Source: Spielel On Line

Minneapolis near 50th ST & James Ave June, 2014 Jeffrey Thompson/MPR News

Resilience Challenges and Opportunities

Alliance for Sustainability – Planning for Resilient Cities

November 9, 2017 – Matt Metzger, PE, ENV SP, Civil Engineer

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Source: MPR News, Courtesy of John Goodge

Source: 2014 Lake Susan (Michelle Jordan/RPBCWD)

…a Hazard…

…creates Risk…

…because of Vulnerability…

…unless we take Action…

Infrastructural

Societal

Environmental

The Nature Conservancy

Image courtesy of: www.CommunityResilienceBuilding.com

Community Vulnerabilities & Strengths

Infrastructural

- Roads & Railroads
- Water Supply, Wells & Treatment
- Wastewater Treatment
- Pump Stations Nursing Homes
- Schools/Education
- Churches
- Business Clusters
- Groceries
- Pharmacies
- Fuel Stations & Supply Chain
- Electrical Distribution Network

Societal

- Vulnerable Neighborhoods
- Elderly
- Low/moderate Income
- Special Needs
- Languages Spoken
- Civic Groups/ Organizations
- Police/Fire/Ambulance
- Emergency Medical Services
- Emergency Communications

Environmental

- Groundwater
- Lakes/Streams/ Wetlands
- Parks/Preserves
- Recreation/Tourism
- Biodiversity
- Floodplain
- Urban Forest
- Slope Stabilization

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Image courtesy of: www.CommunityResilienceBuilding.com

Preparing for our Changing Climate

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Climate Hazards

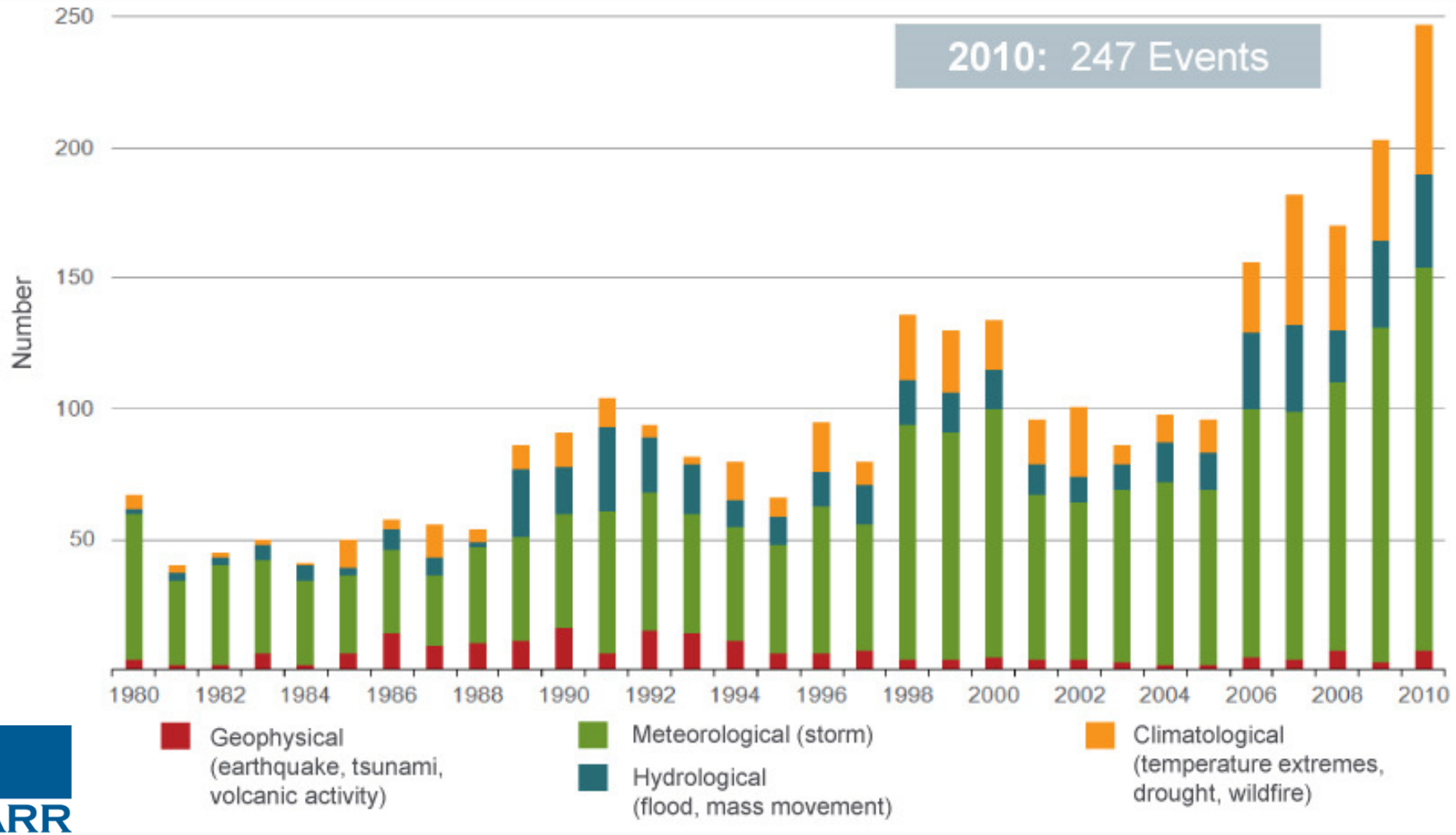
- Extreme precipitation & flooding
- Heat waves & urban heat island
- Drought
- Extreme wind (tornado, straight-line winds, etc.)
- Winter minimum temperature increase (including ice storms)

