



# Growing Tomorrow's Climate & Health Workforce

Brenda Hoppe, PhD

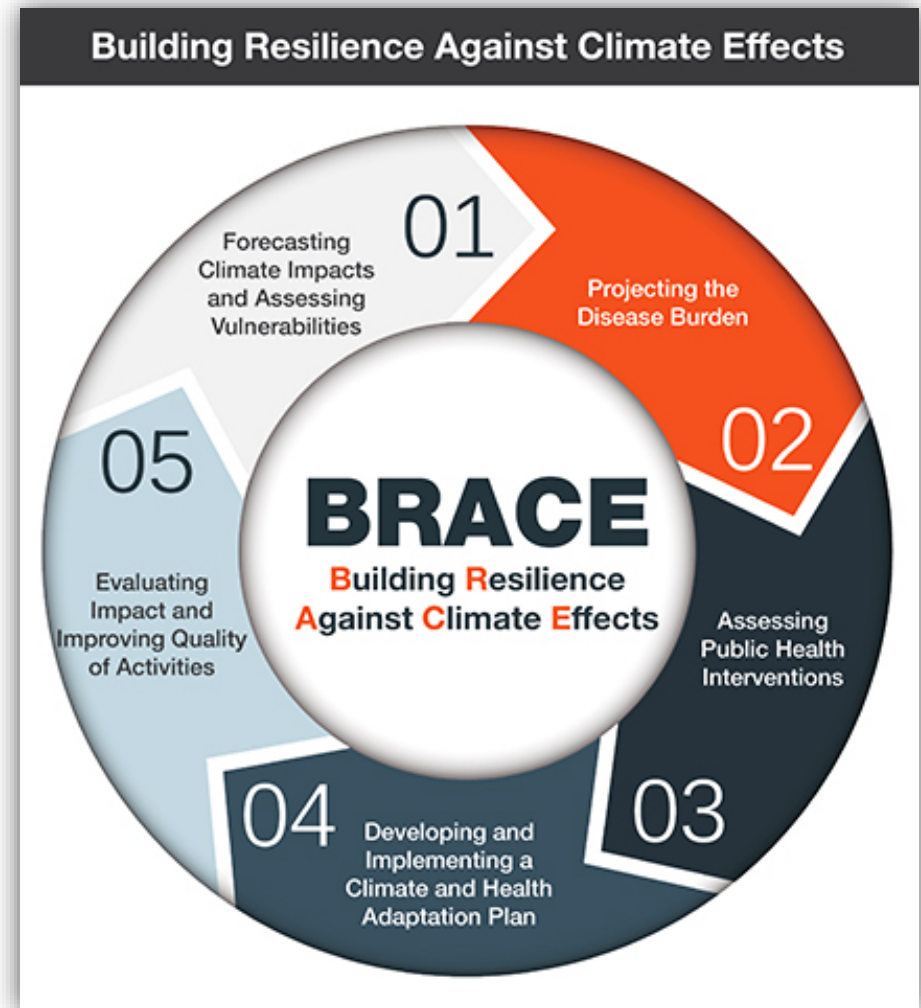
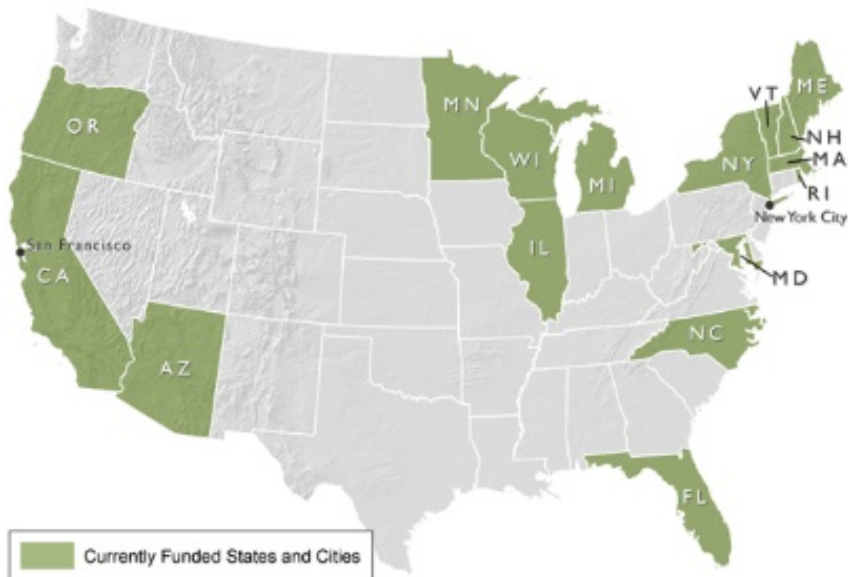
UMN SPH Healthy Futures Summit

