



# Climate Change and Preparedness

# Climate Change and Preparedness



- 🌍 ***Climate Change and the Plagues of Colorado***

**Laurie Peterson-Wright, BS, MS**

Colorado Department of Public Health & Environment

- 🌍 ***H2-Uh-Oh It's 25 Below:***

***Out of the Frying Pan and Into the Polar Vortex***

**Joanne Bartkus, PhD, D(ABMM)**

Minnesota Public Health Laboratory Division

- 🌍 ***Somewhere Over the Spillway:***

***What's Next and Are We Prepared?***

**Michael Wichman, PhD**

State Hygienic Laboratory at the University of Iowa

# Climate Change and Preparedness



*Recent extreme weather events ranging from heat and cold events, blizzards, drought, flooding, tornadoes, hurricanes, tornadoes and wild fires impact public health and public health laboratories.*

## Objectives

- 🌍 Recognize the link between climate change and extreme weather
- 🌍 Discuss recent extreme weather events and impact upon public health
- 🌍 Evaluate strategies for responding to extreme weather events



# Climate Change and Preparedness

Somewhere Over the Spillway:  
What's Next and Are We Prepared?

**Michael Wichman**  
State Hygienic Laboratory

**APHL Annual Meeting**  
June 2, 2014





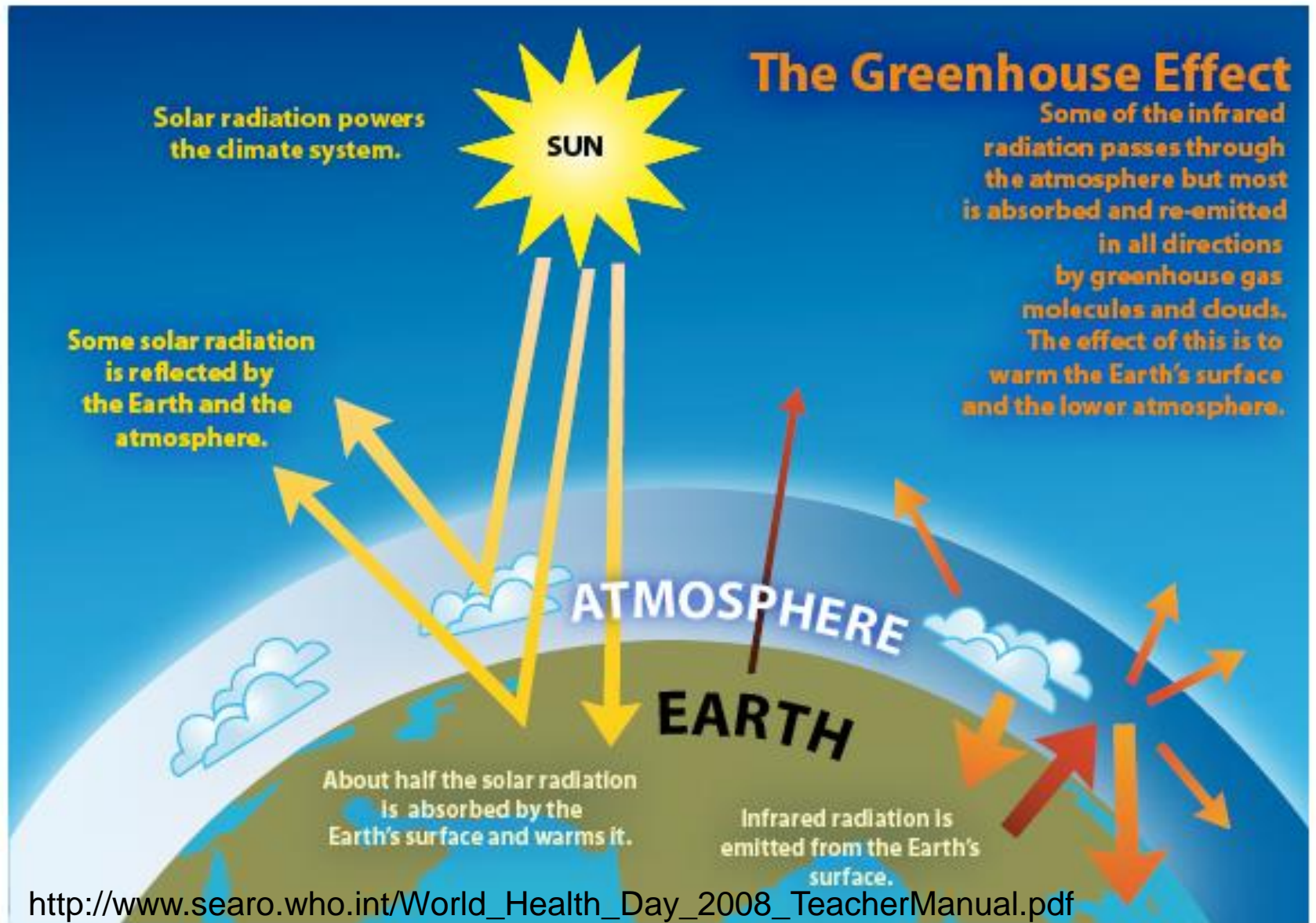
# Climate Change and Preparedness

## Outline

- 🌍 Brief Review – Climate Change
- 🌍 Impacts – Health and Environment
  - 🌍 This Winter?
  - 🌍 Recent Events
- 🌍 Impacts in Iowa
- 🌍 SHL response to flooding incidents
- 🌍 SHL Lessons learned
- 🌍 SHL Emergency preparedness activities