Natural Disasters in the United States, 1980 – 2010

Number of Events, Annual Totals

Munich RE

The number of events in the United States in 2010 set a new record.



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Source: MR NatCat*SERVICE*

© 2011 Munich Re

Climate change adaptation options for cities

Breadth of climate change adaptation planning

City-focused planning

100-year 24-hour 50th percentile storm (Atlas 14, 7.5 inches)

- Develop annual flood-risk maps with key infrastructure features marked
- Meeting with City staff to coordinate prioritization/design of projects

7.5" Rain

City-focused planning

100-year 24-hour 95th percentile storm (Atlas 14, 9.5 inches)

- Develop annual flood-risk maps with key infrastructure features marked
- Workshop with City staff to coordinate prioritization of projects

9.5" Rain

Community-focused planning

100-year 24-hour 95th percentile storm (Atlas 14, 9.5 inches)

- Develop annual flood-risk maps with key infrastructure features marked
- Workshop with broader range of stakeholders (City staff, community groups, local businesses, agency staff, citizens, etc.) to coordinate prioritization of design projects

Community-focused planning

Climate change adaptation planning (broad focus)*

- Develop annual flood-risk maps with key infrastructure features marked
- Workshops with broad range of stakeholders to identify a range of local impacts and vulnerabilities (not just flooding)
- Use facilitated brainstorming techniques to generate ideas and document concerns

* Similar to 2017 climate resiliency workshop series sponsored by RPBCWD/NMCWD

Level of City-led effort

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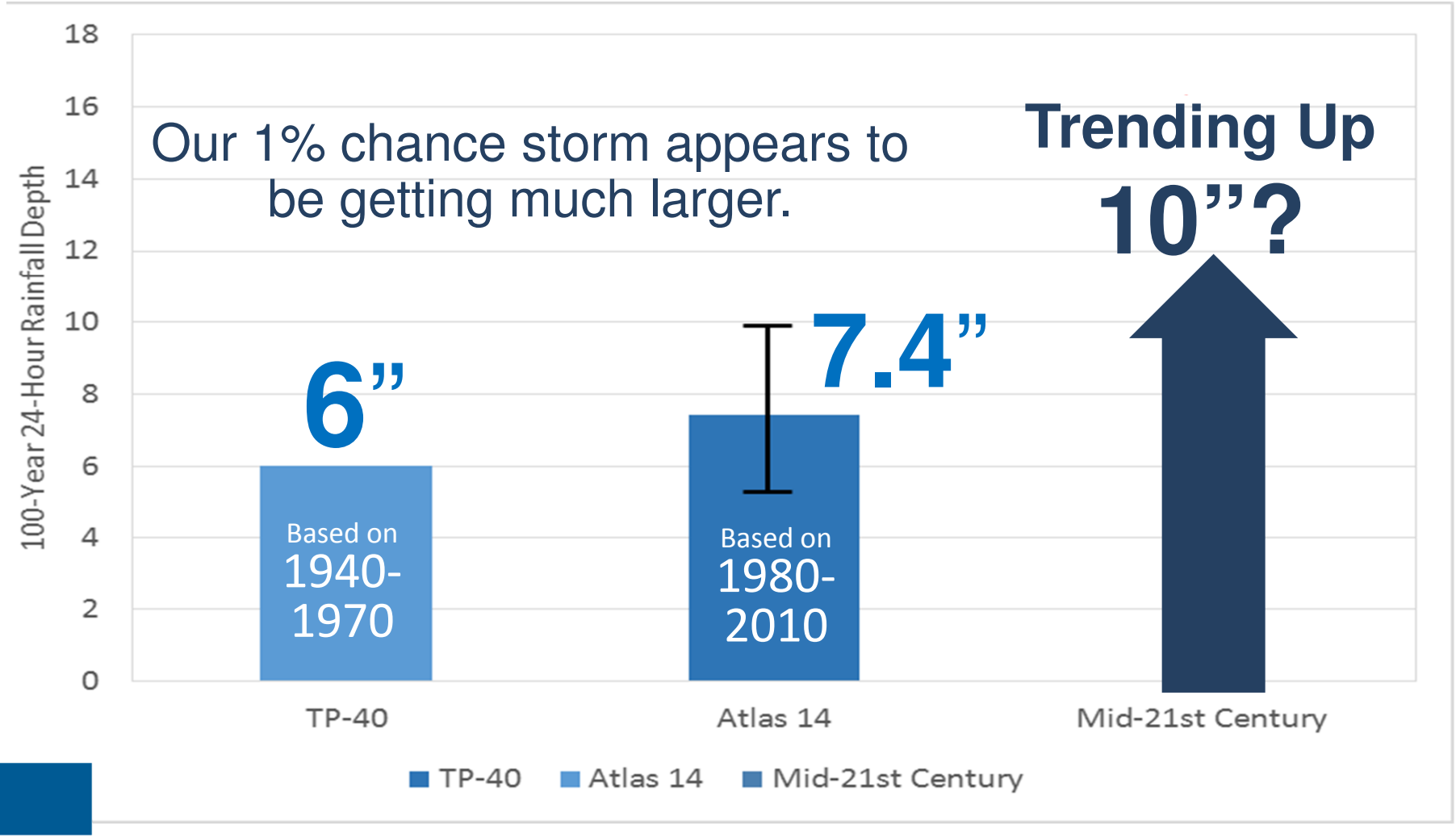
Our risk of extreme precipitation is greater than we use to assume