December 5, 2019

- Growth of Climate & Health workforce
- Role of climate projection data in advancing Climate & Health work
- Status of climate projection data in US and MN
- MN Climate Data Community of Practice

# Minnesota Climate & Health Program

## CDC's Climate-Ready States & Cities Initiative Grantees



# Minnesota Climate & Health Program



# Minnesota Climate & Health Program

## Example topics

- Drinking water
- Drought
- Pollen
- Built environment
- Emergency management
- Mental health
- Climate migrants

## Example partners

- Federal agencies
- Tribes
- State agencies
- Local governments
- Universities
- Businesses
- Community organizations

## Example audiences

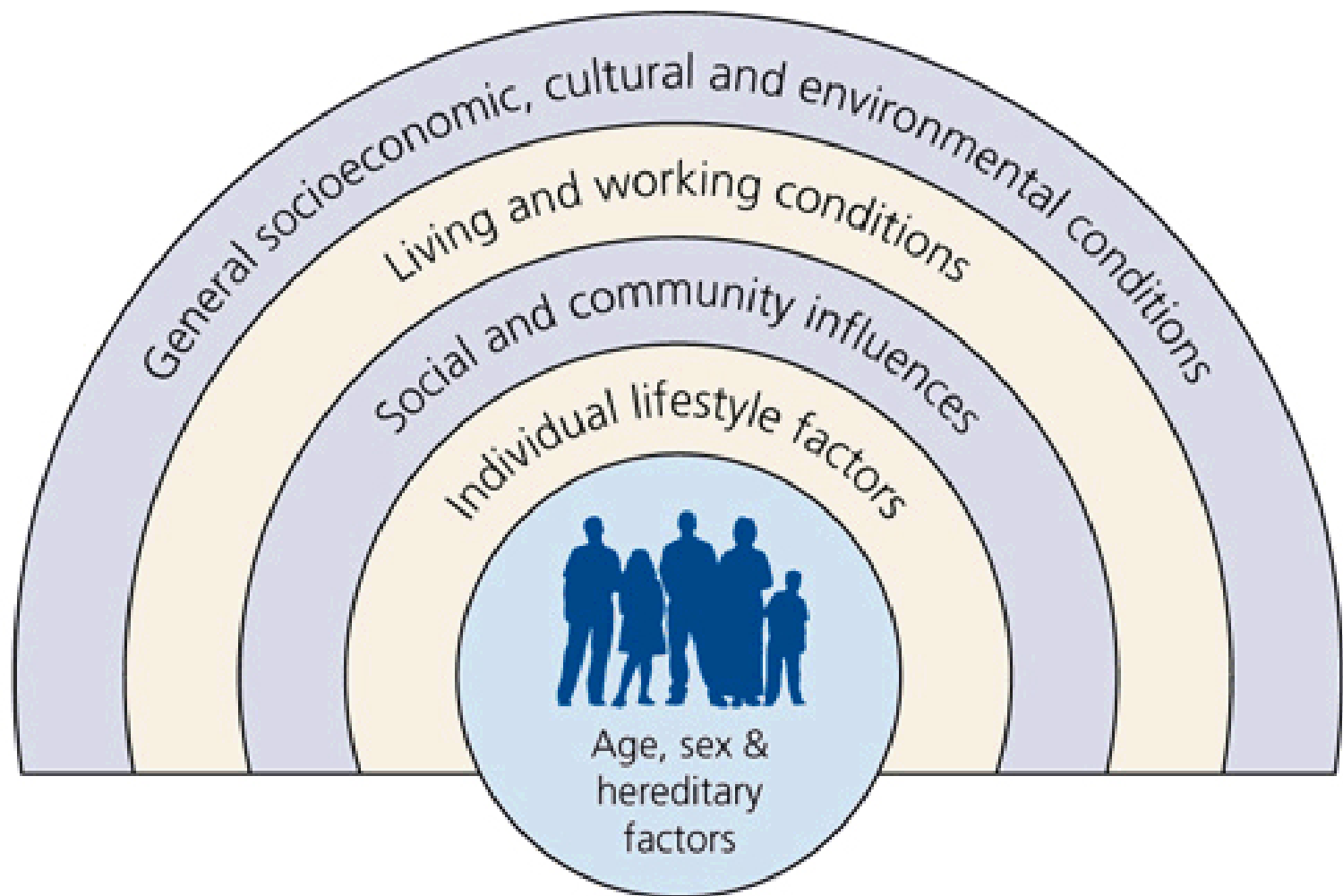
- Internal PH colleagues
- Project partners
- Public
- Fellow grantees
- Politicians, decision-makers
- Students



