How Do We Know We’re On the Road to Resilience?

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Outline

• Respond to Pre-Disaster Resilience report recommendations
• Identify strategies for adaptation with reference to Chicago and elsewhere
• Provide a basis for scalability of strategies that stress working landscapes over engineered systems
Chicagoland is Getting Warmer…

Annual Heating and Cooling Degree-Days (HDD + CDD)
Measured at Midway Airport 1929-2013

Annual HDD *Dropped* from 6331 to 5987
= 5.43% = 0.065 % Per Year

Annual CDD *Increased* from 946 to 1266
=33% = 0.4 Percent Per Year
...and Wetter

Annual Precipitation and Snowfall Measured at Midway Airport 1929 - 2013

Average Rain Increased
From 30 to 43 Inches
= 43% = 0.5% per Year

Average Snow Increased
From 33.7 to 43 Inches
= 27.6% = 0.3% per Year
1-Day, “20-Year Storms” Now Happening Every 12-13 Years

Don Wuebbles, US Climate Assessment Testimony to Senate Committee on Appropriations, July 28 2011
Some Observations from Local Climate Protection
Prognosis: Warmer, Wetter & Crazier

- Precipitation could increase 20 percent
- Frequency of extreme events, 2.5 inch 24-hour storm, could increase 50 percent by 2039 and 80-160 percent by the end of the century.
Regional Climate Future:
More Intense Heat, Storms, Floods

• “…More than triple the number of high flow days toward the end of the century.”
Chicago’s Surface Cover

Land Cover:
- Forested Land
- Urban Open Space
- Rural Grassland or Shrubland
- Water
- Wetland
- Agricultural Land
- Urban Developed Land
- Bare Rock/Sand/Clay

Protected Land:
- Protected Land Overlay
Losing Permeability

In just five years, Chicago lost significant ground cover and gained impervious surface

2005-2009

Grass & Herbs  Trees & Shrubs  Buildings  Roads  Other Impervious Surface

Chicago  18-City Average
Cook County IL

- 945 Square Miles of Land Area or 15 percent of the 7 county MPO planning area
- 135 Incorporated Municipalities, Chicago + 134 Suburbs + 30 Townships
- Significant special governments: Metropolitan Water Reclamation District; Cook County Forest Preserve District

- 5.2 Million people, 2.7 Million in Chicago; 58 percent of metro area
- 1.933 million households, 1 million in Chicago
- Family households average 3.45 people, non-family households average 1.25 people
- 130,000 businesses
- 2.3 million employees
- One half of the metro area’s manufacturing
- Over 1.83 million separate parcels of land
CNT’s Cook County Findings

• Urban flooding is chronic and systemic
  – Widespread
  – Repetitive
  – Costly

• No correlation between water-related claims and flood areas

• Highest claim concentrations in poorest neighborhoods

• Homeowners cannot solve this problem
  – 70% of survey respondents estimated 3+ floods in last 5 years
  – 20% estimated 10+ floods
- Flood risk is usually assumed to be highest in floodplains
- Study of actual claims in Cook County from largest insurers and FEMA shows otherwise
- Natural systems act like sponges
- Built systems usually cover that sponge
- Results in “runoff” of water
Cost of Cook County’s Urban Floods Based on Claims from 2 Large Insurers, FEMA & SBA

<table>
<thead>
<tr>
<th>2007 to 2011 Statistics</th>
<th>Claims</th>
<th>Total Payout in millions</th>
<th>Average Payout</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Insurance</td>
<td>20,461</td>
<td>$ 185</td>
<td>$9,047</td>
</tr>
<tr>
<td>FEMA Flood Insurance</td>
<td>3,872</td>
<td>$ 64</td>
<td>$16,505</td>
</tr>
<tr>
<td>FEMA Disaster Relief</td>
<td>152,864</td>
<td>$415</td>
<td>$2,716</td>
</tr>
<tr>
<td>FEMA Public Assistance Grant</td>
<td>206</td>
<td>$ 28</td>
<td>$137,848</td>
</tr>
<tr>
<td>SBA Disaster Loan</td>
<td>3,691</td>
<td>$ 81</td>
<td>$21,940</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>181,094</td>
<td><strong>$774</strong></td>
<td><strong>$4,272</strong></td>
</tr>
</tbody>
</table>