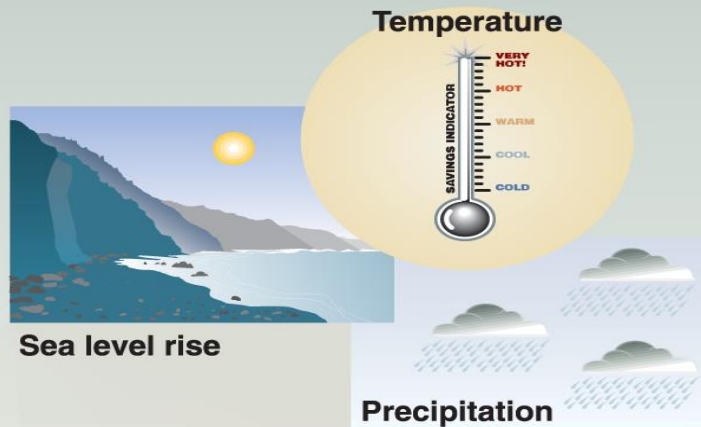
# Climate Change



Source: [www.global-greenhouse-warming.com/](http://www.global-greenhouse-warming.com/)

# Climate Change

## Potential climate changes impact



## Impacts on...

### Health



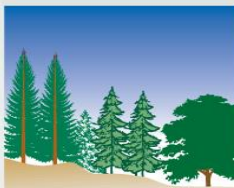
Weather-related mortality  
Infectious diseases  
Air-quality respiratory illnesses

### Agriculture



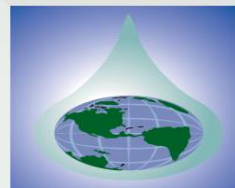
Crop yields  
Irrigation demands

### Forest



Forest composition  
Geographic range of forest  
Forest health and productivity

### Water resources



Water supply  
Water quality  
Competition for water

### coastal areas



Erosion of beaches  
Inundation of coastal lands  
additional costs to protect coastal communities