## CDC's Climate-Ready States & Cities Initiative Grantees



# Climate Projection Data: Essential Tools for Public Health



# What are climate projection data?

Estimates of future climate characteristics derived from complex global climate models for time periods many decades into the future.

Incorporate physics, chemistry, biology of our planet and their interactions with GHG emissions, population and technology changes, and more.



# Climate Projection Data: Enabling a view to the future

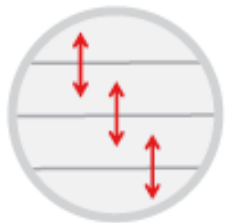


# Why do we need climate projection data?

**The Past No Longer Predicts the Future**



# A Climate Modeling Timeline (When Various Components Became Commonly Used)



1890s  
Radiative  
Transfer



1960s  
Non-Linear  
Fluid Dynamics



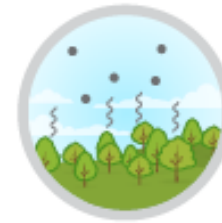
Hydrological  
Cycle



1970s  
Sea Ice and  
Land Surface



1990s  
Atmospheric  
Chemistry



2000s  
Aerosols and  
Vegetation



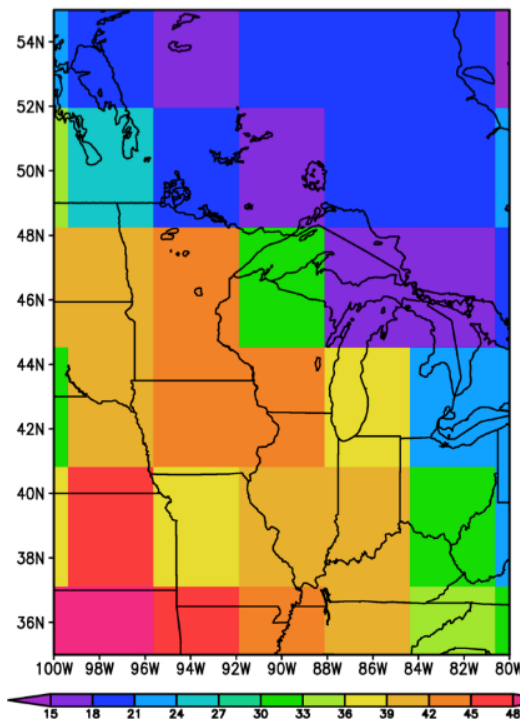
2010s  
Biogeochemical  
Cycles and Carbon

Energy Balance Models

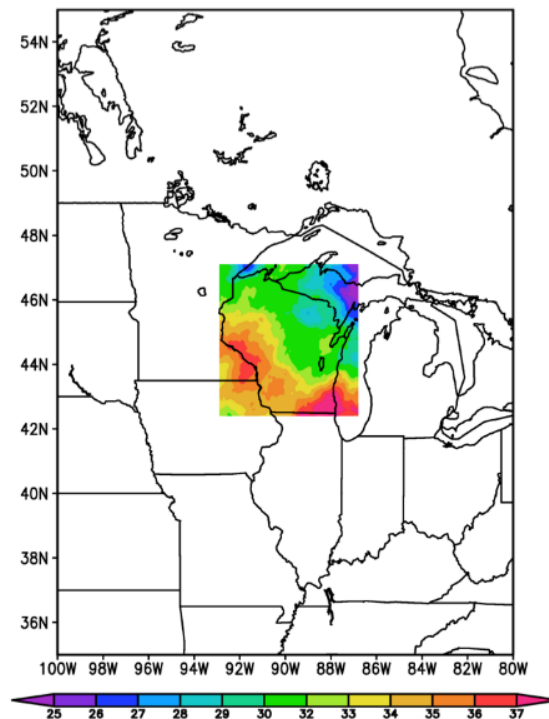
Atmosphere-Ocean General Circulation Models

Earth System Models

Climate Model



Downscaled





Stroke. 2018 Apr;49(4):828-834. doi: 10.1161/STROKEAHA.117.020042. Epub 2018 Mar 9.