Source: CNT, “The Prevalence and Cost of Urban Flooding”
92% of Statewide Claims 2007-2014 Were Outside of Flood Plain

Figure 3.4: The percentage of NFIP and Private insurance claims and the land cover they fall within is shown. The graph also displays the percentage each land cover classification cover in the urban area. Developed land covers 77.67% of the urbanized areas and accounts for 99.03% of all insurance claims.
Prevalence and Cost in Illinois

- Flooding in urban areas has resulted in at least $2.319 billion in documented damage since 2007. 85.2% of all payouts (2007-2014) were located in the six-county Chicago Metropolitan Area of Cook, DuPage, Kane, Lake, McHenry, and Will Counties.
- The top five damaging storm events in Illinois occurring between 2007 and 2014 totaled $1.6 billion and 69% of all payments.
ACHIEVING RAIN READINESS--
THREE DISTINCTIVE APPROACHES
BEING PILOTED IN COOK COUNTY
RAINREADY PRINCIPLES

- **Solutions** that are affordable/quick to install
- Community-based/residents are advocates + participants
- Leverage **public investment in infrastructure** with actions on private property
- **Add economic/social/environmental value** to the community

- **Approach** easily replicated, “tool box of solutions”
- **Standardized/accredited** – market value
- Leverages multiple **investment sources**: homeowners, banks, insurance sector, real estate
1. DIVERSE PARTNERSHIPS

Agencies: Army Corps of Engineers, FEMA, MWRD, HUD
For profits: Intel, Schneider Electric, Sprint
Local government: City of Chicago, Cook County
Non-profits: CDFIs+ community-based partners

2. PLAN FOR EXPANSION

- Business model – public/private
- One-stop shop
- Licensing, patenting + accreditation
- Marketing + outreach
- Incentives e.g. insurance, packaged financing

3. COMMUNITY ORGANIZING

- Give residents a voice
- Connect climate change/urban sustainability with issues that resonate with the public
Three services
Two pilot areas
Backwater Valve

Regrading/French Drain

Raingarden and Bioswales

Downspout Disconnection And Dry Well
RainReady Home: $4,850

Cumulative flood damage: $17,000

Upgrades:
- Backwater valve
- Disconnected downspout
- Re-routed gutters
- Rain garden
NOW & NEXT STEPS

- Year one: designed + tested prototype
- Year two: 45 assessments, 10 upgrades
- Additional 250 homes
- Risk model
- Accreditation + licensing
RAINREADY COMMUNITY
Assess Properties

Map Problems and Opportunities

Document the Problem

Help Residents Organize
28

70% flooded 3 or more times in 5 years

Floodlothian Parade

Telling the Story...

And Sharing it

SURVEY OF FLOOD VICTIMS

70% flooded 3 or more times in 5 years
CONVENE DECISION MAKERS
Bioswale on Parkway

Alleys Before Retrofit

Green Alley After

Porous Paving
TOWN CENTER STREET RETROFIT
RAINREADY PLAN

1. Summarizes the problem
2. Outlines the opportunities and limits to community scale action
3. Lists, maps and quantifies recommended solutions
   • Individual properties
   • Public rights-of-way + public property
4. Describes how to implement them
   • How to fund them
   • How to install them
   • The policies + incentives for widespread adoption
Natalie Creek
Adopt a plan for Natalie Creek that minimizes destructive overbanking, improves water quality, and provides a beautiful place for residents and visitors to run, walk, and bike.

Repair existing trail network between Palaski and 144th St. and work with upstream partners to expand the recreational trail, add lighting and benches, and increase stormwater conveyance capacity.

NEXT STEPS
- Palaski and Palisades Phase II Engineering Study of Natalie Creek
- National Park Service (NPS) help to create a Landscape and River Plan
- Purusa Bay Club for Homeowners

GET INVOLVED!
Partners
- CNT
- NPS

Questions?
Contact Natalie Creek Initiative by calling 1-800-RAIN-READY or email info@rainreadyseattle.org

Your Street
Establish a street-by-street program that progressively upgrades the Village roads to manage stormwater runoff from impervious surfaces and protect your homes.