### Species and natural areas



Loss of habitat and species  
Cryosphere: diminishing glaciers

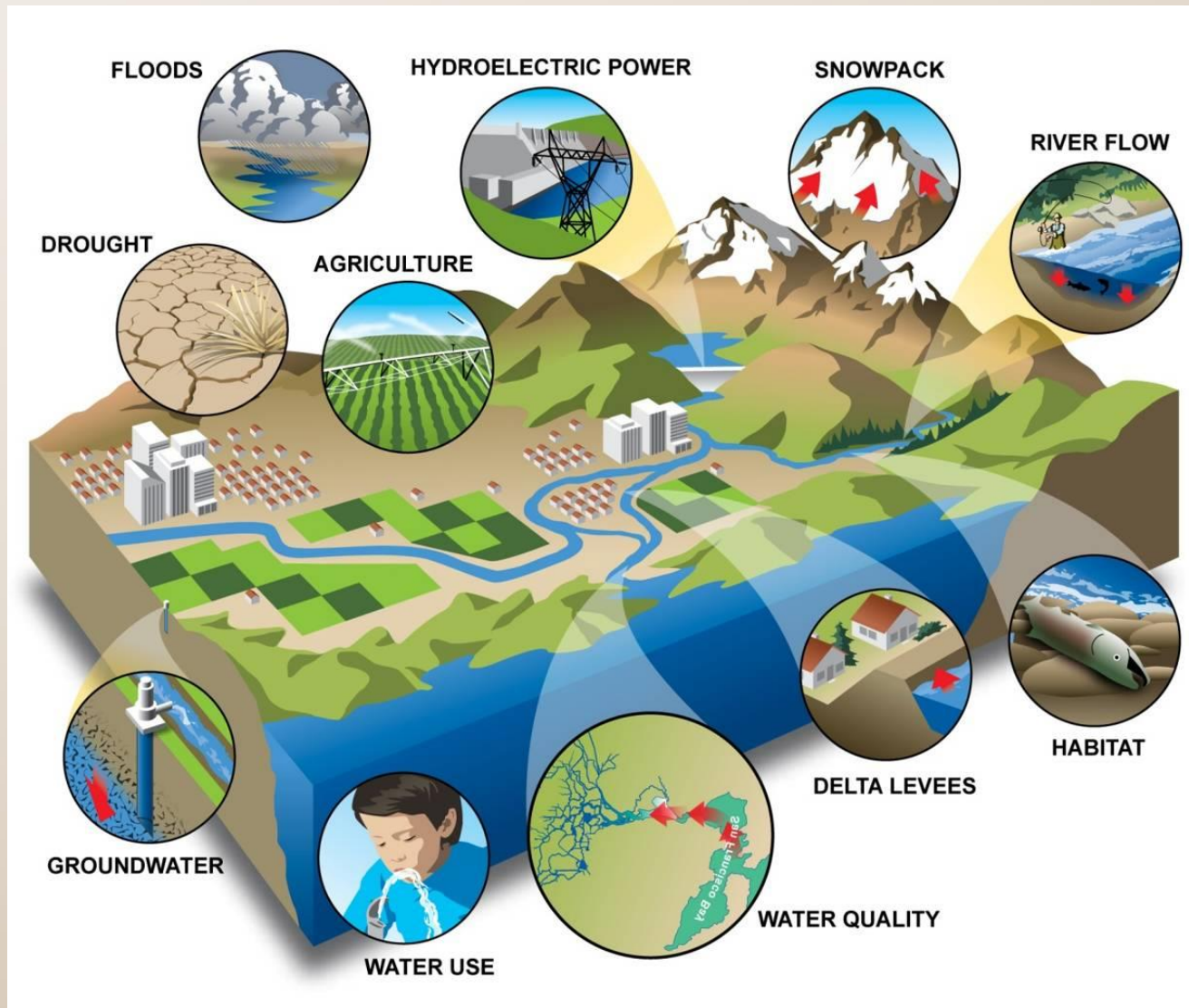


# Climate Change – Water Challenges

Karen Metchis  
Climate Advisor  
U.S. EPA Office  
of Water

EPA's  
Watershed  
Academy  
Webcast

October 27, 2009



Source: California – Department of Water Resources. Climate Change in California Fact Sheet.





# What happened this winter?

- Anticipate milder winters?



**Ecocentric**

All things green, from conservation to Capitol Hill

WEATHER

## Climate Change Might Just Be Driving the Historic Cold Snap


Climate change skeptics are pointing to the record cold weather as evidence that the globe isn't warming. But it could be that melting Arctic ice is making sudden cold snaps more likely—not less

By Bryan Walsh @bryanwalsh | Jan. 06, 2014 | 1029 Comments

<http://science.time.com/2014/01/06/climate-change-driving-cold-weather/>

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## Hot Alaska, Cold Georgia: How The Shifted Polar Vortex Turned Winter Upside-Down

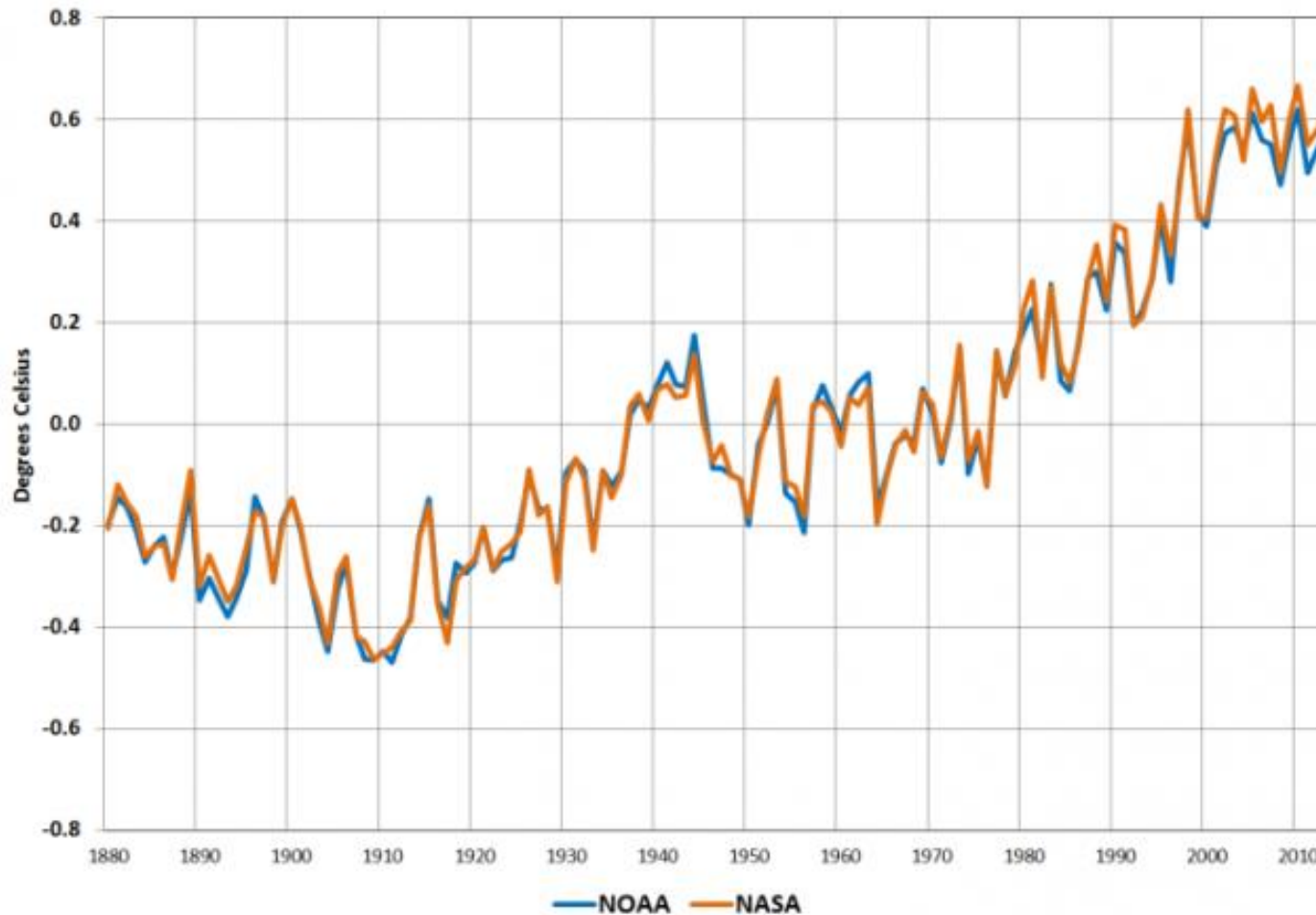
BY [RYAN KORONOWSKI](#)  ON FEBRUARY 8, 2014 AT 12:33 PM

