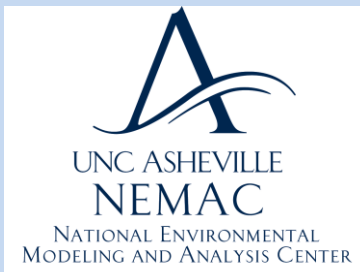# Providing Meaningful and Actionable Decision Tools to Local and Regional Stakeholders across the Southeastern U.S.

J. Greg Dobson and Jim Fox

National Environmental Modeling and Analysis Center

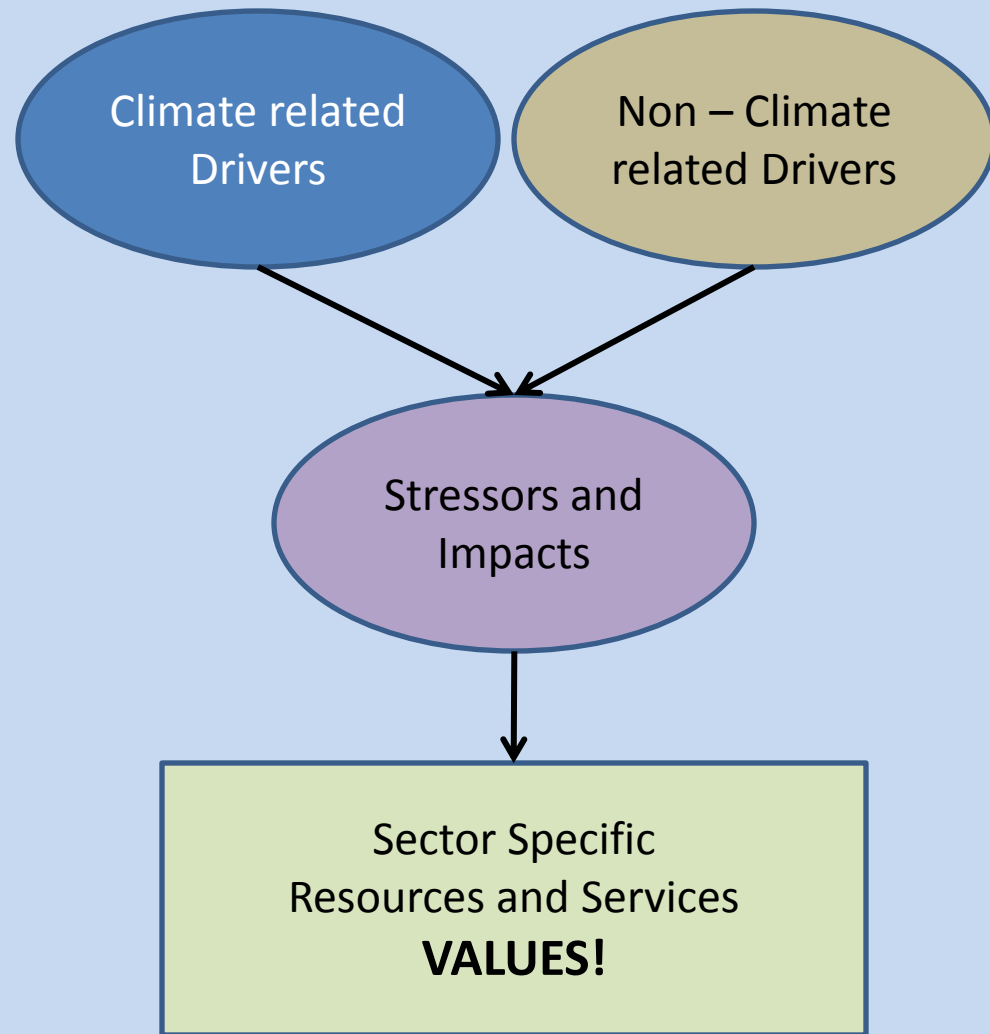*University of North Carolina at Asheville*

