Building Connections between Emergency Management and Climate Adaptation

Director Rick Larkin
Department of Emergency Management
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  ❖ University of Michigan Climate Center, Great Lakes Integrated Sciences + Assessments (GLISA)
    danbro@umich.edu

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About Saint Paul ...

(We are in the bible)

Area: 56.2 sq miles (145.6 km²)
Founded: 1854
Population: 288,448 (2011)
Unemployment rate: 5.4% (Mar 2013)
What we think we do
vs what others think we do
What we actually do
Mission Statement

We save lives through community resilience and preparedness.

“Hero Support”
The Department is responsible for coordination of the City's response to emergency situations and disasters such as:

- Severe Weather
- Flooding
- Hazardous Material Incidents
- Mass Casualty Incidents
- Acts of Terrorism
- Large National Events
- And much more...
I am not a scientist
(nor did I stay at a Holiday Inn Express last night)

“The truth is: the natural world is changing. And we are totally dependent on that world. It provides our food, water and air. It is the most precious thing we have and we need to defend it.”
David Attenborough
City Goal –

“The Most Livable City in America”

Mayor Coleman’s Leadership –

“Sustainability and resilience are global goals that begin at the local level.”

Department Goal –

Implement a World Class “Community Emergency Management Program”
Take Aways from Today

1. Saint Paul currently faces flooding, thunderstorms, wind storms, aging infrastructure, and funding problems.

2. *Temperatures and precipitation will increase*, in turn increasing diseases, damages, costs, and deaths.

3. Best practices combat heat, precipitation, wind storms, and winter storms, and often have *multiple co-benefits*. 
4. Saint Paul is already a leader in *green infrastructure and sustainable development* and should continue these efforts.

5. Resilience requires *working across departments & plans* to leverage strengths.

6. Four working groups will begin increasing *sector resilience* in Saint Paul.

All of which will help make Saint Paul the Most Livable City in America
Overall Project Objectives

1. Research hazards, risks and climate impacts.

2. Research best adaptation, mitigation, and resiliency practices.

3. Assess current Saint Paul practices, policies and data to determine opportunities for alignment.

HAZARDS, RISKS, AND CLIMATE IMPACTS

Shocks & Stresses
Temperature
Precipitation
SECTOR-SPECIFIC ACUTE SHOCKS AND CHRONIC STRESSES
The July 7 City of St. Paul Climate Resiliency Kickoff meeting queried about top shocks and stresses.
There are many things which reduce a City’s ability to serve the population.

**Acute shocks:** Sudden, sharp events that threaten a sector.

**Examples:** Floods, heat waves, infrastructure failures, disease outbreaks, and terrorist attack.
There are many things which reduce a City’s ability to serve the population.

**Chronic Stresses:** Ongoing condition that weakens the fabric of a city on a day-to-day or cyclical basis.

**Examples:** Unemployment, aging infrastructure, declining/aging population, an overtaxed or inefficient public transportation system.
Top Shocks Mentioned: Flooding, T-storms, Infrastructure failure, Winter storms
Top Stresses Mentioned: Old / Overwhelmed Infrastructure, Poverty, Lack of Funding, Lack of Trained Professionals
The cumulative amount of precipitation falling in the heaviest 1% of precipitation events increased by 37% in the Midwest and by 71% in the Northeast from 1958 to 2012.
More Problem Precipitation

1.25-inch Precipitation Days:

70%

Nuisance flooding and minor damages are reported more frequently after these events.

Changes are calculated from linear best fits of annual totals from 1951-2012.

Source: National Climatic Data Center
St. Paul precipitation increased by 9 billion gallons from the 1950s, and is expected to increase another 9 billion gallons by 2040.
This means St. Paul will need to prepare for more and heavier rain events.

• 1-2 more days a year with precipitation events over 1.25”
  MORE COMBINED SEWER OVERFLOWS & FLASH FLOODS

• Increase in water treatment costs
  MORE GREEN/GREY INFRASTRUCTURE NEEDED

• Increase of 10-30% in Spring rain
  SEED MORE LIKELY TO BE WASHED AWAY

Source: Great Lakes Integrated Sciences + Assessments
Precipitation Impacts: Flooding and Water Quality

**Greater Flood Risk:** Saint Paul has already seen large increases in storms that lead to flooding, damage and health risks.