<http://thinkprogress.org/climate/2014/02/08/3266731/hot-alaska-cold-georgia-polar-vortex/>

# What happened this winter?

These extremes can make climate change difficult to understand — and it's why looking at warming trends over the years is much more useful to understand what's going on:

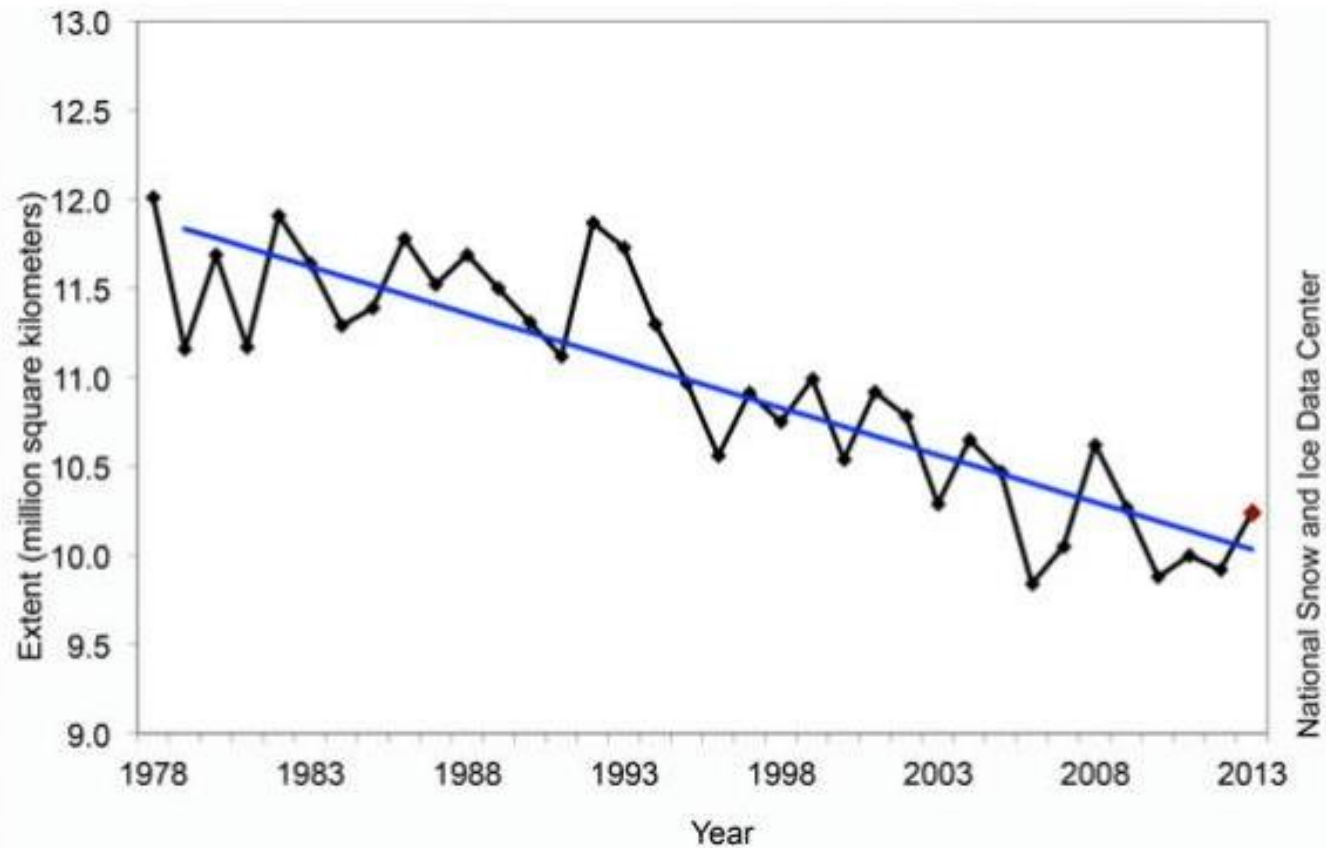
**Global Average Temperature: Departure from 1951-80 average**



