

## 2018 Carolinas Climate Resilience Conference

### Incorporating Resilience: How Planning Tools Can Enhance Resilience in the Carolinas

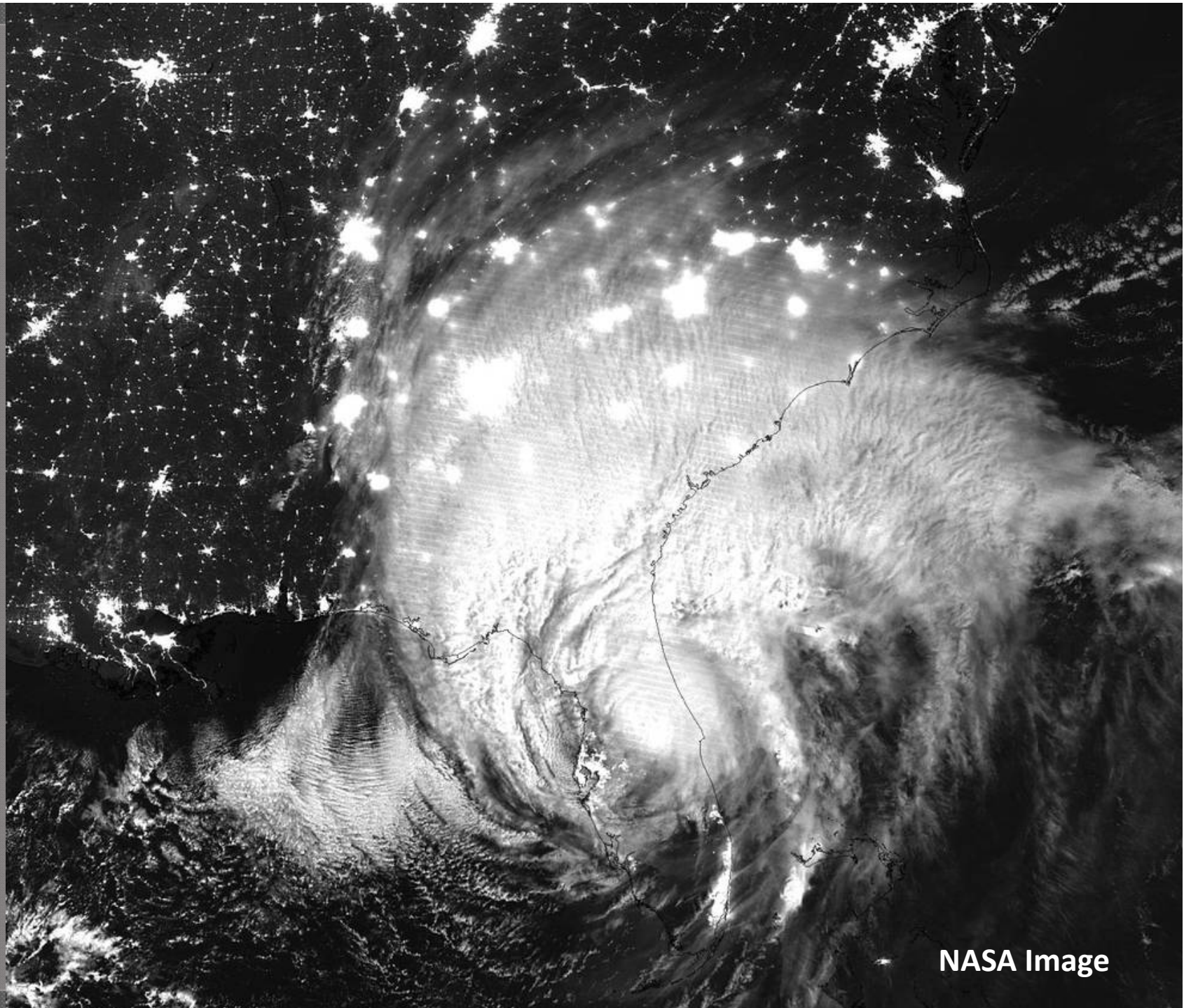
Scott Shuford, AICP  
CASE Consultants International