COMMUNITY NEEDS

- **Better and affordable access to tools and information**

- **More equipped to assess risk**

- **Tools that can integrate within their own current technology**
  - Not solutions they are not asking for
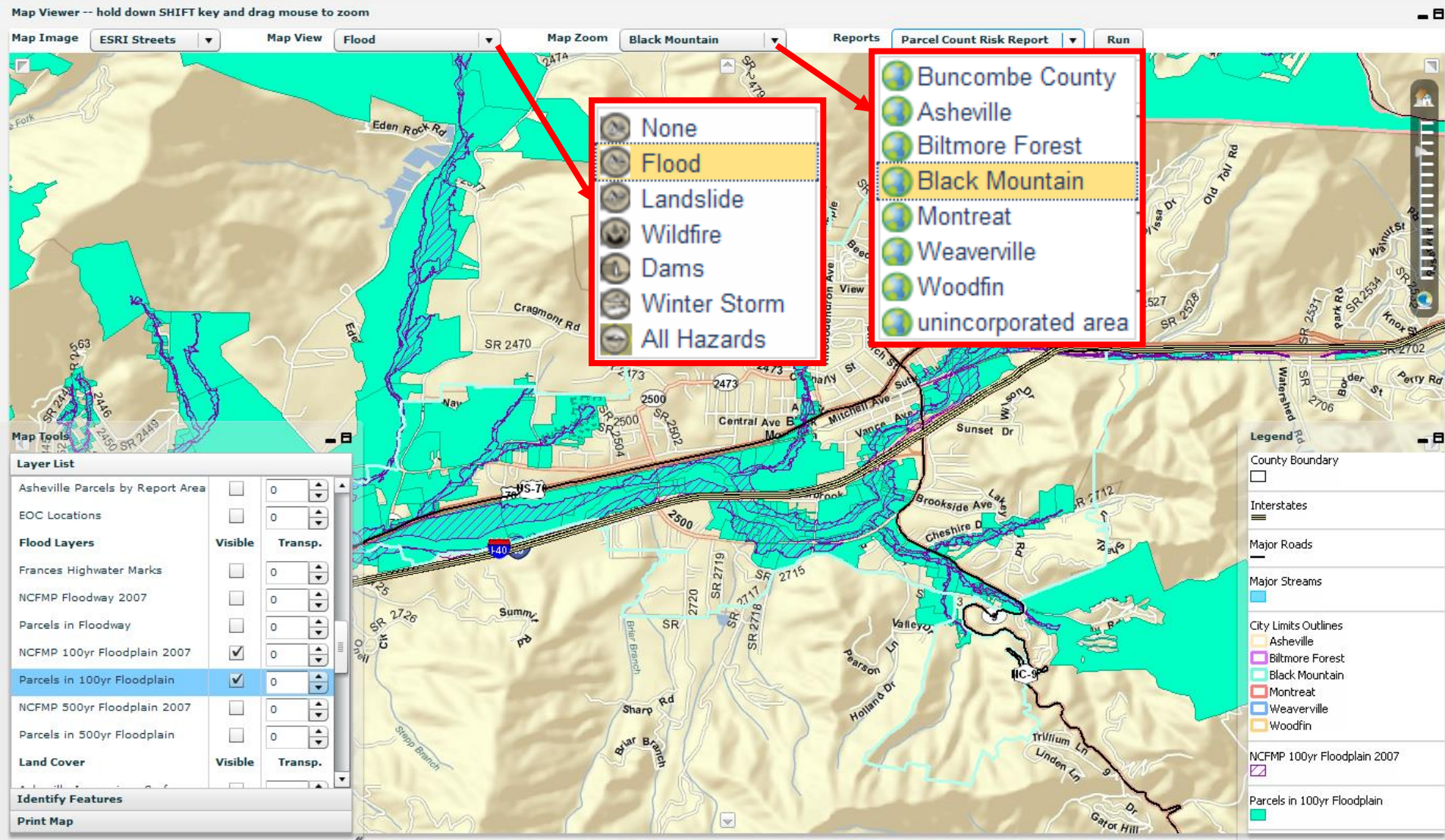
INFORMATION & TOOLS LEAD TO DECISIONS

