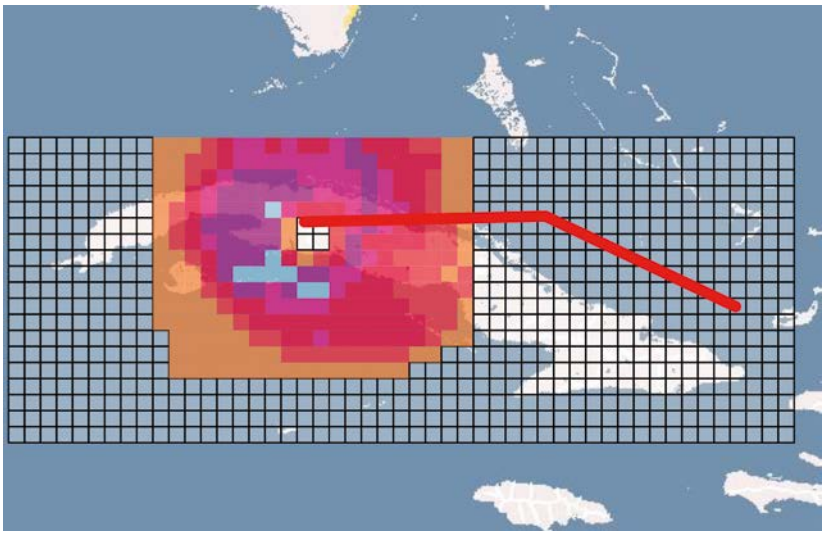

**Figure 5. Simulated path of a hypothetical hurricane striking Cuba using the CARIWIG tropical storm model**

**Table 1. Summary of CARIWIG-based resources**

| Information provided | Climate variables covered | Geographical coverage | Spatial and temporal scale |
|---|---|---|---|
| **Historical climate data** | | | |
| Historical data on Caribbean climate, including observed data from weather stations as well as estimates of daily historical weather properties based on atmospheric reanalysis data. | • Rainfall (monthly average, amount on wet days)<br>• Sunshine duration<br>• Temperature (daily maximum and minimum)<br>• Vapour pressure<br>• Wind speed<br>• Proportion of dry days | Observed data are provided for 44 weather stations with better coverage in the western Caribbean. Where observed data are not available, gridded reanalysis data are available for the entire region. | Observed data provided for specific locations. Two time periods are available (1971-2000 and 1981-2010).<br>Gridded dataset is provided at a resolution of about 75 kilometres. The time period covered is 1979-2011. |
| **PRECIS regional climate model** | | | |
| Future climate change projections for the Caribbean region. Driven by HadCM3Q0 and ECHAM5 global climate models under the A1B (mid-range) emissions scenario. | • Rainfall (daily mean, daily variance, skewness)<br>• Sunshine hours (daily mean, daily variance)<br>• Temperature (daily mean, daily mean range, daily mean variance, daily range variance)<br>• Vapour pressure (daily mean, daily variance)<br>• Proportion of dry days | Regional coverage. | Information provided at the 25-kilomtre resolution.<br>Time periods covered include: 1971-2000, 1981-2010, 2011-2040, 2041-2070, and 2071-2100. |
| **Weather generator** | | | |
| Describes potential changes to weather at particular locations. Provides monthly change factors based on regional climate model data. This gives information about expected changes in, for example, temperature compared with a baseline. | • Rainfall (mean, maximum and minimum)<br>• Temperature (mean, maximum and minimum)<br>• Vapour pressure<br>• Sunshine duration<br>• Wind speed<br>• Relative humidity<br>• Diffuse and direct radiation<br>• Evapotranspiration | Currently 44 locations. Better coverage in western parts of the Caribbean. Poor coverage in the east. | Daily time series across 44 locations. |
| **Tropical storm model** | | | |
| Gives rainfall intensity and wind speed data based on past events. Users can create hypothetical storms and model the likely rainfall and wind speed. | • Rainfall intensity<br>• Wind speed | Regional coverage. | Data provided at 15-minute intervals for predetermined locations. |
| **Caribbean Assessment of Regional Drought (CARiDRO) tool** | | | |
| Provides future drought projections based on regional climate model data and two drought indices, the Standardized Precipitation Index and the Standardized Precipitation-Evaporation Index. The tool allows users to identify different drought types such as meteorological (lack of rainfall) or hydrological drought (lack of surface and ground water). | • Drought frequency | Regional coverage. | Data provided for droughts lasting one to 12 months at user-determined locations. |