NASA Photo

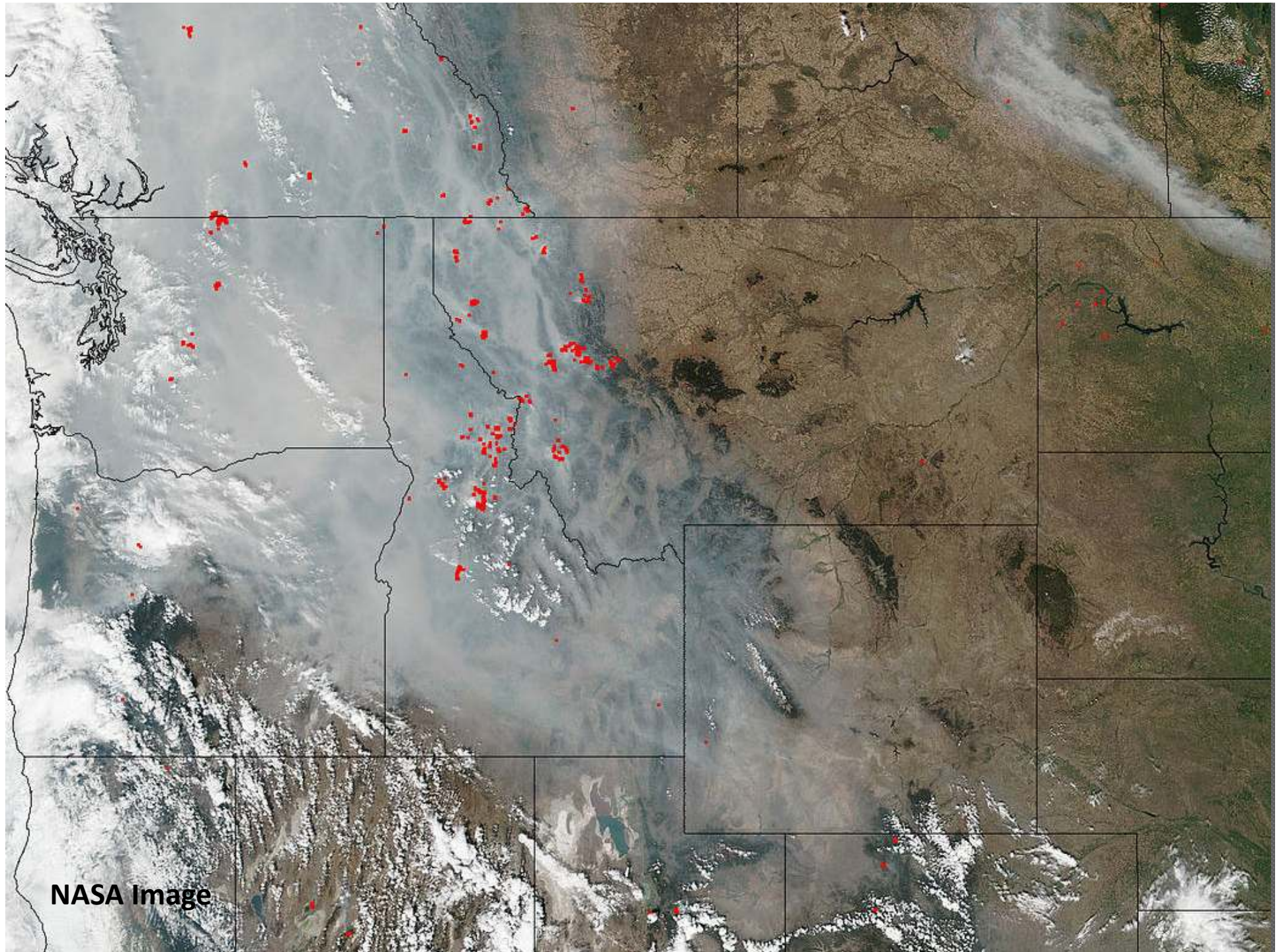






NASA Image







# 2017's Record-Breaking Weather

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- Hurricane Harvey - Total rainfall 51"+
- Hurricane Irma
  - Longest sustained winds of 185+ mph (37 hours vs. 24)
  - Strongest hurricane ever not in Gulf or Caribbean basins
- Western US heat waves
- Hurricane Maria - >30" of rainfall in PR
- 2017 was the 3rd hottest year on record, worldwide (2016 was hottest, followed by 2015)

