Climate Projections for the Capital Region (2024)

FREQUENTLY ASKED QUESTIONS

Capital Regional District | April 2024

Contents

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About the Report

1. What is the purpose of this report?

This report is designed to help the Capital Regional District (CRD), local governments and community partners in the capital region better prepare for climate change. The CRD engaged the Pacific Impacts Climate Consortium (PCIC) to develop high resolution (~800m) regional climate projections, providing information on a range of temperature and precipitation-related variables up to the end of this century.

This report is an update to a 2017 report produced by CRD and PCIC.

2. What is the Pacific Climate Impacts Consortium (PCIC)?

The Pacific Impacts Climate Consortium (PCIC) is a regional climate service provider at the University of Victoria that provides practical information on both historical climate and future climate projections in support of long-term planning. PCIC operates in collaboration with climate researchers and regional stakeholders on projects driven by user needs. Downscaling climate projections to the regional scale is one of the main project areas at PCIC.

3. What's new in the updated report?

Climate science has been evolving since the CRD and PCIC published the first *Climate Projections for the Capital Region* report in 2017. New information is now available to re-evaluate the projections and provide the most up-to-date information on how the regional climate may change by the middle and end of this century.

The updated report includes:

- ✓ New indices for describing projected changes in heatwave frequency and severity;
- ✓ A 'Regional Impacts' section informed by engagement with local government staff, and;
- ✓ Technical guidance to assist users in implementing climate projections data into their projects, policies, and planning activities.

The report also incorporates information from the latest international climate modelling exercise (CMIP6). In recent years, improvements in models and downscaling methods have enhanced our understanding of climate processes at regional scales. CMIP6 uses a new set of emissions scenarios called Shared Socio-Economic Pathways (SSPs), that are connected to "bottom-up" estimates of future economic and social development worldwide (see question 9 below for further information about SSPs). In addition, the baseline period was shifted from 1971-2000 to 1981-2010, following the best practice of using a recent climatological period as a baseline.

The use of CMIP6 and SSPs led to a larger spread in model results across the ensemble, particularly at the high end (90th percentile), since some CMIP6 models in the ensemble have a higher climate sensitivity than those in CMIP5. The shift in the baseline period (the Past) resulted in slightly smaller median projections for many indices because global and regional mean temperatures increased slightly between the 1971-2000 period and the 1981-2010 period.

4. What time periods and greenhouse gas emissions scenarios were used for the report?

The report highlights projections for mid-century (the 2050s time period) under a high greenhouse gas emissions scenario (SSP5-8.5) for a selection of climate variables.

The complete data package contains additional maps and Excel tables for 77 climate variables for the following:

- ✓ Four time periods: Past (1981-2010), 2030s (2021-2050), 2050s (2041-2070), 2070s (2071-2100)
- ✓ Three emissions scenarios: low (SSP1-2.6), moderate (SSP2-4.5), and high (SSP5-8.5)

The complete data package also contains GIS files for all 77 climate variables for the Past and the 2050s under a high emissions scenario. To inquire about access to the complete data package, contact climateaction@crd.bc.ca.

Note: Because the 2030s is a 30-year average from 2021 to 2050, the three emissions scenarios (SSPs) driving the climate models will not be very different from the Past (1981-2010) period, nor will they be

distinguishable from each other. Hence, for certain variables, changes by the 2030s may not be very noticeable. In addition, climate variable responses under the three emissions scenarios (SSP1-2.6, SSP2-4.5, and SSP5-8.5) do not begin to diverge noticeably until roughly 2050.

5. Why is there no information about sea level rise, windstorms or hydrological projections?

The report is based on statistically downscaled regional projections for **temperature and precipitation-based variables only**. PCIC has assembled Canada-wide, gridded, observational datasets for these two variables (called "target data") that are necessary for producing the downscaling results. At this time, target data of adequate quality and geographical extent are not available for other climate variables, such as wind or specific humidity. Hence, this prohibits the production of downscaled data for these additional variables.

Hydrological modelling (which is also conducted at PCIC but is outside the scope of this work) employs a separate modelling framework and different input variables to produce future projections.

Regional projections for sea level rise, which require a significantly different modelling framework, were developed separately at a regional scale in 2021 through the CRD's *Capital Region Coastal Flood Inundation Mapping Project*. For more information, see www.crd.bc.ca/coastalflood.

6. How does this report compare with other climate projections resources?

Compared to generally available climate data resources, the *Climate Projections for the Capital Region (2024)* report offers the most localized information for understanding climate change in this specific region. The associated data package should be well-suited to further work requiring authoritative, quantitative results for many climatic quantities of interest.

Users may decide to access other existing climate projections resources for applications that require different variables, higher spatiotemporal resolution (e.g., time series for follow-on model simulations), or sector-specific information. Data sources that may be helpful to review in conjunction with the current assessment are listed in Appendix D of the report.

About Climate Projections

7. What's the difference between climate and weather?

Weather refers to the short-term conditions of the atmosphere at a specific location. Weather is highly variable, and can change from minute-to-minute, hour-to-hour, and day-to-day. *Climate,* on the other hand, is the average weather in a specific location or region over a longer period of time – usually 30 years or more. Climate varies on time scales from months to decades and longer. To cite an old but accurate adage: "Climate is what you expect; weather is what you get."

