It's Getting Hot In Here…

Now take out all your planning tools!

Adaptive Planning for Coastal Change: Legal Issues for Local Government | **April 19, 2013**

PRESENTED BY

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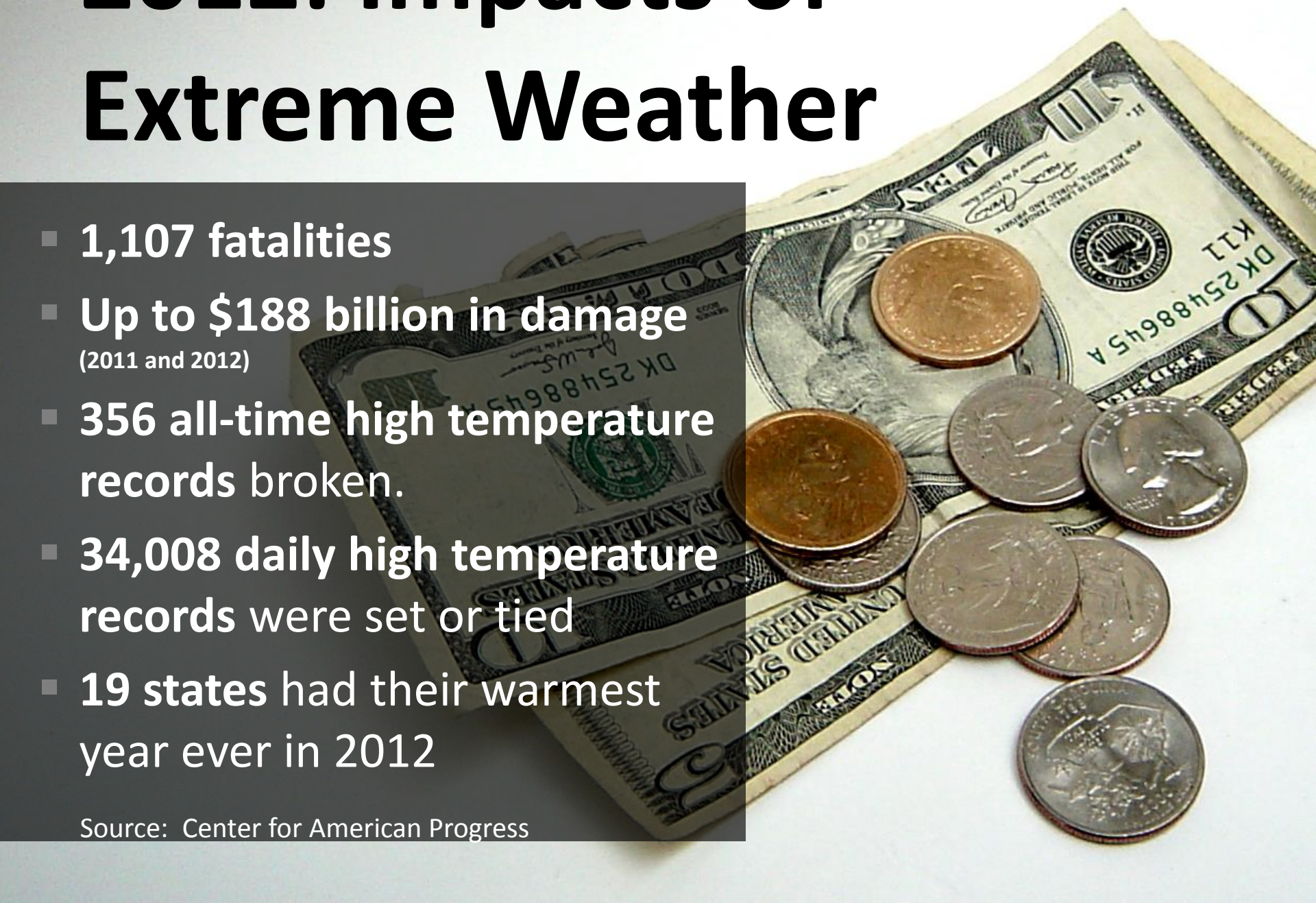
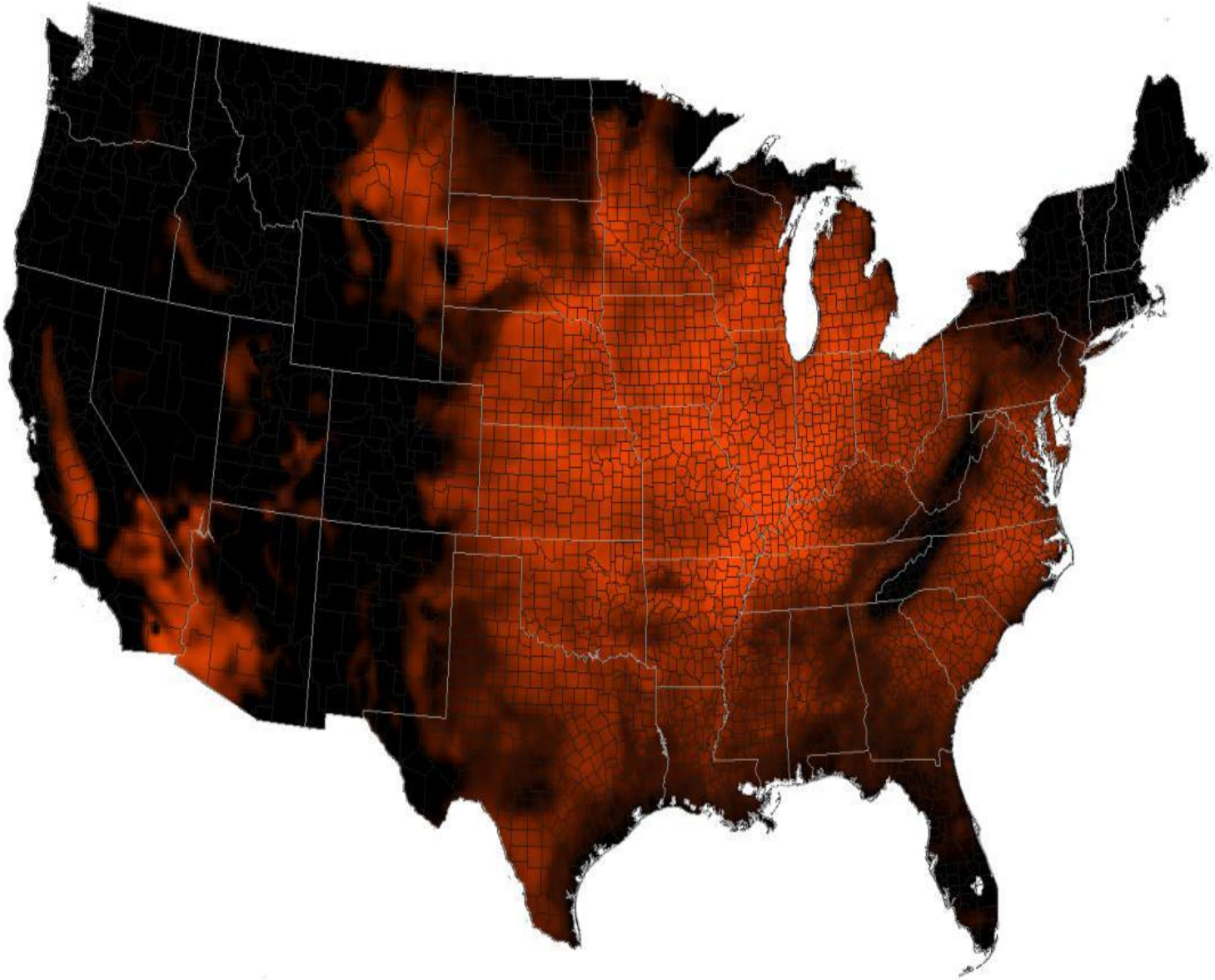
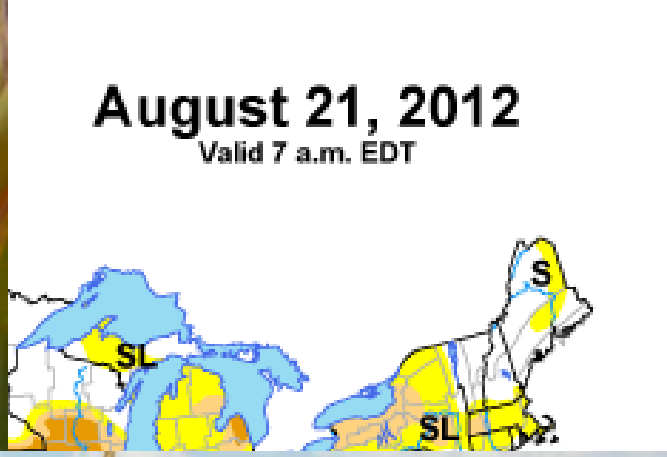
2012: Impacts of Extreme Weather