# Resilience Tools and Techniques for Urban and Rural Planners

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- ◉ Comprehensive Plans
- ◉ Climate Adaptation/Resiliency Plans
- ◉ Hazard Mitigation Plans/Continuity of Operations Plans
- ◉ Development Standards/Community Design
- ◉ Private Governance
- ◉ Infrastructure Projects
- ◉ Economic Resiliency Plans



# plaNorfolk2030



# Stand-Alone Comprehensive Plan Element

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Natural Hazards

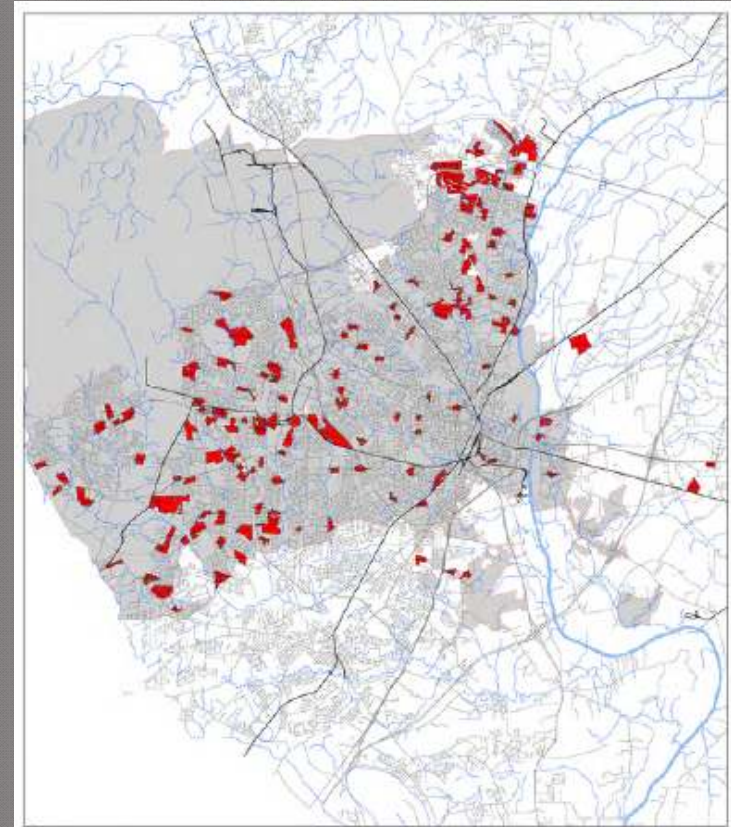
**CITY OF FAYETTEVILLE RESILIENCY  
ELEMENT**



Economy



Social Equity





# Climate Adaptation/Resiliency Plans

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## Cumberland County Climate Resiliency Plan