- Communities and the business sector within them will **not** make decisions based on climate alone
- Driven by **values**, not just data
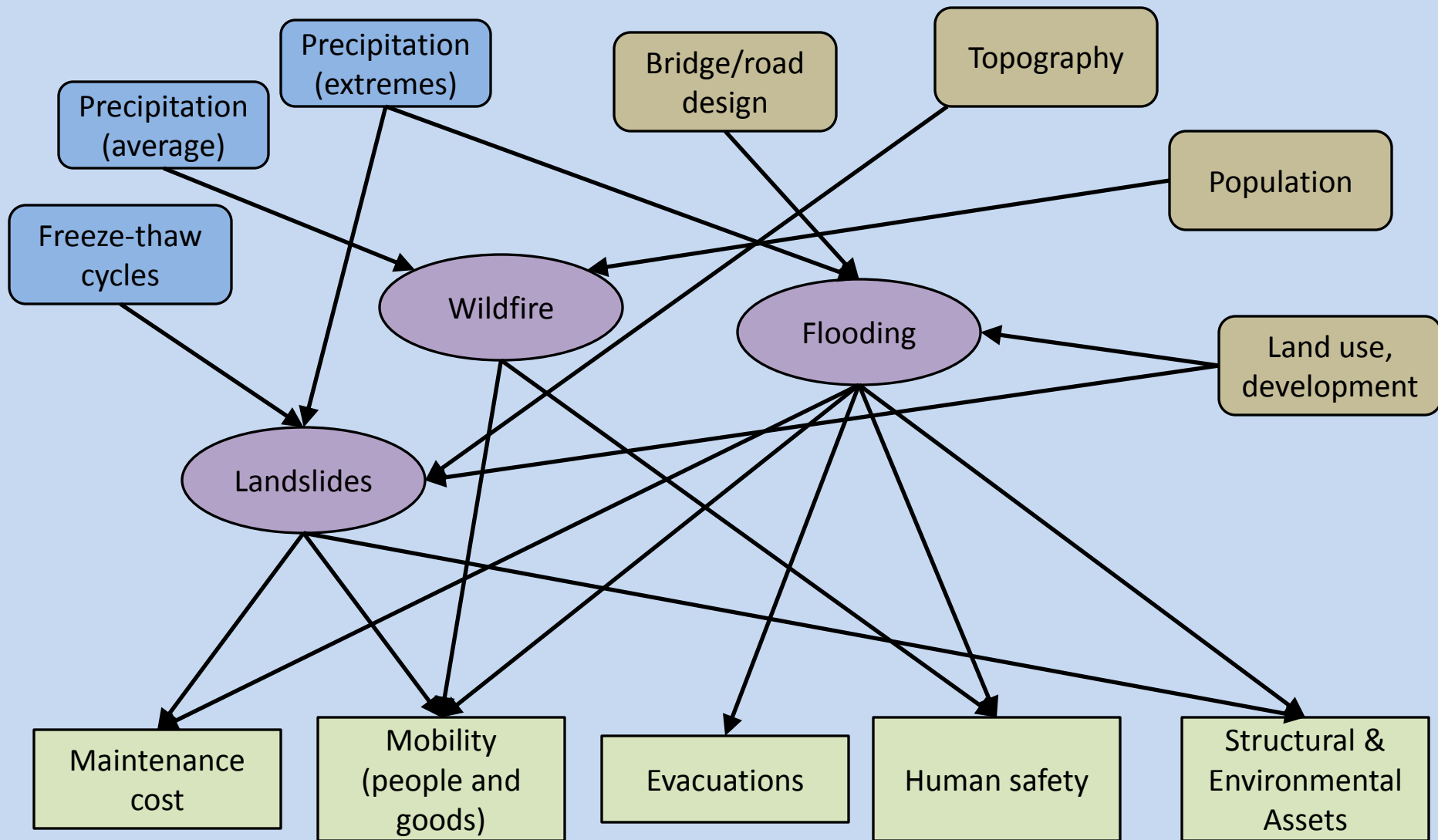- Must engage with decision makers from the beginning

Climate related Drivers

Non – Climate related Drivers

Stressors and Impacts

Sector Specific Resources and Services
VALUES!