## Projected Temperature-Related Years of Life Lost From Stroke Due To Global Warming in a Temperate Climate City, Asia: Disease Burden Caused by Future Climate Change.

Li G<sup>1</sup>, Guo Q<sup>2</sup>, Liu Y<sup>2</sup>, Li Y<sup>2</sup>, Pan X<sup>2</sup>.

Vet Sci. 2019 May 6;6(2). pii: E40. doi: 10.3390/vetsci6020040.

## Forecasting Zoonotic Infectious Disease Response to Climate Change: Mosquito Vectors and a Changing Environment.

Bartlow AW<sup>1</sup>, Manore C<sup>2</sup>, Xu C<sup>3</sup>, Kaufeld KA<sup>4</sup>, Del Valle S<sup>5</sup>, Ziemann A<sup>6</sup>, Fairchild G<sup>7</sup>, Fair JM<sup>8</sup>.

Environ Health Perspect. 2012 Nov;120(11):1571-7. doi: 10.1289/ehp.1104728. Epub 2012 Aug 24.

## Excessive heat and respiratory hospitalizations in New York State: estimating current and future public health burden related to climate change.

Lin S<sup>1</sup>, Hsu WH, Van Zutphen AR, Saha S, Lubner G, Hwang SA.

Int J Environ Res Public Health. 2016 Aug 9;13(8). pii: E804. doi: 10.3390/ijerph13080804.

## Working with Climate Projections to Estimate Disease Burden: Perspectives from Public Health.

Conlon KC<sup>1</sup>, Kintziger KW<sup>2</sup>, Jagger M<sup>3</sup>, Stefanova L<sup>4</sup>, Uejio CK<sup>5,6</sup>, Konrad C<sup>7</sup>.

nature  
climate change

ARTICLES

<https://doi.org/10.1038/s41558-018-0222-x>

## Higher temperatures increase suicide rates in the United States and Mexico

Marshall Burke<sup>1,2,3\*</sup>, Felipe González<sup>4</sup>, Patrick Baylis<sup>5</sup>, Sam Heft-Neal<sup>2</sup>, Ceren Baysan<sup>6</sup>, Sanjay Basu<sup>7</sup> and Solomon Hsiang<sup>3,8</sup>

PLoS Med. 2018 Jul 3;15(7):e1002598. doi: 10.1371/journal.pmed.1002598. eCollection 2018 Jul.

## Future ozone-related acute excess mortality under climate and population change scenarios in China: A modeling study.

Chen K<sup>1,2</sup>, Fiore AM<sup>3</sup>, Chen R<sup>4,5</sup>, Jiang L<sup>6,7</sup>, Jones B<sup>8</sup>, Schn

PLoS One. 2011 Jan 10;6(1):e16126. doi: 10.1371/journal.pone.0016126.

## Predicting impacts of climate change on Fasciola hepatica risk.

Fox NJ<sup>1</sup>, White PC, McClean CJ, Marion G, Evans A, Hutchings MR.



ELSEVIER

Environment International

Volume 44, 1 September 2012, Pages 26-30

Projected burden of disease for *Salmonella* infection due to increased temperature in Australian temperate and subtropical regions

Ying Zhang<sup>a,\*,</sup> Peng Bi<sup>a,</sup> Janet E. Hiller<sup>a, b</sup>

BMC Public Health

BMC

Projections of the effects of global warming on the disease burden of ischemic heart disease in the elderly in Tianjin, China