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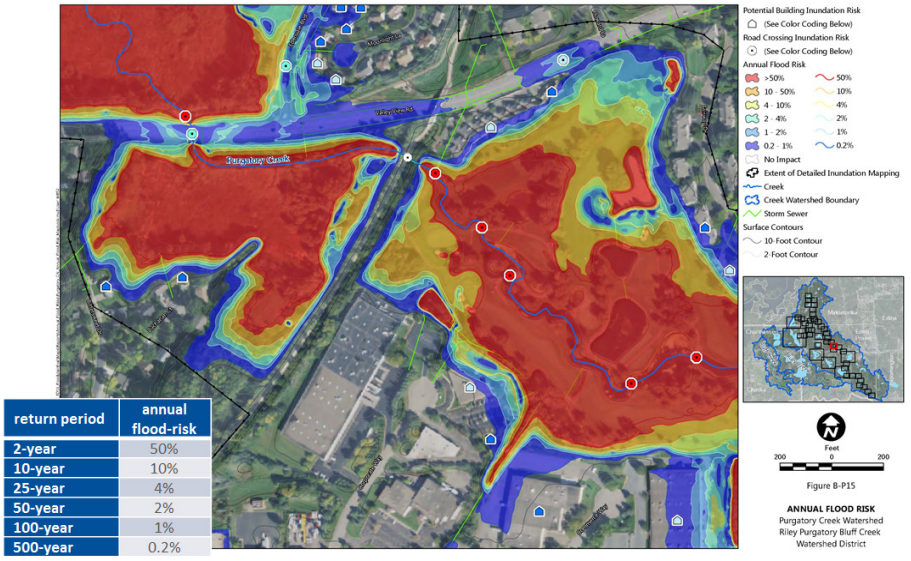
Community Concern…

"…uncertainty of flooding and damage from extreme precipitation & weather…"

…Community Response

watershed vulnerability assessment for populations, structures, crossings, infrastructure.

MAKE MAPS



return period	annual flood-risk
2-year	50%
10-year	10%
25-year	4%
50-year	2%
100-year	1%
500-year	0.2%

Community Concern…

"…impervious surfaces driving impacts to health due to water quality, urban heat island effect…"