Sustainable Resource Management for Climate Resilient Communities

<http://www.sustainablesandhills.org/climate-adaptation-planning>



# FEMA Multi-Hazard Mitigation Plans





# Development Standards

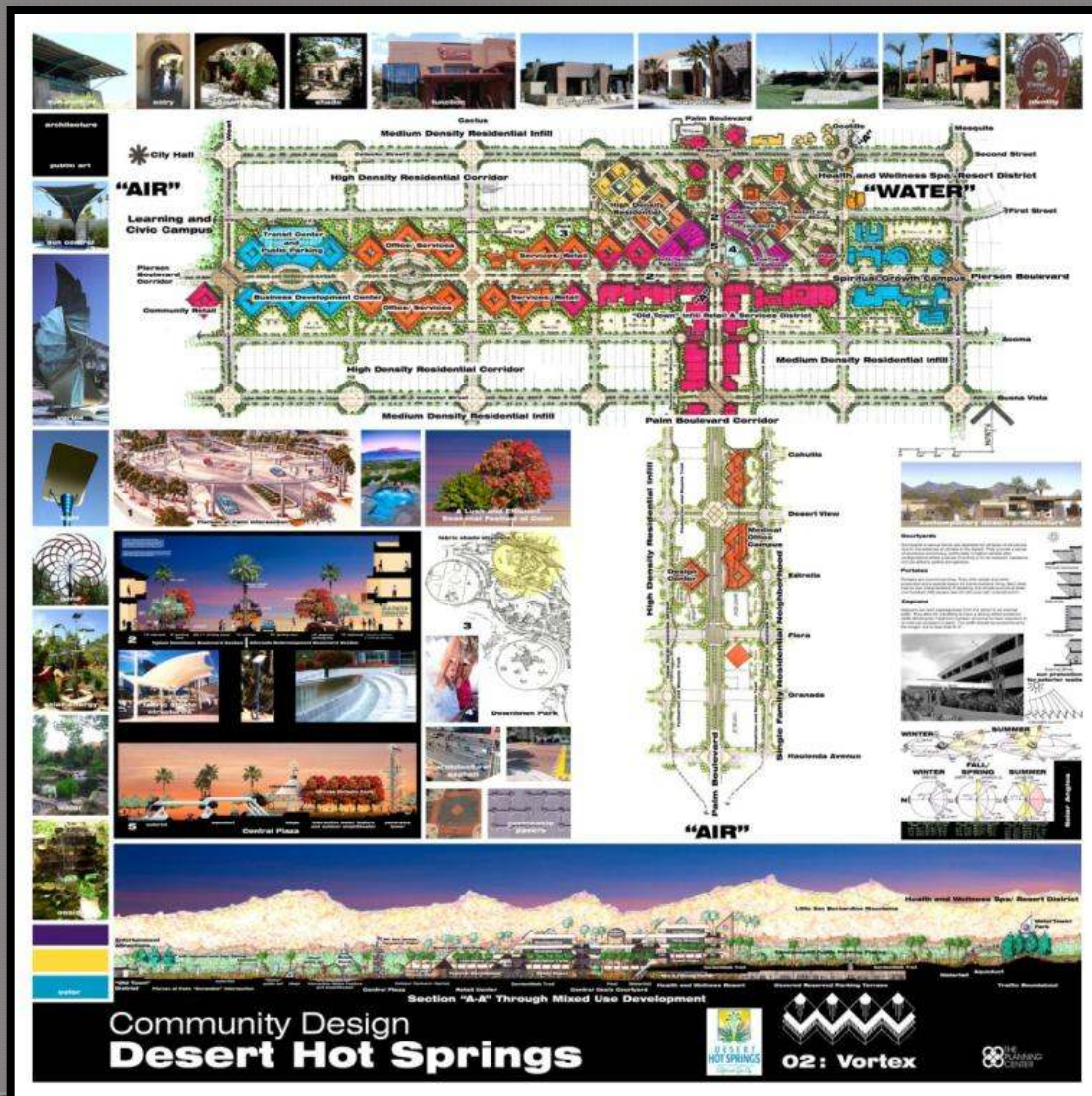
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NOAA Photo



# Community Design



[www.cityofdhs.org/](http://www.cityofdhs.org/)





## Mixed Use Development Core





# Shared Experience

**As Extreme Weather Events Become More Common,  
We Will All Have An Extreme Weather Story or Two**



Photo Credits:  
NOAA, FEMA,  
DOT, AP



# Private Governance: Mitigation

## The Behavioral Wedge

*Dietz et al, Household Actions Can Provide a Behavioral Wedge to Rapidly Reduce U.S. Carbon Emissions, 106 PROC. NAT'L ACAD. SCI. 18452 (2009)*

Behavior Change	Category	Potential Emissions Reduction (MTC)	Behavioral Plasticity	RAER (MTC)	RAER (%I/H)
Weatherization	W	25.2	90%	21.2	3.39%
HVAC Equipment	W	12.2	80%	10.7	1.72%
Low-flow showerheads	E	1.4	80%	1.1	0.18%
Efficient water heater	E	6.7	80%	5.4	0.86%
Appliances	E	14.7	80%	11.7	1.87%
LRR tires	E	7.4	80%	6.5	1.05%
Fuel-efficient vehicle	E	56.3	50%	31.4	5.02%
Change HVAC air filters	M	8.7	30%	3.7	0.59%
Tune up AC	M	3.0	30%	1.4	0.22%
Routine Auto Maintenance	M	8.6	30%	4.1	0.66%
Laundry temperature	A	0.5	35%	0.2	0.04%
Water heater temperature	A	2.9	35%	1.0	0.17%
Standby electricity	D	9.2	35%	3.2	0.52%
Thermostat setbacks	D	10.1	35%	4.5	0.71%
Line drying	D	6.0	35%	2.2	0.35%
Driving behavior	D	24.1	25%	7.7	1.23%
Carpooling & Trip-chaining	D	36.1	15%	6.4	1.02%
Totals		233		123	20%