Jing Huang, Qiang Zeng, [...], and Guoxing Li



# Climate Projection Data



Climatic Change

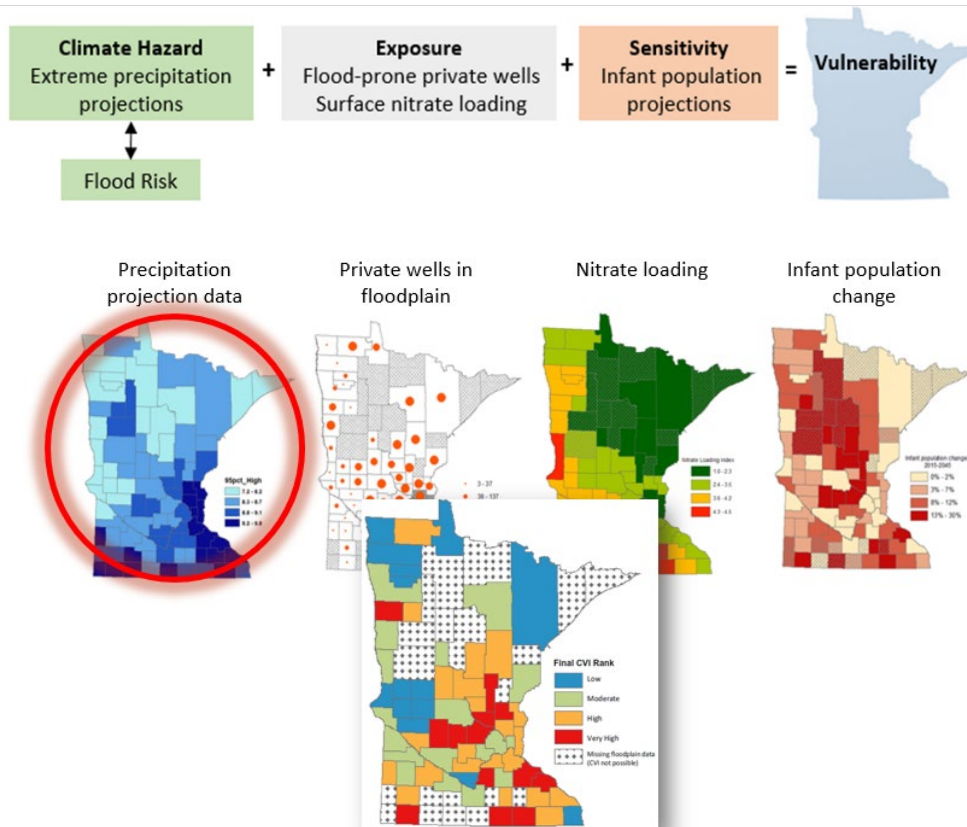
June 2018, Volume 148, Issue 4, pp 533–546 | [Cite as](#)

## Vulnerability assessment of future flood impacts for populations on private wells: utilizing climate projection data for public health adaptation planning