MULTI-HAZARD RISK TOOL (BUNCOMBE COUNTY [ASHEVILLE], NC)

- **Purpose of Project**: Tool for Emergency Managers that integrates multiple risks including flooding, wildfire, landslides, winter storms, dam failures, among others

- **Scale**: County

- **Use of Climate Data**: Drought, flooding, precipitation, winter storm occurrence
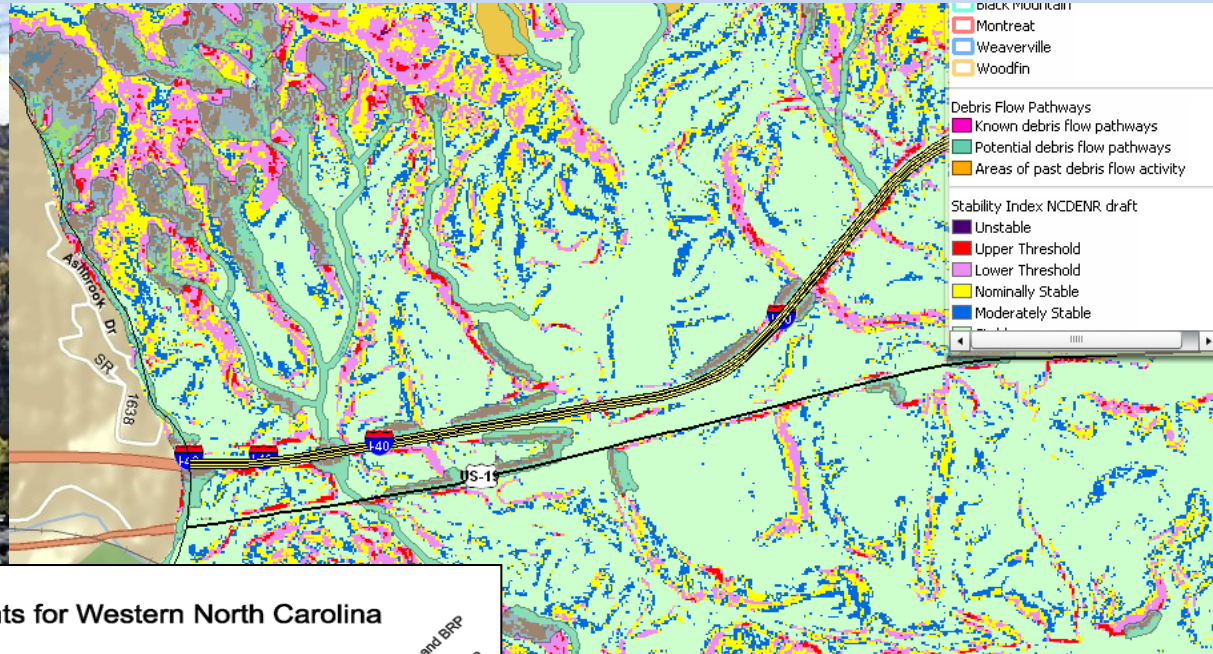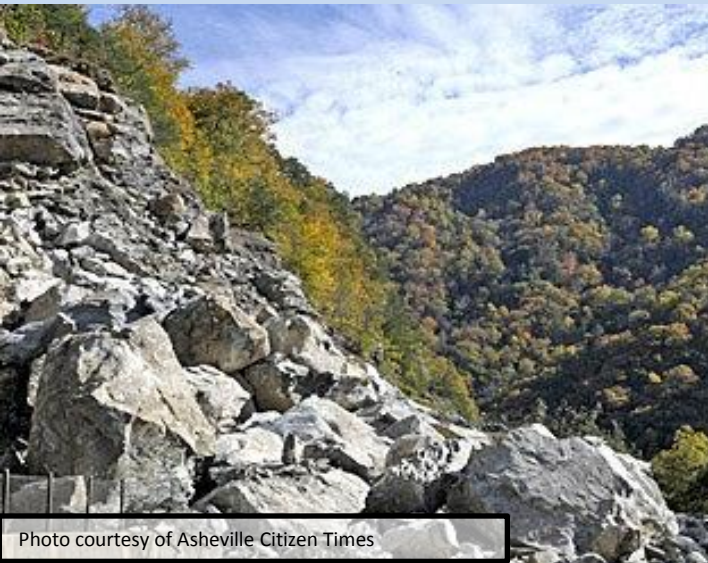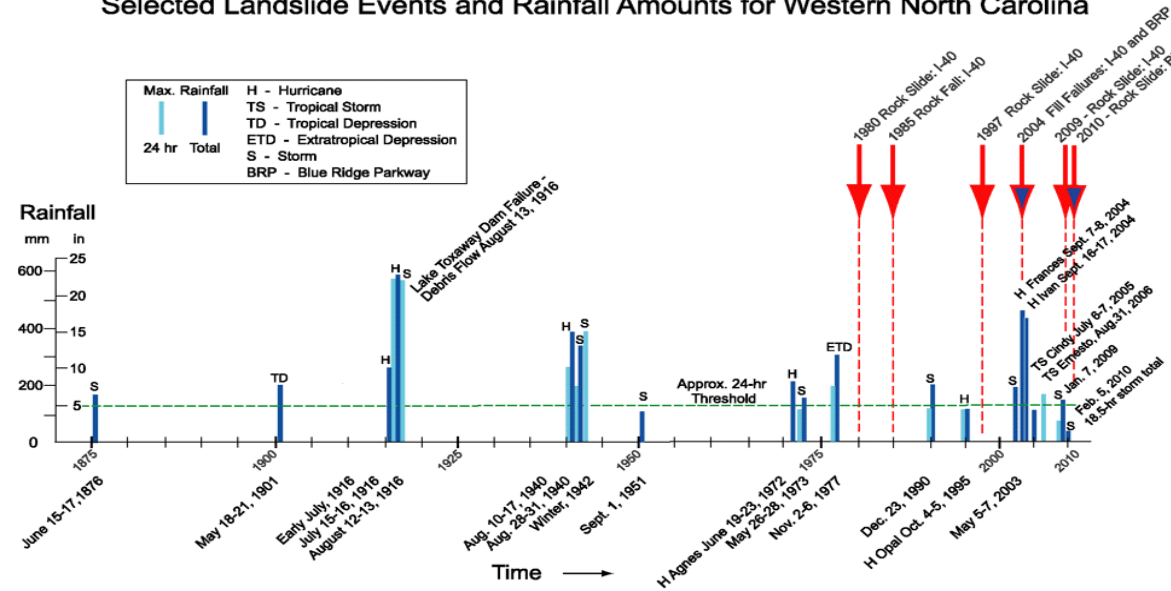
Integrated Geospatial Data Viewer