A further important principle for decision-making in the face of uncertainty is to apply adaptive management. This promotes strategies that evolve as new evidence becomes available or circumstances change,[49] In practice, this might mean periodically reviewing climate change allowances used for engineering design in the light of new developments and climate model experiments.

The CDKN-funded CCORAL[50] (see Box 3) and associated sourcebook for the water sector[51] are particularly instructive on how to make effective decisions about climate change in the face of uncertainty. This is important given that uncertainties exist around the specific nature of climate impacts at the local level, and the fact that climate data at the regional level are subject to a greater degree of uncertainty than at the global scale.

## Conclusion

The suite of CARIWIG tools[52] provides a powerful resource for Caribbean decision-makers. The downscaled climate change projections provide information about possible future climate on a spatial and temporal scale that is relevant for decision-makers in a wide range of sectors, including tourism, health, agriculture, and coastal zone management.[53]

CDKN research has shown how the regional climate model data can be applied in practice to real-world situations in a variety of Caribbean countries. These case studies demonstrate how the climate projections – and associated simulation tools such as the weather generator, the tropical storm model and CARiDRO – can be used in conjunction with other tools such as crop models to provide new insights about the impact of future climate change in the Caribbean.

Decision-makers should be aware that the downscaled data do not provide increased certainty. In light of this, the CARIWIG regional climate model data should be considered as only one source of information – to be assessed alongside other projections, including the latest global climate model ensemble of projections.[54]

CDKN-funded tools such as CCORAL[55] provide important guidance on making decisions in spite of uncertainty, decisions that will perform well under a range of climate scenarios and that often provide important additional benefits to societies and economies.

**Box 3. CCORAL – An online tool for integrating climate risk into decision making[56]**

Developed by the Caribbean Community Climate Change Centre (CCCCC) with funding from CDKN, the Caribbean Climate Online Risk and Adaptation TooL (CCORAL) is a Caribbean-specific, web-based platform.

It is used to screen policies, legislation, plans, budgets and projects to assess climate risks and to identify options to enhance climate resilience.

CCORAL can be applied by all sectors, and is available at the CCCCC website: http://ccoral.caribbeanclimate.bz.