Authors

Authors and affiliations

Brendalynn O. Hoppe, Kristin K. Raab, Kenneth A. Blumenfeld, James Lundy

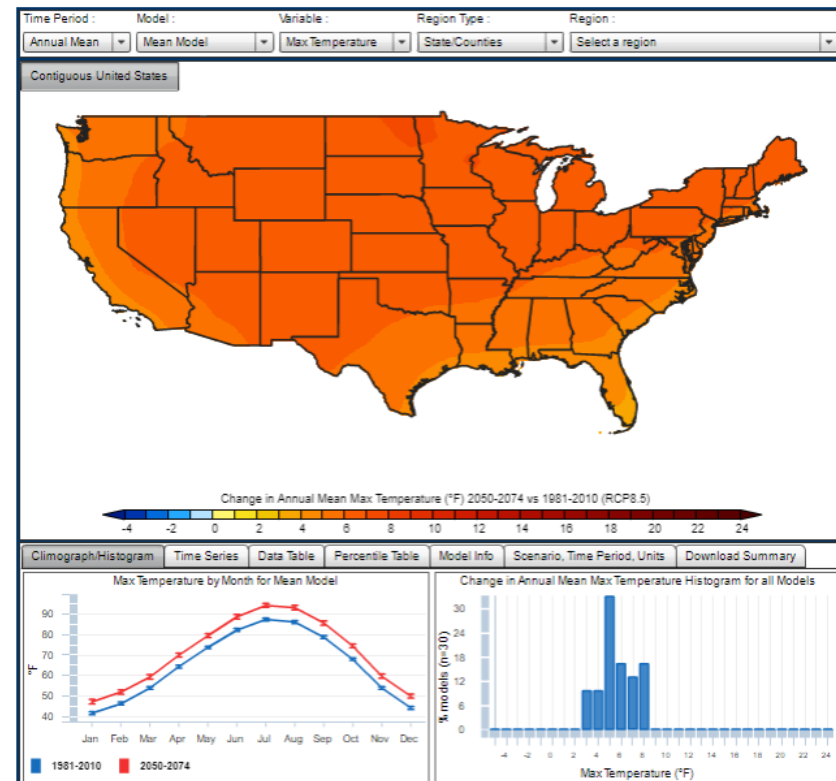


Land Change Science Program


## National Climate Change Viewer (NCCV)

[Home](#) || [Tutorial \(PDF\)](#) || [Updates](#)

04-28-2019 National Climate Change Viewer data used in an evaluation comparing statistical downscaling methods and data sets.







**We need freely available, high quality, facilitated climate projection data that have been developed and downscaled specifically for Minnesota to inform development of climate resiliency strategies across Minnesota sectors and disciplines.**

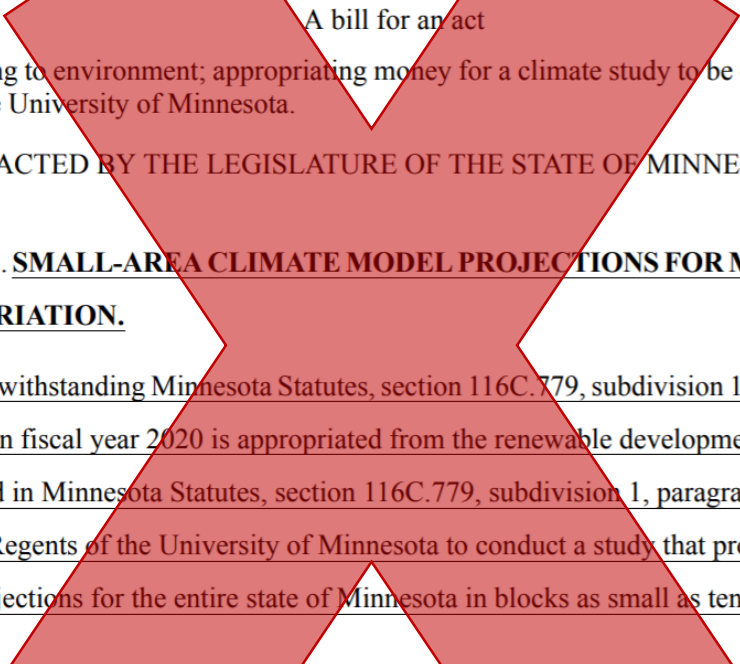


# Challenges

- Time and cost
- Computing power
- Expertise
- Guidance for end-users
- Consistency

# Quest for Climate Data in MN

- 1999 – SF 2226
- 2016 – LCCMR
- 2019 – HF 1251
- 2020 - ?



A bill for an act  
relating to environment; appropriating money for a climate study to be conducted  
by the University of Minnesota.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF MINNESOTA:

Section 1. **SMALL-AREA CLIMATE MODEL PROJECTIONS FOR MINNESOTA;  
APPROPRIATION.**

(a) Notwithstanding Minnesota Statutes, section 116C.779, subdivision 1, paragraph (j),  
\$411,000 in fiscal year 2020 is appropriated from the renewable development account  
established in Minnesota Statutes, section 116C.779, subdivision 1, paragraph (a), to the  
Board of Regents of the University of Minnesota to conduct a study that produces climate  
model projections for the entire state of Minnesota in blocks as small as ten square miles  
in area.



# Exploring California's Climate Change Research

Cal-Adapt provides a view of how climate change might affect California. Find tools, data, and resources to conduct research, develop adaptation plans and build applications.



Annual Averages

Extreme Precipitation Events

Extreme Heat Days & Warm Nights

Cooling Degree Days & Heating Degree Days

Snowpack

Sea Level Rise - CalFloD-3D

Wildfire

Streamflow

Extended Drought Scenarios

Hourly Projections of Sea Level

Maps of Projected Change



resilient MA

Climate Change Clearinghouse for the Commonwealth

Explore Sectors

Identify Changes

Take Action

Maps

Data

Documents

Search for resources...