- **1,107 fatalities**
- **Up to $188 billion in damage** (2011 and 2012)
- **356 all-time high temperature records** broken.
- **34,008 daily high temperature records** were set or tied
- **19 states** had their warmest year ever in 2012

Source: Center for American Progress





Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

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The Drought Monitor focuses on bro
Local conditions may vary. See acco
for forecast statements.

http://droughtmonitor.unl.

Best Practices Planning: Extreme Heat

- Develop an Extreme Heat Response Plan
- Identify and promote cooling centers
- Initiate a cool roofs program
- Ongoing, effective communication

Examples
Crop Adaptation

Best Practices: Planning: Flooding & Sea Level Rise

- Comprehensive Plans
- Setbacks & Buffer zones
- Conservation Easements
- Rolling Easements
- Overlay Zones
- Tax Incentives
- Transfer Development Rights

Hull, MA

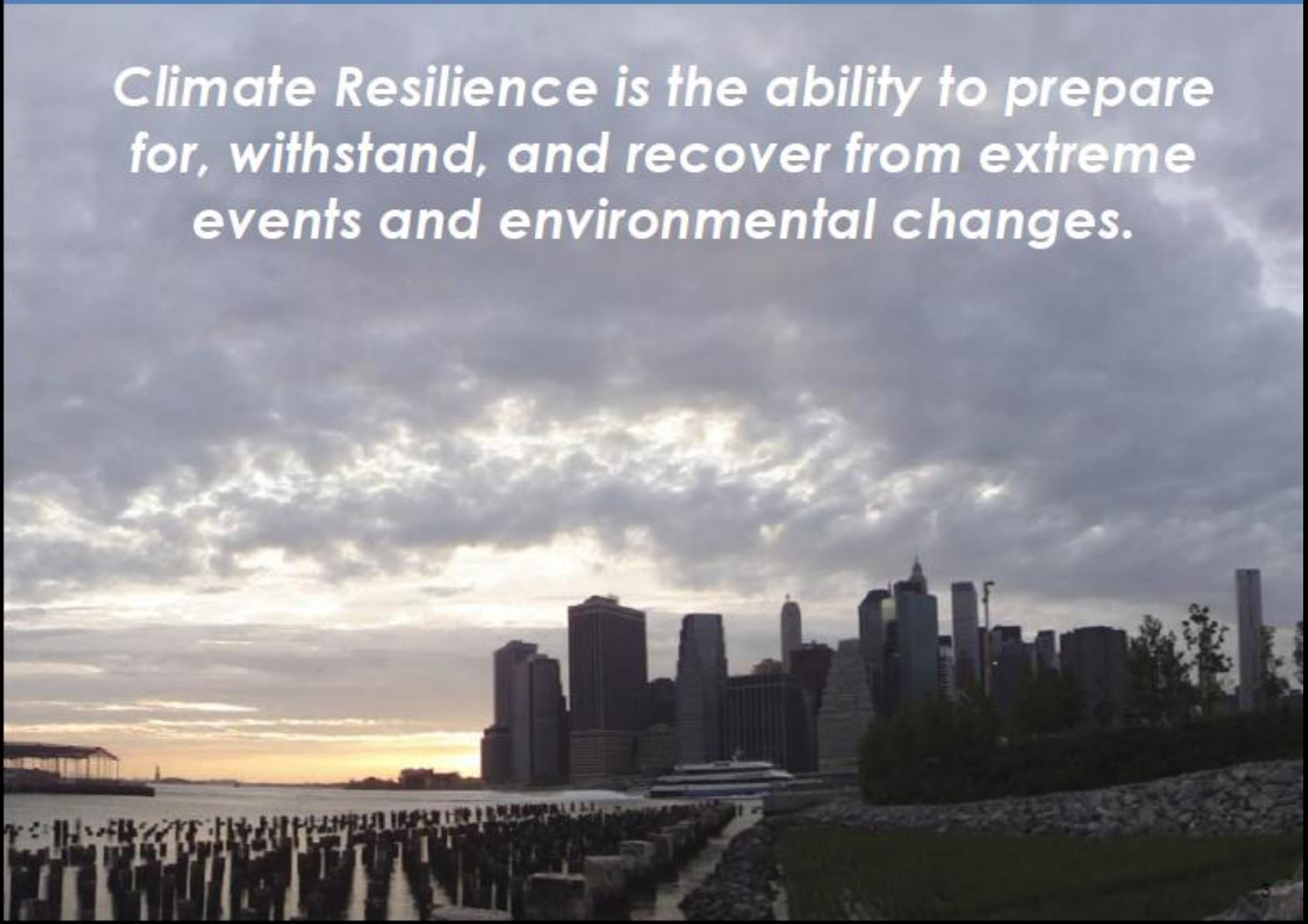
Town Facts

- Pop. 11,000
- Located 12 miles south of Boston
- Elevation 50 feet (15m)

Climate Adaptation Efforts

- Storm Smart Coasts Pilot
- 3D Visualization modeling
- Freeboard incentives

COASTAL CLIMATE RESILIENCE



Best Practice: New York, NY

1 Understand the Vulnerabilities

Create Coastal Area Typologies that are representative of the range of uses, densities, conditions of the city's coastal zone.

Example: Low-density oceanfront beach

2 Identify Specific Adaptive Strategies

At the scale of the site, neighborhood and reach.

Example: Elevating a building

3 Develop Adaptive Approaches (A group of strategies)

A cohesive strategy which may be a combination of individual strategies.

Example: Flood proofing of private homes and building an off-shore barrier reef.

4 Evaluate

The overall costs and benefits of strategies for different kinds of neighborhoods.

Example: Implementation challenges, un-tested strategy, potential impacts on streetscape

Best Practice: Resilience Strategies- Green Infrastructure

Best Practices
Planning: Vulnerability Assessments

- Assess the vulnerable areas of your community
- Based on a comprehensive systems based assessment
- Looks at a system's sensitivity to and ability to adapt to a changing climate