**Figure 6. The CCORAL website homepage**

## Resources for researchers and policy-makers

**Table 2. CDKN-funded research resources from the Caribbean used to formulate this policy brief**

| Title | Type | Country | Project | Details | Weblink |
|---|---|---|---|---|---|
| **CARIWIG data, tools and general guidance** | | | | | |
| CARIWIG data portal – historical climate data | Website | Regional | CARIWIG | The CARIWIG data portal provides open access to historical (observed) climate data from weather stations in the Caribbean. | www.cariwig.org/ncl_portal/#history_data_viewer |
| CARIWIG data portal – future data | Website | Regional | CARIWIG | The CARIWIG data portal provides open access to future climate change projections based on a regional climate model. These data are provided at a 25km resolution for the Caribbean region. | www.cariwig.org/ncl_portal/#future_data_viewer |
| CARIWIG data portal – simulations | Website | Regional | CARIWIG | The CARIWIG data portal provides open access to simulations based on RCM data for the Caribbean region. These include simulations of future weather at specific locations using the Weather Generator; and hypothetical tropical storm scenarios using the tropical storm model. | www.cariwig.org/ncl_portal/#simulations |
| CARiDRO tool | Website | Regional | CARIWIG | The CARiDRO tool is an open access web portal hosted on the CCCCC website. It provides future drought projections for the Caribbean. | http://caridro.caribbeanclimate.bz |
| 'Assessing the effect of domain size over the Caribbean region using the PRECIS regional climate model' | Peer-reviewed study | Regional | CARIWIG | This technical paper investigates the sensitivity of the CARIWIG regional climate model to domain size for the Caribbean region. | http://link.springer.com/article/10.1007/s00382-014-2272-8 |
| **Case studies relating to historical climate data and future RCM projections** | | | | | |
| 'Case study: assessment of climate change impacts on agriculture on Cayo District, Belize' | Case study | Belize | CARIWIG | The study used CARIWIG tools to assess the impact of climate change on crop production in Belize. It employed the regional climate model data combined with crop models. | www.cdkn.org/resource/assessment-climate-change-impacts-agriculture-cayo-district-belize |
| 'Case study: Barbados coastal zone protection' | Case study | Barbados | CARIWIG | The study demonstrates how CARIWIG tools can be used to inform Integrated Coastal Zone Management. It employed regional climate model data and the CARIWIG tropical storm model. | www.cdkn.org/resource/report-barbados-coastal-zone-protection |
| 'Case study: effect of climate change on water availability in the Font D'Or catchment, Saint Lucia' | Case study | Saint Lucia | CARIWIG | The study assesses projected impacts of climate change on river flows in the Font D'Or catchment under two future climate scenarios. It uses CARIWIG regional climate model projections combined with HR Wallingford's Kestrel-IHM software. | www.cdkn.org/resource/effect-climate-change-water-availability-font-dor-catchment-saint-lucia |
| 'Long-term trends in precipitation and temperature across the Caribbean' | Peer-reviewed case study | Regional | CARIWIG | This technical study considers long-term precipitation and temperature variability across the Caribbean using two gridded datasets (CRU TS3.21 and GPCCv5). | http://onlinelibrary.wiley.com/doi/10.1002/joc.4557/full |

| Title | Type | Country | Project | Details | Weblink |
|---|---|---|---|---|---|
| 'Report: assessing the potential impacts of climate change on Belize's water resources' | Report | Belize | Research call | Report providing an impact assessment of climate change on Belize's water sector based on CARIWIG regional climate model data | www.cdkn.org/resource/report-assessing-potential-impacts-climate-change-belizes-water-resources |
| 'Flooding and climate change in Jamaica: risk to vulnerable communities' | Presentation | Jamaica | Research call | This study provides a historic overview of the frequency and severity of flooding for Jamaica and an island-wide riverine flood hazard map. Flood hazard maps were created based on CARIWIG regional climate model data. | https://drive.google.com/file/d/0B5UjhmrNlXwYcjJFQjR3WnMwOHM/view?pref=2&pli=1 |
| **Case studies relating to the Weather Generator and Threshold Detector** | | | | | |
| 'Dengue fever in the Belize district' | Case study | Belize | CARIWIG | This case study assessed the impact of climate variability and change on the occurrence of dengue fever in Belize. It employed the regional climate model and CARIWIG weather generator. | www.cdkn.org/resource/report-dengue-fever-belize-district |
| 'The impact of future climate change on sweet potato production' | Case study | Jamaica | CARIWIG | This case study assessed the impact of future climate change on sweet potato production in Jamaica. It employed the CARIWIG weather generator and the Food and Agriculture Association's AquaCrop model. | www.cdkn.org/resource/case-study-impact-future-climate-change-sweet-potato-production |
| 'Downscaling regional climate model outputs for the Caribbean using a weather generator' | Peer-reviewed study | Regional | CARIWIG | This scientific paper describes the downscaling process for the CARIWIG model using the weather generator. | http://onlinelibrary.wiley.com/doi/10.1002/joc.4624/abstract |
| **Case studies relating to storms and hurricanes** | | | | | |
| 'Barbados coastal zone protection' | Case study | Barbados | CARIWIG | This case study demonstrates how CARIWIG tools can be used to inform integrated coastal zone management. It employed regional climate model data and the CARIWIG tropical storm model. | www.cdkn.org/resource/report-barbados-coastal-zone-protection |
| 'Scenarios of discharge for the Hope river watershed in response to variable tropical cyclone characteristics' | Presentation | Jamaica | CARIWIG | This study investigated six river discharge scenarios from Hope river watershed, simulating Hurricane Ivan, using the tropical storm model and combined with a hydrological modelling system. | http://dms.caribbeanclimate.bz/M-Files/openfile.aspx?objtype=0&docid=6746 |
| 'Rainfall-runoff simulations using the CARIWIG simple model for advection of storms and hurricanes and HEC-HMS: Implications of Hurricane Ivan over the Jamaica Hope River watershed' | Peer-reviewed study | Jamaica | CARIWIG | Scientific study running rainfall simulations for CARIWIG model. Rainfall data were simulated in relation to the Hope River watershed in eastern Jamaica to investigate implications for peak discharge. The study used the tropical storm model, which provides rainfall and wind speeds over Caribbean islands under varying tracks, speeds and categories of a select group of hurricanes. | http://link.springer.com/article/10.1007/s11069-016-2380-3 |