CREDIT: NOAA/NASA

# What happened this winter?

Average Monthly Arctic Sea Ice Extent in November, 1978-2013

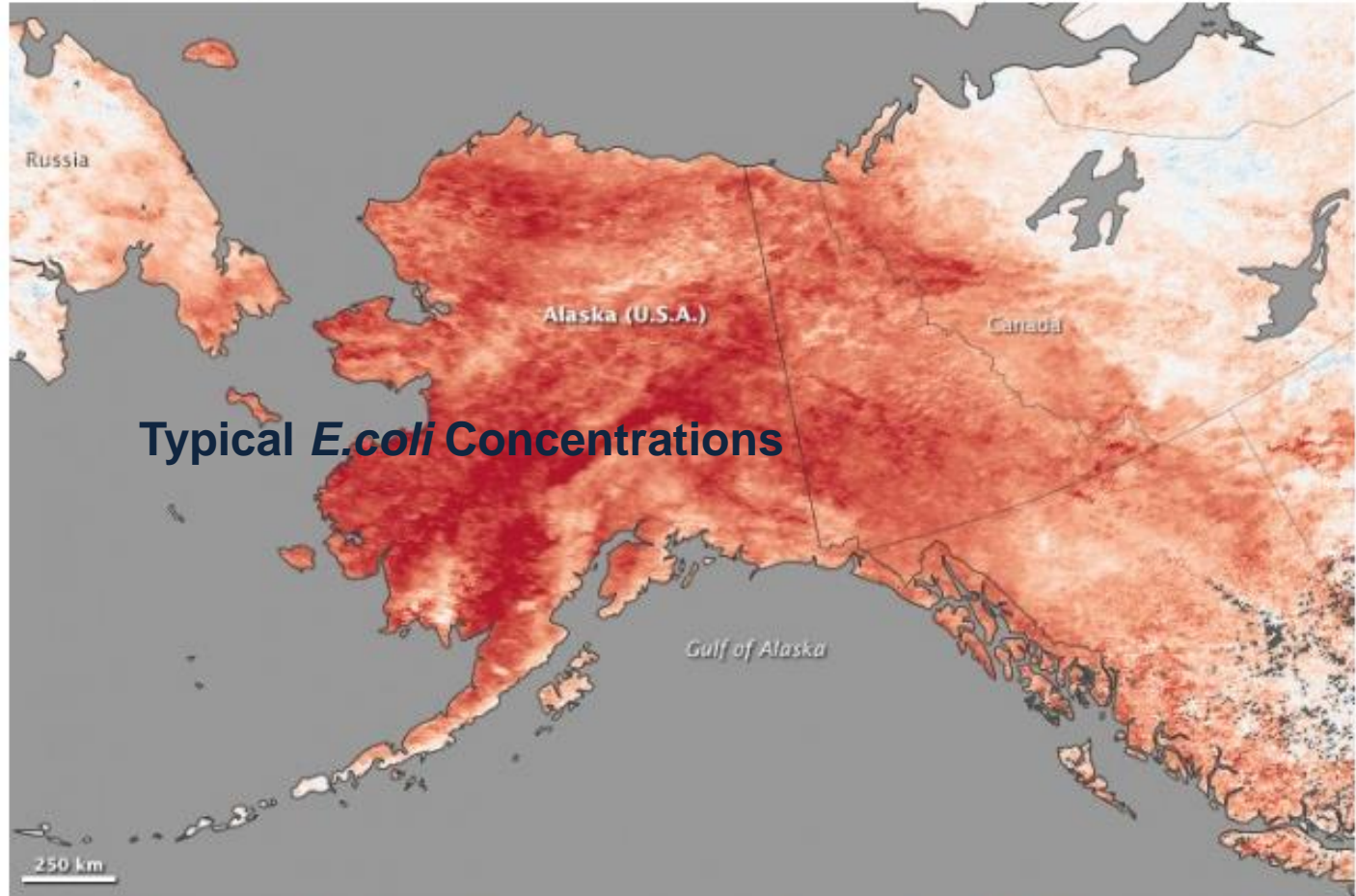


Including 2013, the linear trend in November ice extent is  $-4.9$  percent per decade relative to the 1981 to 2010 mean, or a loss of about 20,700 square miles per year. (Courtesy National Snow and Ice Data Center)

NSIDC

# What happened this winter?

This map shows how much warmer different parts of Alaska were during the last week of January — red signifies 18°C warmer than the 2001-2010 average for the same week.



*This map depicts land surface temperature anomalies in Alaska for January 23–30, 2014. Based on data from the Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Terra satellite, the map shows how 2014 temperatures compared to the 2001–2010 average for the same week. Areas with warmer than average temperatures are shown in red; near-normal temperatures are white; and areas that were cooler than the base period are blue.*




CREDIT: NASA EARTH OBSERVATORY

<http://thinkprogress.org/climate/2014/02/08/3266731/hot-alaska-cold-georgia-polar-vortex/>





# Recent Events – Severe Weather

-  Drought
-  Flooding
-  Tornadoes
-  Land Slide
-  . . . more

<http://droughtmonitor.unl.edu/>  
<http://www.reuters.com/article>  
<http://dfw.cbslocal.com/2014/0>  
<http://www.heraldnet.com/artic>  
<http://www.wri.org/publication/>

Flood v

Half-Mile  
Through

April 28, 2014 9:15 P

Like 107



Related Tags: [Arkan](#)  
[Tornadoes](#)

## Fact Sheet: The Connection Between Climate Change and Recent Extreme Weather Events

by James Bradbury and Christina DeConcini - August 2012

The United States has been experiencing ongoing extreme heat, droughts, and wildfires. This fact sheet examines the connection between climate change and these recent extreme weather events.



Mark Mulligan / The Herald

During a press conference Monday in Everett, Snohomish County Executive John Lovick shows a card, note and attached \$5 bill from a Wisconsin grade-school student sent with other correspondence to the county in response to the March 22 mudslide in Oso.



# Des Moines Register

## Sunday, May 11<sup>th</sup> 2008

By Perry Beeman

# Global climate change

## What it means to Iowa

State outpaces U.S. in greenhouse gas emissions; challenges away

By PERRY BEEMAN  
pbeeman@dmreg.com

Iowa's greenhouse gas emissions are growing faster than the nation's as a whole, even as new state programs fight to limit the damage from global climate change, a new report shows.