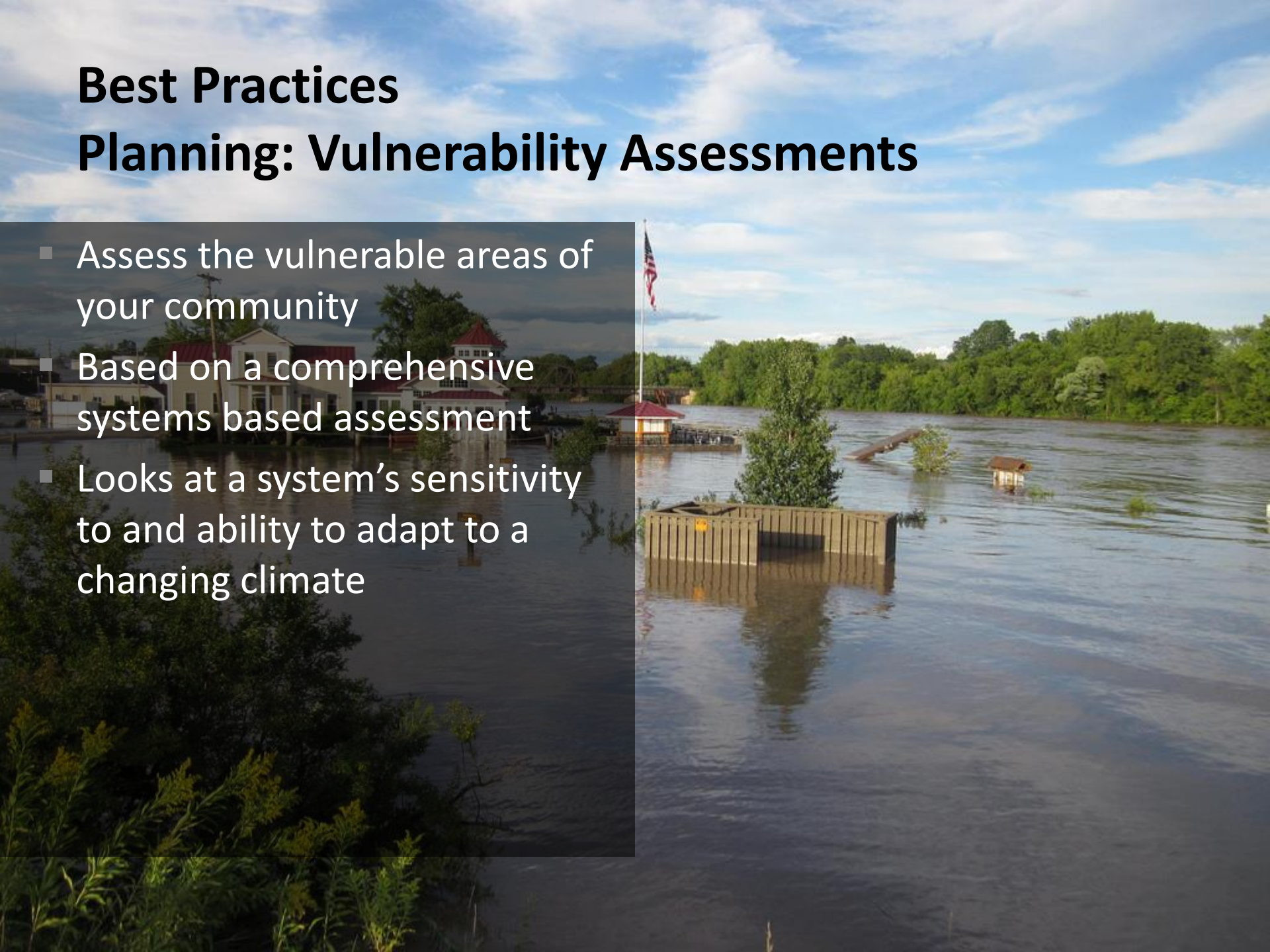


Table 2: Snapshot of projected changes in climate for Vancouver

Climate Variable	Summary of Change	Snapshot of Anticipated Changes
	 Increase in average annual precipitation with a decrease in the summer.	**Averages**[A] Increase of 6% and 9% in winter and decrease of 15% and 14% in the summer by the 2050s and 2080s respectively. **Wet days**[B, C] By the 2050s, precipitation during extremely wet days is expected to increase 28% relative to the baseline period (1971-2000). **Extreme events**[C] By the 2050s, a daily rainfall event that occurred once every 25 years in the past is expected to occur almost 2.5 times as frequently.
	 Increase in average annual temperature with most notable change in night-time lows.	**Averages**[A] Annual increase of 1.7°C by the 2050s and 2.7°C by the 2080s. **Warm days** Summer days above approx. 24°C are projected to occur more than twice as frequently in the 2050s than during the baseline period 1971-2000. **Extreme events** In the 2050s, an extreme heat event that occurred once every 25 years in the past is expected to occur over 3 times as frequently.
	 Rising Seas	**Averages** The Province of B.C. recommends using 0.5m global mean sea level increase to 2050, 1.0m to 2100 and 2.0m to 2200. There is a wide range of projections for sea level rise by 2100 from 45cm to over 2m. **Extreme events** Sea level rise will cause problems when experienced together with storm surge. Detailed storm surge projections are not available.
		An increase in extreme events is projected including windstorms and heavy rainfall.