*Three "1,000-year floods" have occurred in Minnesota since 2004.*

**Reduced Water Quality:** Stronger storms increase runoff and overload stormwater systems, potentially contaminating water resources.
By mid-century, models project Saint Paul could see:

- **90°F Days**: 25-35 more days per year
- **95°F Days**: 6 to 12 more days per year

But, it is unclear if there has been a significant observed change in hot days.
St. Paul warmed 3°F since the 1950s, and is expected to rise another 4-5°F by 2070.
Extreme Heat and Humidity

High humidity 70°F dewpoint days are more frequent

Fewer cool relief days during summer heat waves

**DAILY SUMMER WEATHER TRENDS**

Very hot, humid days and hot, dry days are both dangerous to human health, while cool, dry days bring relief from the summer heat and humidity.

<table>
<thead>
<tr>
<th>Very Hot, Humid Days</th>
<th>Hot, Dry Days</th>
<th>Cool, Dry Days</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Increased</strong> 55% 1.5 Days</td>
<td><strong>Increased</strong> 45% 3 Days</td>
<td><strong>Decreased</strong> 32% 4.5 Days</td>
</tr>
</tbody>
</table>

^Decreased
Overnight Lows Have Warmed Faster Than Daytime Highs
Air Quality

Air quality deteriorates with warmer temperatures and hot days.

Smog production, ground-level ozone, is enhanced by sunlight and heat.

Respiratory conditions and asthma are anticipated to increase with rising temperatures.

Ragweed pollen season has rapidly increased by 21 days in the Twin Cities region from 1995-2013.
This means heat waves will increase in intensity and frequency.

- 25-35 more days annually over 90°F
  MORE HOSPITALIZATIONS AND HEAT RELATED DEATHS

- Doubling in the number of cooling degree days
  DRASTIC INCREASE IN ELECTRICITY BILLS

- Growing season increased by 25-35 days
  MAY ALTER CROPS IN THIS REGION

Source: Great Lakes Integrated Sciences + Assessments
BEST PRACTICES

Best Practices for Heat
Best Practices for Urban Flooding
Best Practices for Wind
Best Practices for Winter Weather
Best practices have multiple co-benefits.

Resilience is ability to prepare and plan for, absorb, recover from, or more successfully adapt to actual or potential adverse events.

Efforts can be:

• Protective/Opportunistic
• Structural/Behavioral

Co-benefits include:

• Decreased Costs
• Improved Air Quality or Water Quality
Combat heat via air conditioning, cooling centers, green infrastructure, & cool roofs.
Combat flooding via green and grey infrastructure.

Yards that soak up and store water
Rain Barrels that store water
Roads that allow water to seep through them

Underground pipes
Sewers that move water
Water treatment facilities that clean water
Combat strong wind events via vegetation management and improved building codes.
Combat winter weather via vegetation management, undergrounding wires, etc.
OPPORTUNITIES FOR ALIGNMENT

City Practices
City Policies
City Data
St. Paul is already a leader in green infrastructure.
Example 1: St. Paul’s permeable pavement lets stormwater drain through it.

Source: Wes Saunders-Pearce
Example 2: St. Paul fire station green roof has made national headlines.
In addition, St. Paul has more than 20 online databases & more than 20 City plans.
Resilience requires working across departments & plans to leverage strengths.

1. Coordinate across departments to share resources, streamline efforts, and improve funding.

2. Identify and implement “no regrets” actions that yield benefits even in the absence of climate change.

3. Identify and implement “low-hanging fruit” that benefits multiple stakeholders.

4. Consider public-private partnerships and increased coordination with local universities.
Four working groups have begun increasing sector resilience.

- Infrastructure
- Natural Resources
- Emergency Response and Public Health
- Economic and Social Well-Being

Working groups will meet through February 2016.

Community meeting planned for March 2016.
Current Sector Participants Include:

- City and County departments
- St. Paul Port Authority
- Xcel Energy
- District Energy St. Paul
- Science Museum of MN
- Minnesota Pollution Control Agency
- Macalester College
- Watershed Districts
- Metropolitan Airports Commission
- Metropolitan Council
- Public Health
- Hospitals and Healthcare Systems, MDH

More added as we evolve
What if we are wrong about climate change and we create a better world for nothing..?
There is hope...

Cities can lead by example.
Thank You!

Daily Planet

SATURDAY, SEPTEMBER 8, 1973

SUPERHEROES UNITE TO PROTECT EARTH

Rick Larkin

rick.larkin@ci.stpaul.mn.us

651-266-5490