| Title | Type | Country | Project | Details | Weblink |
|---|---|---|---|---|---|
| 'Flood risk in Jamaica: recent damage and loss due to tropical cyclones in Jamaica' | Policy brief | Jamaica | Research call | High-level summary of flooding impact on Jamaica including coastal flooding. Flood hazard maps were created based on CARIWIG regional climate model data. | www.cdkn.org/resource/policy-brief-flood-risk-jamaica-recent-damage-loss-due-tropical-cyclones-jamaica |
| **Case studies relating to CARiDRO** | | | | | |
| 'CARiDRO The Caribbean Assessment Regional DROught Tool' | Case study | Regional | CARIWIG | The study summarises the Caribbean Assessment Regional DROught (CARiDRO) tool. | www.cdkn.org/resource/case-study-caridro-caribbean-assessment-regional-drought-tool |
| 'Drought and agricultural-related forest fires in Belize' | Case study | Belize | CARIWIG | This case study uses CARiDRO to assess the relationship between agricultural forest fires and climate change, via drought indices. | www.cdkn.org/resource/case-study-drought-agricultural-related-forest-fires-belize |
| 'Drought assessment & projection for the eastern Caribbean using the CARiDRO tool' | Case study | Eastern Caribbean | CARIWIG | Study uses CARiDRO to assess the likelihood of drought events in the eastern Caribbean. | www.cdkn.org/resource/case-study-drought-assessment-projection-eastern-caribbean-using-caridro-tool |
| 'An example of local assessment of future drought. Las Tunas province, Cuba' | Case study | Cuba | CARWIG | This case study uses CARiDRO to assess the likelihood of drought events in Las Tunas, Cuba. | www.cdkn.org/resource/case-study-example-local-assessment-future-drought-las-tunas-province-cuba |
| **Guidance on making decisions under uncertainty** | | | | | |
| Caribbean Climate Online Risk and Adaptation Tool (CCORAL) | Web tool | Regional | CCORAL | CCORAL is a decision support tool specifically designed for decision-makers who are working on laws, policies, strategies, plans, programmes, projects or budgets that might be affected by climate change. These decision makers can use the tool to see whether their work is vulnerable to climate impacts and, if so, what steps they can take to increase resilience. | http://ccoral.caribbeanclimate.bz |
| 'Achieving development resilient to climate change: a sourcebook for the Caribbean water sector' | Report | Regional | CCORAL | This sourcebook guides planners, project developers and water sector practitioners on the main elements for consideration in planning and executing actions to improve water resources management, and to build the resilience of the water sector against climate change. | www.cdkn.org/resource/report-achieving-development-resilient-climate-change-sourcebook-caribbean-water-sector |
| 'Summary of sourcebook' | Policy brief | Regional | CCORAL | This is a short policy brief that outlines what to expect in the sourcebook. | www.cdkn.org/resource/information-brief-summary-sourcebook |
| 'No and low regrets investment options for climate resilience' | Policy brief | Regional | CCORAL | Policy brief about no- and low-regret options for resilience investments in the water sector. | www.cdkn.org/resource/information-brief-no-low-regrets-investment-options-climate-resilience |

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The Climate and Development Knowledge Network (CDKN) aims to help decision-makers in developing countries design and deliver climate compatible development. We do this by providing demand-led research and technical assistance, and channelling the best available knowledge on climate change and development to support policy processes at the country level.

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