Climatic Change	Impact Statement	Primary Service Area
Increase in sea level	Increased flooding along the Coast and Fraser River as sea level rises and the storm surge and waves breach height of land	Engineering General
	Increased damage to structures (seawalls) and shoreline resulting in greater discontinuity of use	Engineering General
	Reduced gravity drainage of the existing drainage system, resulting in more frequent flooding of the False Creek low areas and Southlands	Engineering - Sewers
	Saltwater intrusion in built up areas affecting the longevity of underground infrastructure	Engineering General
	Saltwater intrusion may foul fresh water wells or lead to water quality issues	Engineering - Water
	VPD facilities may not support emergency operations (low lying areas and lack of emergency power)	Police
	Liability issues in flood risk areas without restrictive covenants	Risk Management
	Increase in environmental refugees from surrounding areas increasing population stress on resources and development	CSG - Planning
	Increase in shoreline erosion affecting natural environment and public amenities such as parks, trails and access to the water	Parks and Recreation
	Saltwater intrusion at sanitary sewer pump stations will increase risk of corrosion and decrease in design life.	Engineering - Sewers
	Gradual inundation of low lying areas of land along the Coast or Fraser River	CSG - Planning
	Increased cost and difficulty acquiring insurance for private and public property owners in high risk areas	Risk Management
	Rising groundwater levels in coastal regions resulting in ponding and drainage problems	Engineering General

Adaptation Indicators- Vancouver, BC

OBJECTIVE 1.1: MINIMIZE RAINFALL RELATED FLOODING AND ASSOCIATED CONSEQUENCES.

Potential Indicators:

- Number and or cost of insurance claims related to water incurred losses
- Number of combined sewer overflows
- Percentage of permeable ground to total ground coverage

OBJECTIVE 2.1: INCREASE THE RESILIENCE OF VANCOUVER'S INFRASTRUCTURE AND ASSETS TO COASTAL FLOODING AND EROSION.

Potential Indicators:

- Percentage of the population in unprotected coastal flood prone areas
- Value of City assets in unprotected coastal flood prone areas
- Changes to salinity of groundwater

OBJECTIVE 4.1: MINIMIZE MORBIDITY AND MORTALITY DURING HEAT WAVES.

- Heat related hospitalizations/mortalities
- Capacity of cooling centers
- Average distance to cooling centres from known hot spots/vulnerable population location
- Average temperature at assigned community hotspots
- Proportion of shade coverage (canopy cover)
- Number of new fountains in known hotspots