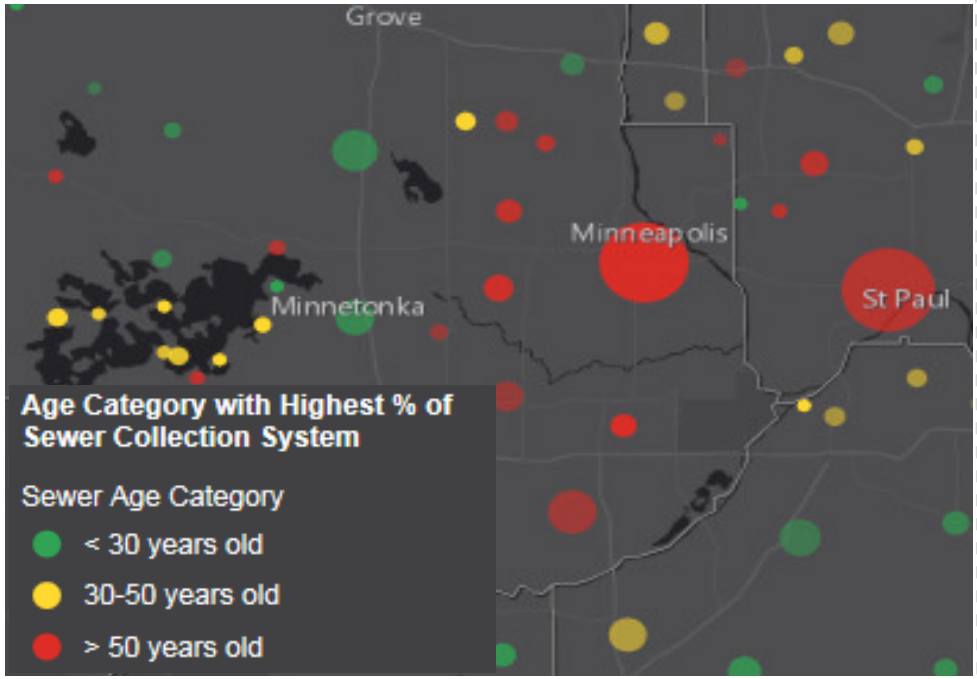
Source: 2014 Lake Susan (Michelle Jordan/RPBCWD)

…Community Response

vegetated green infrastructure & urban forest for treating runoff & buffering microclimate. reduce impervious surface.

Community Concern…

"…uncertainty of costs to repair/replace aging infrastructure under increasing stress…"



…Community Response

maintain a larger "rainy day" fund for failures of slopes, pavement, scouring, flooding.

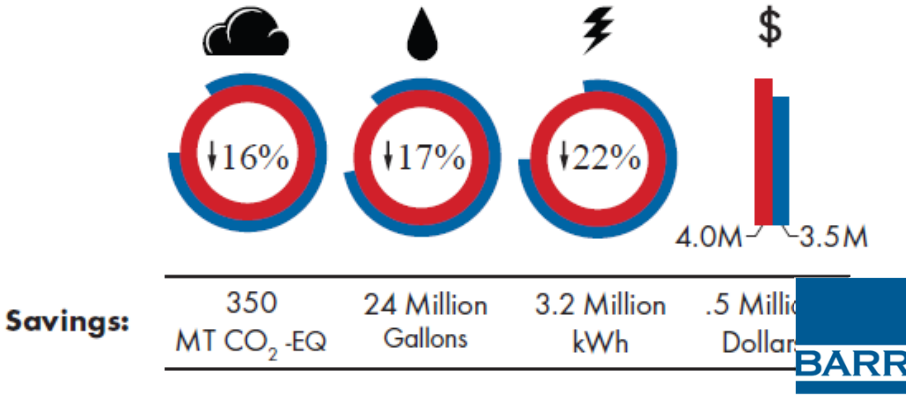
expect the unexpected.

Community Concern…

"…greenhouse gas emissions contributing to climate change…""

…Community Response

use less energy.
use renewable energy.
use less materials.
buy local.
mix, densify land use.
use LCA, tool-based approaches.
find priorities.



Community Concern…

"…our water balance is uncertain… sometimes too much and sometimes not enough…"

…Community Response

perform a risk assessment.

conservation strategies.

replace lawn with drought-tolerant landscape.

offset potable irrigation by recycling stormwater, w.w.

saving energy…saves water.

Community Concern…

"…it seems daunting for us to attack this alone.."

…Community Response

don't go it alone.

partner w/ watershed districts, counties, others to share resources.

look for district system opportunities.

engage stakeholders together.

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Envision sustainability framework

INSTITUTE FOR SUSTAINABLE INFRASTRUCTURE
I S I

Developed by:

ZOFNASS PROGRAM FOR SUSTAINABLE INFRASTRUCTURE
Graduate School of Design Harvard University

APWA

ACEC
American Council of Engineering Companies
100 Years of Excellence

ASCE American Society of Civil Engineers

Are we doing the right projects?
Are we doing the projects right?

https://sustainableinfrastructure.org/

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Extreme Storm Event – Duluth 2012

Questions?