NEXT STEPS
- Comprehensive Local Technical Assistance (CLTA) Program could help design and implement a plan for 147th St.
- The Village has received funding from King County Departament of Public Health’s Healthy HotSpot Complete Streets Technical Assistance Program to plan for Stormwater management and non-motorized transportation on Midlothian streets.

GET INVOLVED!
Partners
- King County
- CNT

Questions?
Contact RainReady Initiative by calling 1-800-RAIN-READY or email info@rainreadyseattle.org

Your Home
Adopt a coordinated, property-by-property, program that helps homeowners manage rain on their property and reduce their flood risk using landscaping, plumbing, and building improvements.

Start in neighborhoods such as Jolly Homes and the area near Kostner Park – areas that are experiencing overland flooding from storm sewer conveyance issues. For example, by redesigning yards and parkways to send stormwater into rain gardens and dry wells, as well as checking and maintaining private lateral lines, homeowners can protect their homes while also reducing the prevalence of flooding across Midlothian.

NEXT STEPS
- In 2016, Midlothian Public Works will finalize a strategy to identify and address IL across the Village
- CNT’s RainReady Home Initiative is designed to help homeowners manage their flood risk

GET INVOLVED!
Partners
- Midlothian Public Works

Questions?
Contact RainReady Initiative by calling 1-800-RAIN-READY or email info@rainreadyseattle.org

Your Village
A Village-wide approach to help residents and businesses get ready for the rain and bring economic investment and beautification to the Village - this includes better building standards, improved floodplain mapping, protective tree plantings, better use of vacant properties, and street enhancement and maintenance.

NEXT STEPS
- Hire RainReady Planner
- Kansas City Floodplain

GET INVOLVED!
Partners
- Kansas City Floodplain

Questions?
Contact RainReady Initiative by calling 1-800-RAIN-READY or email info@rainreadyseattle.org
NOW & NEXT STEPS

• Year one: complete 2 plans
• Strong interest from partners in expansion
• Accreditation + licensing

RAINREADY ALERT

• Advanced/real-time warning system + risk mapping
• Sensor network, mapped with topological map, permeability, moisture, rain map, flow gauges, and stream levels
• Clients: MWRD/municipalities/property owners
• Partners: Intel, Schneider Electric, Sprint

NOW & NEXT STEPS

• Pilot this autumn in Midlothian
• Subscription + licensing
Capital Access Needs Attention—And There is a Willingness to Pay

• Most incremental home improvements financed with expensive credit cards

• People are willing to pay if they can obtain financing
Split Incentives Can Be Addressed Through Skillful Intermediaries

- Public versus private ownership
- Retrofit (98% of opportunity) vs. new construction
- Building code strategies are of limited near-term effectiveness and do not address multi-party or public-realm related (e.g. pavement) risk
- “Fixing crumbling infrastructure” or “replace with more effective solutions”
- One stop shops will take industry-government data sharing strategy similar to what’s evolved around effective climate protection strategies
- Building demand for effective adaptation and building effective solutions are equally important

- Landscaping and home improvement are each $75 billion industries
- Accelerated settlement of combined sewer overflow issues—increasingly includes green infrastructure commitments
- Increased use of state revolving funds
- Increased willingness in secondary market and with Federal Housing Administration to support “green” lending
- Increased willingness of realtors (NAR and MLS) to include non-traditional scores (Walkscore, energy scores, transportation affordability) with listings
- Modest incentives can go a very long way toward getting to scale
Runoff Volume Reduction Goal

Select a Goal:

Chicago, IL City Ordinance

Custom

West Virginia Ordinance

Minneapolis, MN Ordinance

North Carolina Ordinance

Required Volume to Capture on Site: 417 ft³

Select a runoff reduction goal from the following drop-down list. The selected value defines the amount of precipitation (0.5 – 1.5 inches) over the impervious area of the site that must be infiltrated, evaporated, and reused on site with Green.

The Value of Green Infrastructure
A Guide to Recognizing Its Economic, Environmental and Social Benefits

Upgrade Your Infrastructure

A JOINT EFFORT BY

American Rivers
The Center for Neighborhood Technology
The Great Lakes and St. Lawrence Cities Initiative
Thank You!

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