



HOW TO ASSESS CLIMATE RISK AND VULNERABILITY IN LOCAL GOVERNMENT



Climate Leadership Academy – March 2012



City of Flagstaff Resiliency Study

Exposure and Sensitivity Analysis

Adaptive Capacity Analysis

Vulnerability and Risk Assessments

Next Steps



Climate Leadership Academy – March 2012



THE CITY OF FLAGSTAFF RESILIENCY STUDY

How can the City of Flagstaff reduce its vulnerability and build local resilience to climate variability and climate related disasters?



Climate Leadership Academy – March 2012



THE CITY OF FLAGSTAFF RESILIENCY STUDY

How vulnerable is the City's operating efficiency, infrastructure and economic competitiveness?

Where does the City lack sufficient capacity to adapt?

What are the risks if we do not act?



Climate Leadership Academy – March 2012



CITY OF FLAGSTAFF RESILIENCY STUDY

Internal operations – focused

City Manager assigned Core Team

Diverse perspectives and skills – Finance, Police, Utilities,
Long-term Planning, etc.

Consensus building process



Climate Leadership Academy – March 2012

FLAGSTAFF CLIMATE PROJECTIONS

Time	Annual Average Temperature Projections	Other factors	Anticipated Impacts
2100	+ 5 °F to + 8 °F	Longer lasting heat waves ~ 2 weeks longer. Greater shifts in summer temperatures.	Longer growing season Fewer frost days More heat waves Increased forest fires Greater water shortages

Precipitation Projections	Anticipated Impacts
5 % decrease in annual average by 2100 compared to 1970 - 2000 for Northern Arizona.	Greater water shortages Increased flooding events

Snowpack and Streamflow Projections	Anticipated Impacts
Snowpack declines likely due to a shift in the jet stream and El-Nino patterns driving precipitation falls northward.	Greater water shortages Loss in winter recreation

PRIMARY SYSTEMS AND KEY PLANNING AREAS

Primary System	Key Planning Areas
Emergency Services	Police and Fire Services, EMS, Disaster Response, Public Works
Energy	Energy Delivery and Assurance, Energy Demand and Cost
Forest Health	Forest Management, Wildlife and Vegetation, Public Infrastructure
Public Health	Public Health Infrastructure, People, Public Services
Stormwater	Buildings, Infrastructure
Transportation	Public Transportation, Transportation Infrastructure, Public Access, Rail, Airport
Water	Water Treatment Quality, Water Resources, Water Infrastructure



EXPOSURE AND SENSITIVITY ANALYSIS

What/who could be impacted by climate?

How does the climate currently impact the City's operations?

What non-climate factors impact the City's operations?

What are the potential impacts to the City's operations?



Climate Leadership Academy – March 2012



ADAPTIVE CAPACITY ANALYSIS

What are the City's current resources available to help it prepare for and respond to the potential impacts?

What are the resources needed to help the City prepare for and respond to the potential impacts?

Natural, Technological, Social, Economic, etc.



Climate Leadership Academy – March 2012

VULNERABILITY ASSESSMENT METHODOLOGY

		Sensitivity: Low → High				
		S0	S1	S2	S3	S4
Adaptive Capacity Low → High	AC0	V2	V3	V4	V5	V5
	AC1	V1	V2	V3	V4	V5
	AC2	V1	V1	V2	V3	V4
	AC3	PO	V1	V1	V2	V3
	AC4	PO	PO	PO	V1	V2



RISK ASSESSMENT METHODOLOGY

What is the function within City operations?

What is the degree of impacts? (Size of the population affected, life threatening, estimated costs)

What is the likelihood that the impacts will occur?



RISK ASSESSMENT METHODOLOGY

Priorities/Risk	1 point	2 points	3 points
A) Critical Function	Maintain a non-critical function/ Improve a non-critical function	Improve a critical function/ Mend a non-critical function	Mend a critical function /Maintain a critical function
B) Citizens Affected	Few/ Less than half of Flagstaff's Population	Half Flagstaff's Population	Entire Flagstaff Population
C) Life Threatening	No	Uncertain	Yes
D) Estimated Cost	Low <i>(up to \$1 Million)</i>	Medium <i>(~\$ 1 - \$7 Million)</i>	High <i>(~\$7 Million +)</i>
E) Probability	Uncertain	Likely (>66%)	Very Likely (>90%)

System	Key Planning Area	Vulnerability Ranking	Risk Ranking	Combine Ranking
Water				
	Water Treatment Quality	3	14	17
	Water Resources	5	13	18
	Water Infrastructure	5	13	18
Forest Health				
	Forest Management	5	14	19
	Wildlife and Vegetation	5	7	12
	Public Infrastructure	4	14	18
Emergency Services				
	Police and Fire Services	4	12	16
	EMS	4	12	16
	Disaster Response	5	12	17
Energy				
	Assurance and Delivery	4	12	16
	Demand and Costs	4	12	16

System	Key Planning Area	Vulnerability Ranking	Risk Ranking	Combine Ranking
Stormwater				
	Infrastructure	4	14	18
	Buildings	2	10	12
Public Health				
	Public Health Infrastructure	1	12	13
	People	2	11	13
	Public Services	3	13	16
Transportation				
	NAIPTA - Public Transit	1	5	6
	Transit Infrastructure	4	13	17
	Public Access	1	10	11
	BNSF	1	7	8
	Airport	4	8	12



NEXT STEPS

Continue to leverage local and regional efforts

Adopt goals and objectives for municipal resiliency

Develop a strategic policy that makes City operations more responsive to changes in climate



Climate Leadership Academy – March 2012

CONTACT INFORMATION

Stephanie Smith

ssmith@flagstaffaz.gov

(928) 213-2150

www.flagstaffaz.gov