ULI CONFERENCE PROGRAM

# Building the Resilient City: Risks and Opportunities

September 4–5, 2014  
Hyatt Regency  
San Francisco, California

[resilientcity.uli.org](http://resilientcity.uli.org)





# Arverne by the Sea

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<http://arvernebythesea.com/>



# Infrastructure Projects – Large and Small

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<http://www.confederationbridge.com>



NYC Metropolitan Transportation Authority



# Green Infrastructure

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**Green Roof – Chicago  
City Hall**

**Photo: City of Chicago**





<http://www.thehighline.org/>



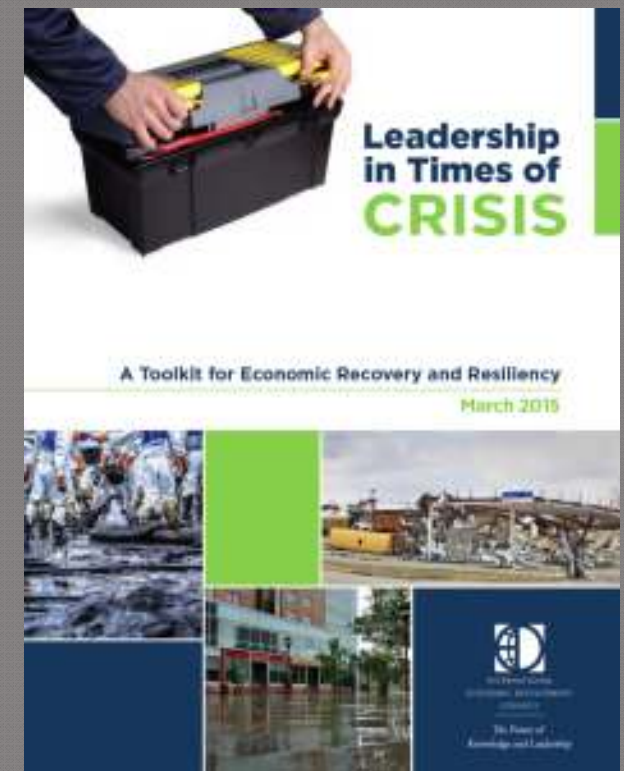
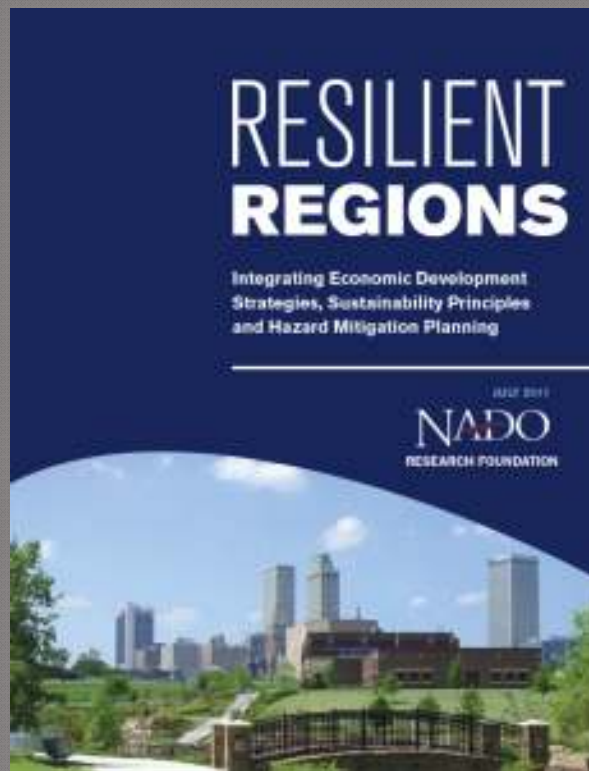
City of Fayetteville



<http://equinoxenvironmental.com/>



# Economic Resiliency Planning





# Economic Resiliency Planning

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- Recognizes the link between economic development and extreme weather events, man-made disasters and even free market disruptions
- Strategic approach to minimize vulnerabilities by specific economic development sector
  - Agriculture
  - Transport
  - Real Estate
  - Industrial
  - Commerce
  - Recreation



U.S. Department of Transportation



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Resilience in the Carolinas

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NASA Photo