The study conducted for Iowa's Climate Change Advisory Council found that the state faces a tough task in cutting greenhouse gases, said Jerald Schnoor, an environmental engineering professor at the University of Iowa who is leading the panel.

The gases, which include water vapor, carbon dioxide and ozone, trap heat that otherwise would escape into the atmosphere. That warms the globe, threatening an increase in disease, heat-related deaths, severe weather and crop damage.

The study by the Harrisburg, Pa.-based Center for Climate Strategies found gross emissions of the gases in Iowa rose approximately 20 percent from 1990 to 2005, while the country's emissions rose 16 percent. Iowa's emissions accounted for 1.7 percent of the U.S. total in 2005.

"We're increasing rapidly, more than a percent a year," said Schnoor, co-director of the U of I's Center for Global and Regional Environmental Research. "When can we begin to reduce? That's the challenge."

Experts say the new findings — and other recent research from across the globe — paint a clearer picture of what Iowa and the rest of the Midwest will be like by the end of the century. They also bring urgency to a number of policy decisions that could hurt or help the problem.

"People are more worried," said Eugene Takle, an atmospheric science professor at Iowa

CLIMATE, PAGE 6A

### ■ Possible consequences for Iowa

The Des Moines Register's analysis of climate change research found that scientists are starting to get a clearer picture of what the warming might mean for Iowa:

**WEATHER:** Hotter and wetter conditions with higher humidity overall, but fewer 100-degree days.

**HEALTH:** Added health threats from heat spells and a longer allergy season worsened by ozone.

**EMISSIONS:** Greenhouse gas emissions rising faster than the national average, but possibly offset by added wind power, biofuels, energy efficiency and plantings that sweep carbon from the air.

**AGRICULTURE:** A mixed bag for agriculture, with longer growing seasons and higher yields tempered by new pests, more drought, floods and plant-damaging ozone.

**WILDLIFE:** A change in the mix of birds because of shifts in migration and nesting.



JEFF BASH/THE REGISTER

### ■ The series

Iowa's role as an agricultural leader means it also is a major contributor to climate change. The state also is home to some of the nation's leading experts on the subject and innovative efforts to reduce greenhouse gas emissions dramatically. Today begins a yearlong series examining Iowa's role in climate change and how the state's agriculture, weather, wildlife and public health are expected to change.

<http://www.desmoinesregister.com/apps/pbcs.dll/article?AID=/2008/0511/NEWS10/805110344/1011>





# Parkersburg Tornado

- Fungicide spill
- LC/MS/MS Method



Method has since been valuable during fish kill investigations by IDNR Field Offices

# Flooding in Iowa

- 1993
- 2008
- 2009
- 2011
- 2013



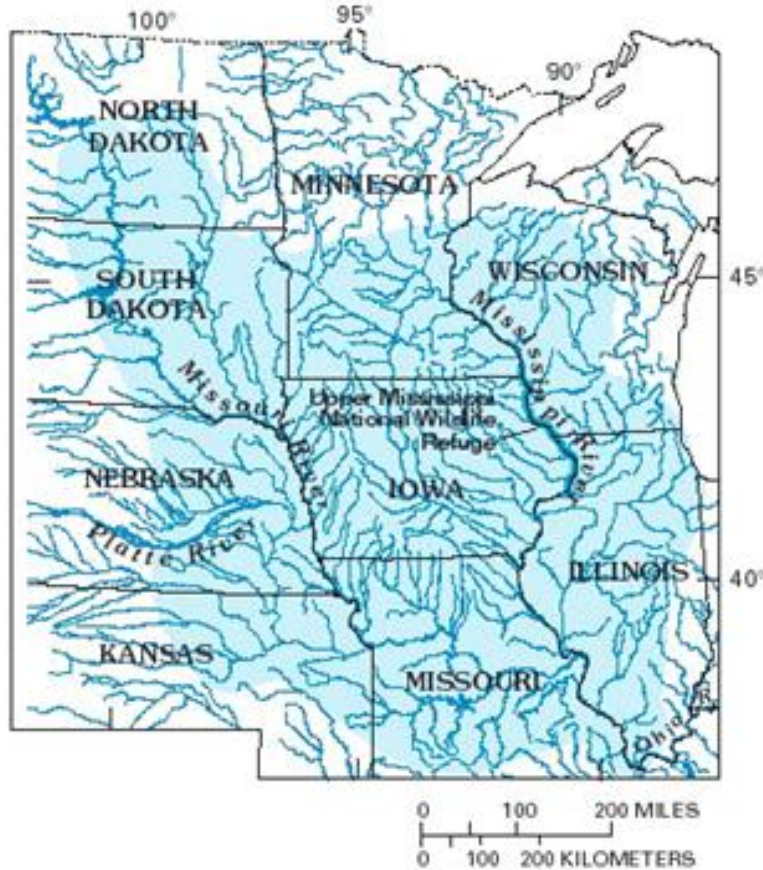
<http://cmsimg.press-citizen.com/apps/pbcsi.dll/bilde?Site=D5&Date=20130413&Category=NEWS01&ArtNo=30413005&Ref=AR&Border=0>

[http://cache.boston.com/universal/site\\_graphic/s/blogs/bigpicture/iowa\\_06\\_17/iowa7.jpg](http://cache.boston.com/universal/site_graphic/s/blogs/bigpicture/iowa_06_17/iowa7.jpg)





# 1993 Flooding



**EXPLANATION**

- Area of flooding streams
- Boundary of Mississippi River Basin

**Figure 62.** Areal extent of flooding in the Upper Mississippi River Basin during the Great Midwest Flood of 1993. (Source: Modified from Parrett and others, 1993).