OBJECTIVE 4.2: MINIMIZE PER CAPITA WATER CONSUMPTION

- Water usage per capita
- Number of new grey water usage initiatives

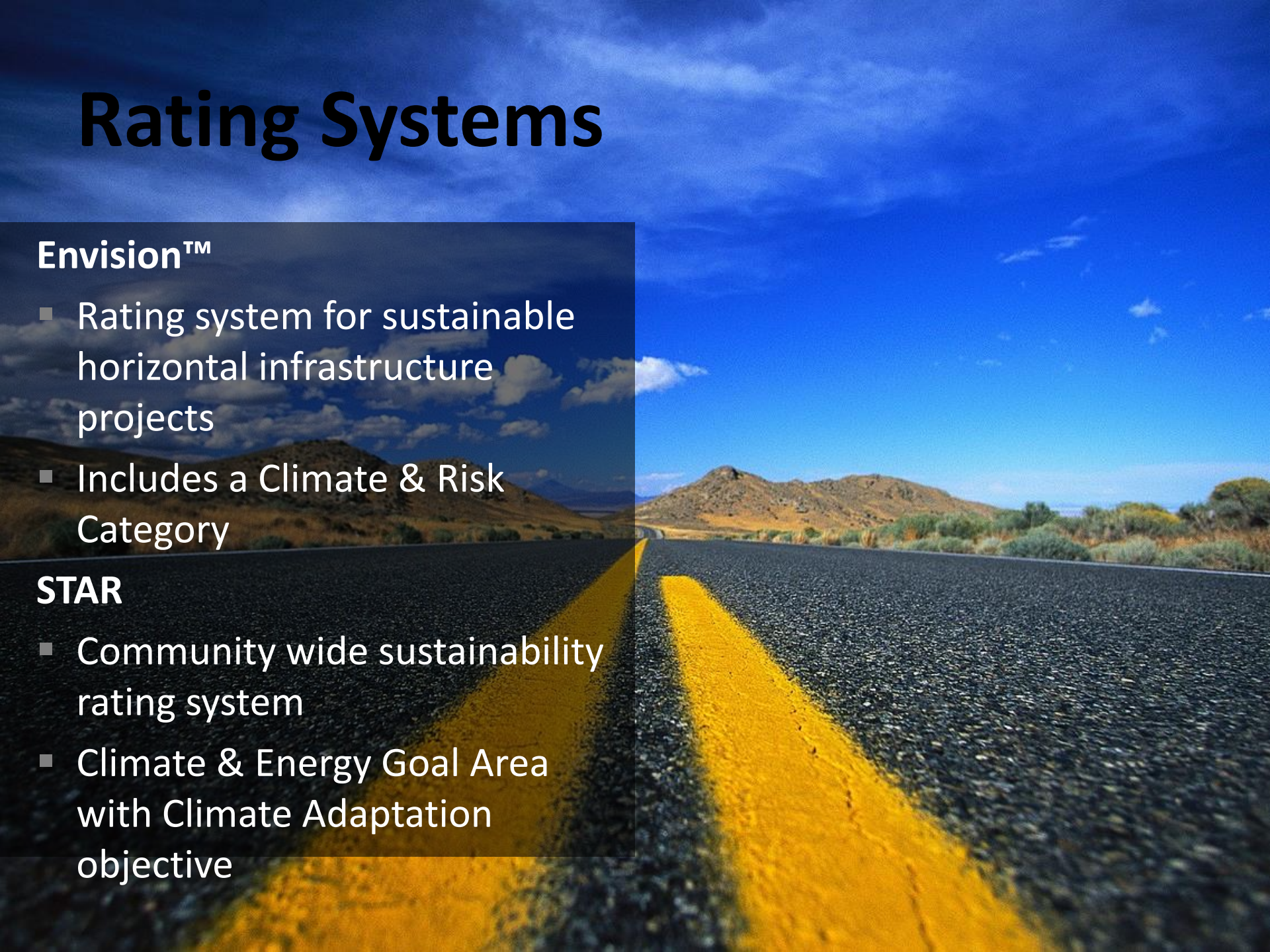
Best Practice
Partnerships and Collaboration

- Southeast Florida Climate Change Compact
- New York State- Cleaner Greener Communities
- San Diego Area

Tools

- NOAA
  - Coastal Communities Vulnerability Assessment Tool
  - Climate Data
- ICLEI
  - Adaptation Database and Planning Tool (ADAPT)
- Rating Systems
  - STAR
  - Envision™

Rating Systems



Envision™

- Rating system for sustainable horizontal infrastructure projects
- Includes a Climate & Risk Category

STAR

- Community wide sustainability rating system
- Climate & Energy Goal Area with Climate Adaptation objective

Next Steps for your Community

- Assess vulnerabilities
- Develop an adaptation plan
- Take action
- Engage the public
- Track your progress

Resources: Databases and Tools

Cake

- http://www.cakex.org/

Georgetown Climate Center

- http://www.georgetownclimate.org/

NOAA Climate Office

- http://cpo.noaa.gov/

ICLEI USA ADAPT Tool

- http://www.icleiusa.org/tools/adapt

Thank you!

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