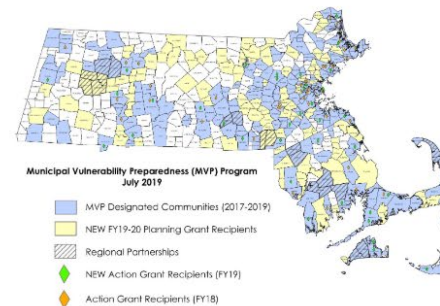
QSearch

Providing the most up-to-date climate change science and decision-support tools for the Commonwealth. [More »](#)

## Municipal Vulnerability Preparedness

Our cities and towns are on the front lines of climate change. The new MVP program from the Executive Office of Energy and Environmental Affairs works with communities across the state to decrease risk, build resiliency, and identify strengths and opportunities through targeted planning and action.

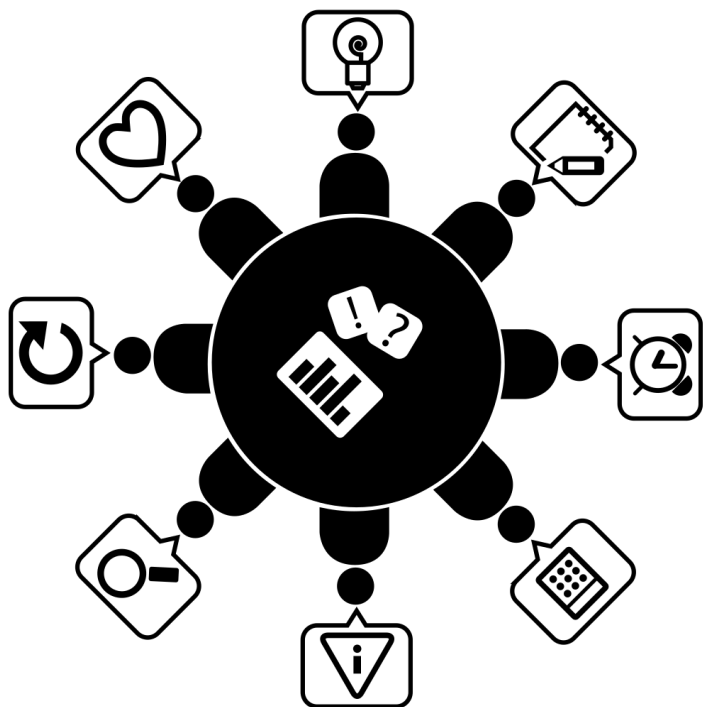
[More »](#)



# Climate Projection Data for Minnesota

## MN Climate Data Community of Practice

Mission: to encourage and enable use of climate projection data within a collegial, collaborative environment with the goal of advancing climate knowledge and resiliency actions for Minnesota.



# Stay Connected!



## Climate & Health

[Home](#)[About Us](#)[Climate & Health in  
Minnesota](#)[Agriculture & Food  
Security](#)[Air Quality](#)[Diseases Spread by Ticks  
& Mosquitoes](#)[Extreme Heat Events](#)[Water Changes](#)[Wellbeing](#)

## Resources

[Climate & Health Stories](#)[Climate Data Community  
of Practice](#)[Planning Tools &  
Publications](#)

## Climate & Health

Changes occurring in Minnesota's climate are affecting our health and wellbeing and will have even greater impacts in the future. The Minnesota Climate & Health Program is focused on improving our ability to protect public health and prevent future harms from climate change.

The latest from  
our program!

Check out our [Climate & Health Stories](#)! We are sharing the stories of public health professionals integrating climate change into their work all summer long.

## Climate & Health Impacts:

### Climate & Health Overview

Climate changes we are  
experiencing here in Minnesota

[Agriculture & Food Security](#)

### Extreme Heat Events

Extreme Heat Toolkit, maps, and  
more

[Water Changes](#)[+ Share This](#)[Translated Materials](#)[Get Email Updates](#)

## Spotlight

MDH staff are integrating climate and health into their work! Check out our [2019 Strategic Plan Progress Report](#)

Visit our [Climate & Health YouTube Playlist](#) for promotional videos and webinar recordings

## Stay Connected

Subscribe to our [Climate & Health e-newsletter](#) to receive email updates

## Questions?

**Phone:** 651-201-4899

**Email:** [health.climatechange@state.mn.us](mailto:health.climatechange@state.mn.us)

# **Thank you!**

Feel free to send me an email with any comments or questions.

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