<http://water.usgs.gov/nwsum/WSP2425/flood.html>



# 2008 Flood



**Figure 1.** The United States Midwest and general areas of flooding streams, January to September, 2008.

<http://pubs.usgs.gov/pp/1775/pdf/pp1775.pdf>





# 2008 Flood





# SHL Role in Response

- SHL testing drinking water
  - Water is essential for life
  - Public and private
  - Rapid testing – courier, private charter
- UHL testing to identify contaminants in flood water
  - Minimize exposure
  - Public information
  - Cleanup precautions





# 2008 Iowa Flood

**WHOtv.com** **13 NEWS**

NEWS

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ED WILSON JOHN BACHMAN ERIN KIERNAN KEITH MURPHY

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**Flooding Causes Mason City Water Treatment Plant to Shut Down**

Updated: Sep 16, 2008 09:58 AM CDT



**June 9, 2008**--Mason City is dealing with severe flood damage. A broken levy along the Winnebago River flooded the town. Multiple levees along the river gave way early Sunday morning, forcing the city's water treatment plant to shut down.

Ten inches of rain fell on the town within a 24-hour period. Rain continued to fall blocking roads and flooding at least 25 homes. With the water treatment plant shut down, all residents are being advised not to drink water from the tap.

The mayor placed a curfew on the city until this morning. The American Red Cross has set up a shelter in Clear Lake for anyone forced from their homes because of the flooding.

**13 Local News** **13 National News** more>>

**Police name driver in deadly hit and run**

**Harkin Fundraising Near \$9 Million**

**Emmetsburg Woman Accused in Mortgage Scam**

**School Officials Face End of Federal Grants**

**DART Buses to Eliminate Left Turns**

**National News Minute**

**Umar becomes major hurricane; top winds at 115 mph**

**Design competition 'Project Runway' pins a winner**

**Man accused of fracas on Paris-to-New York flight**



# What's in the Flood Water?

## Test for what?

- Pesticides
- Metals
- Nutrients
  - Nitrogen
  - Phosphorus
- Volatiles
- Fuels
- Bacteria







# Risk of Floodwater to Health

- Flood water contains fecal material
- Likely to contain microorganisms from sewage that can make one sick if ingested
  - Parasites
  - Enteric viruses
  - Pathogenic bacteria
- ***Message – exercise appropriate caution when working in flood water or sediment?***
  - Flooded river sediment: 500-30,000 MPN/gram





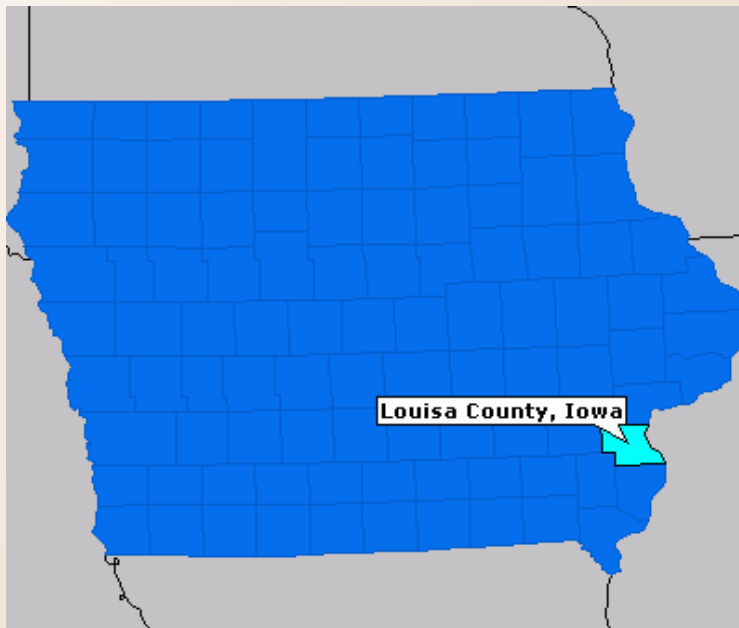
# Recreational Water Quality/Indicator

- ↑ sewage contamination (e.g. rainfall event from sewage source)
- ↑ sewage indicator density (*E.coli*)
- ↑ sewage pathogens
- ↑ risk for recreational water illness