8. What is a climate projection?

The aim of a weather forecast is to describe the near-term behaviour of the atmosphere, in a local area and on an hourly basis, up to 1 to 2 weeks into the future. In contrast, the aim of a climate projection is to describe the statistics of weather in the distant future. This includes the mean values of weather variables and their variability, the frequency and magnitude of extremes, and other features specific to certain variables (e.g., the percent coverage of sea ice over the Arctic Ocean). Because the distant future is much less certain than the near-term, a weather forecast comes with greater precision and accuracy than a climate model projection. Climate projections cannot tell us what the exact weather will be on June 18, 2054, but they *can* give us a good idea of what the climate of a typical season or year might be like in the 2050s.

9. What are Shared Socioeconomic Pathways (SSPs)?

Shared Socioeconomic Pathways, or SSPs, are an updated set of global emissions scenarios for the latest international CMIP exercise. They make assumptions about how various socio-economic conditions (i.e., land-use changes, population, education, energy use, technology, etc.) may change over the next century in combination with global ambition to reduce greenhouse gas emissions. They are used for climate projections to allow climate modelers and end-users to explore climate change under a range of possible future conditions.

Taking Action

10. What can climate projections data be used for?

Broadly speaking, climate projections data allow users to plan for and manage future climate risk. This can range from broader considerations (e.g., to inform strategic planning) to more detailed analyses (e.g., to design infrastructure). Appendix B contains information to help users decide what climate projections data to use and Appendix C outlines key factors to consider when using the data.

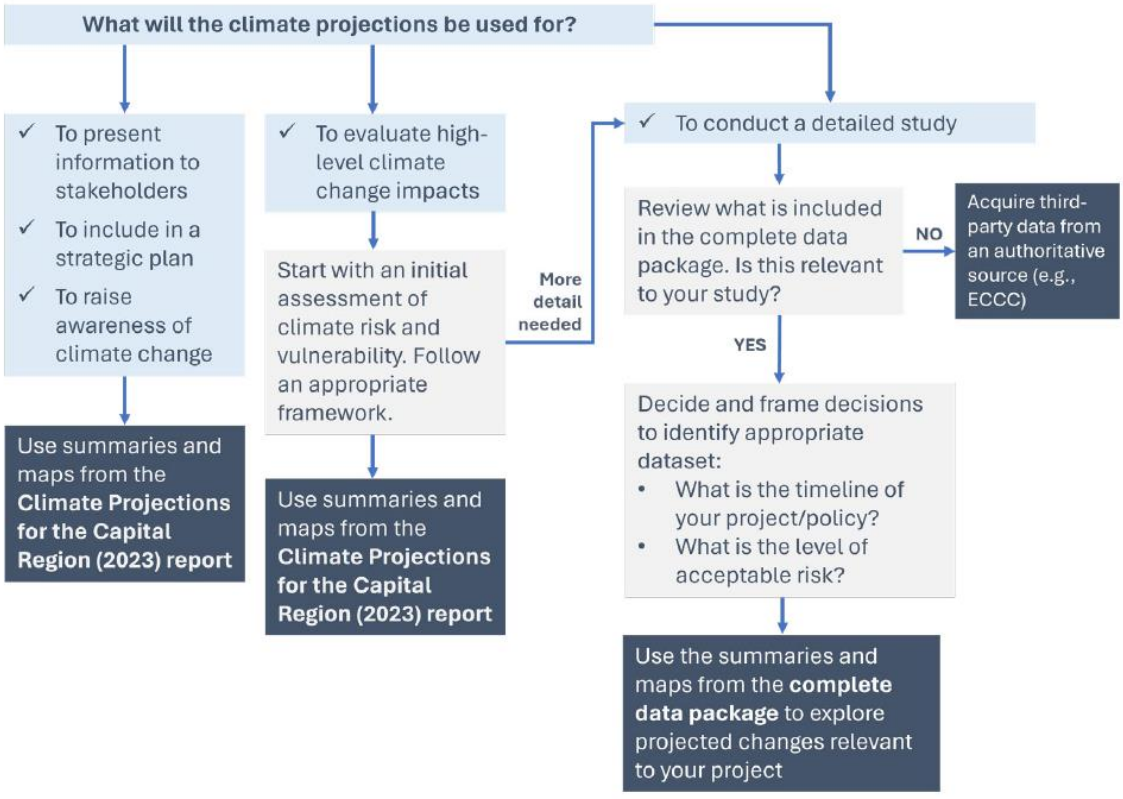

***Figure B1**. Decision tree for using climate projections data. This decision tree has been adapted from the Victoria (Australia) Climate Projections 2019 Technical Report (Clarke et al., 2019).*

11. What is the Capital Regional District doing about climate change?

The CRD has a strong history of climate action and remains committed to addressing climate change within its own operations and at the regional level. In 2007, the CRD signed the BC Climate Action Charter in 2007, establishing a target to reduce regional greenhouse gas (GHG) emissions by 61% by 2038. In 2019, the CRD declared a climate emergency and in 2021, the Board approved a renewed CRD Climate Action Strategy and five-year action plan. This strategy provides direction for how the CRD, under its service mandates, will show leadership on climate action, both for the CRD's corporate operations and for its community-focused services. The CRD reports annually on the progress toward achieving its climate action goals. For more information, visit www.crd.bc.ca/climate.