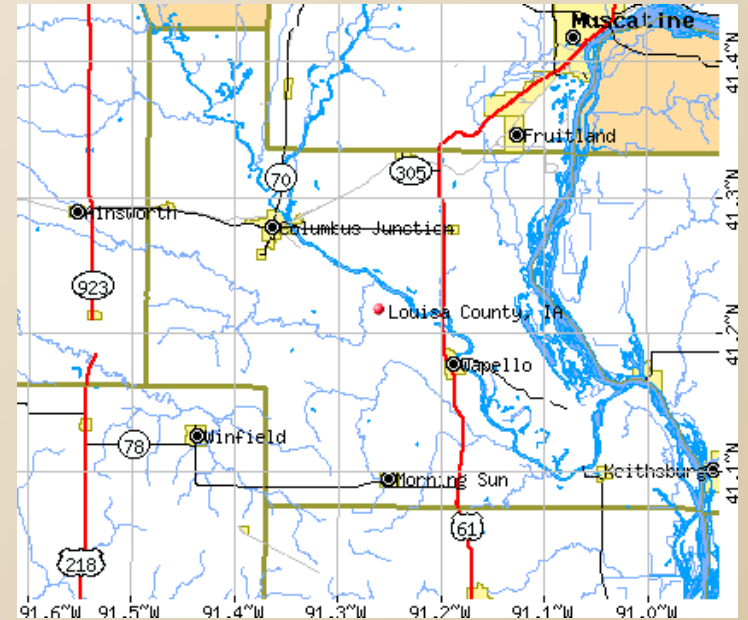


# SHL Testing – Private Wells

- Louisa County Iowa – Private well testing
- Bacteria, nitrate and pesticide screen



<http://www.epodunk.com/cgi-bin/genInfo.php?locIndex=7463>



[http://www.city-data.com/county/Louisa\\_County-IA.html](http://www.city-data.com/county/Louisa_County-IA.html)

- Funding - Iowa Grants to Counties Program



# SHL Testing – Private Wells

- Louisa County Iowa – Private well testing
  - 55 samples

Analyte	Result	
Triazine > 1 ppb	8 samples (one > 5 ppb)	} Represents 15 wells
Nitrate > 45 mg/L	8 samples	
Total Coliform (presence)	6 samples	
E.coli (presence)	0 samples	

- Follow-up: For 15 wells with elevated triazine: common herbicides and organophosphate; for 8 nitrate, repeat nitrate
- Results for follow-up: one well atrazine above MCL; ~12 wells with low levels various pesticide metabolites





# THE UNIVERSITY HYGIENIC LABORATORY



## CONTRIBUTIONS TO RECOVERY EFFORTS FROM THE FLOOD 2008

During the preparation and recovery phases of the flood of 2008, the University Hygienic Laboratory dramatically increased the number of tests it performs to detect disease and environmental contaminants in order to protect the health and property of Iowans.





# SHL Response 2008 Flood



## THE UNIVERSITY HYGIENIC LABORATORY



### CONTRIBUTIONS TO RECOVERY EFFORTS FROM THE FLOOD 2008

During the preparation and recovery phases of the flood of 2008, the University Hygienic Laboratory dramatically increased the number of tests it performs to detect disease and environmental contaminants in order to protect the health and property of Iowans.

Laboratory staff devoted more than 10,500 man-hours to rapidly analyze thousands of samples. Their work ensured that critical water supplies were safe to drink and dangers to the public health were quickly identified. This included:

- monitoring for contaminants in Iowa waterways;
- testing to ensure private well water and municipal water was safe to drink;
- vector-borne disease surveillance;
- screening for asbestos in debris; and
- disease control and environmental expertise for public health partners

Mason City officials recognized UHL's "hard work, dedication and true compassion during the recent flooding" with a certificate of appreciation, saying that UHL "efforts lessened the impact of the damage to the community."

### TESTING VOLUME AND COST

#### *Surface water and sediment testing for Iowa Department of Natural Resources*

Collected 493 surface water samples and 139 sediment samples  
 Performed 15,963 tests for 208 different analytes  
 Cost to Hygienic Laboratory..... \$732,520

#### *Municipal water testing*

Tested 471 samples for June and July related to flood  
 Cost to Hygienic Laboratory..... \$5,181

#### *Private well water testing*

Tested approximately 2,216 for June and July  
 An additional 180 flood-related tests performed for August-October  
 Cost to Hygienic Laboratory..... \$26,356

#### *Grants to Counties program (additional well water testing)*

Distributed kits and performed 907 tests during June and July  
 Cost to Hygienic Laboratory..... \$11,963

#### *Surveillance and testing for vector-borne diseases*

Collected 164 pools and performed related testing  
 Cost to Hygienic Laboratory..... \$40,625

#### *Asbestos testing in structural debris*

Cost to Hygienic Laboratory..... \$15,500

#### *Testing kits, mailings and support materials*

Cost to Hygienic Laboratory..... \$7,565

**TOTAL COST TO HYGIENIC LABORATORY..... \$839,710**

#### *Staff time*

Expertise in infectious diseases, environmental issues and industrial hygiene  
**TOTAL HOURS WORKED BY HYGIENIC LABORATORY..... 10,580**







# SHL Lessons Learned

- Activate Incident Command
  - Retrain on what IC is and define roles
  - Create and communicate specific role descriptions for key IC functions
  - Communicate to all staff when IC ends
  - Hold daily meetings of key staff
- Ensure a SHL representative present every day at the Iowa SEOC
- Staffing
- Supplies
- Sample collection
- Data transfer





# SHL Lessons Learned

- Courier
- Media – be prepared
  - Public Information Officer
  - APHL Media training
- Coordinate Public Health Message
- Communication
  - Internal
  - External
  - State and local agencies



# Multiple Levels of Preparedness

- General preparedness – natural disasters, such as hurricanes, floods, and tornadoes
- Public health preparedness – disease outbreaks, vaccinations, pandemic flu, setting up points of distribution (PODS), etc.
- Public health laboratory preparedness – testing for biological/chemical agents, etc.

**\*All levels overlap!**

Questions?  
Thank you!



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Environmental Health Programs

State Hygienic Laboratory

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