Conceptual Model

Precipitation (average)

Precipitation (extremes)

Bridge/road design

Topography

Freeze-thaw cycles

Population

Wildfire

Flooding

Land use, development

Landslides

Maintenance cost

Mobility (people and goods)

Evacuations

Human safety

Structural & Environmental Assets

= *individual city and county municipal department*

NCDOT – Landslide Issues

Photo courtesy of Asheville Citizen Times

Black Mountain
Montreat
Weaverville
Woodfin

Debris Flow Pathways
Known debris flow pathways
Potential debris flow pathways
Areas of past debris flow activity

Stability Index NCDENR draft
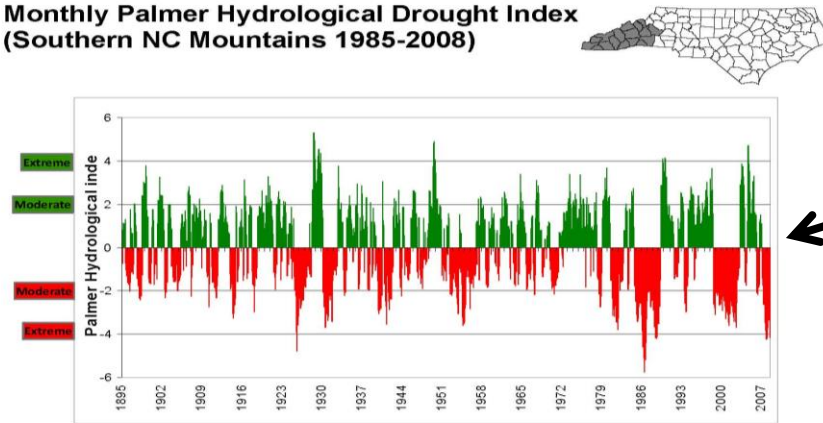Unstable
Upper Threshold
Lower Threshold
Nominally Stable
Moderately Stable

Selected Landslide Events and Rainfall Amounts for Western North Carolina

Water Shortage and Drought Issues

Monthly Palmer Hydrological Drought Index
(Southern NC Mountains 1985-2008)

Source: State Climate Office of NC

The graph above is a long-term drought index indicating impacts to water resources, such as reservoirs and groundwater levels. The index helps to understand the variability (frequency and severity) of precipitation in the region. Positive values in green indicate wet conditions whereas the negative values in red indicate dry conditions. While the index shows much variability since 1985, the two longest dry periods have occured in the last thirty years.
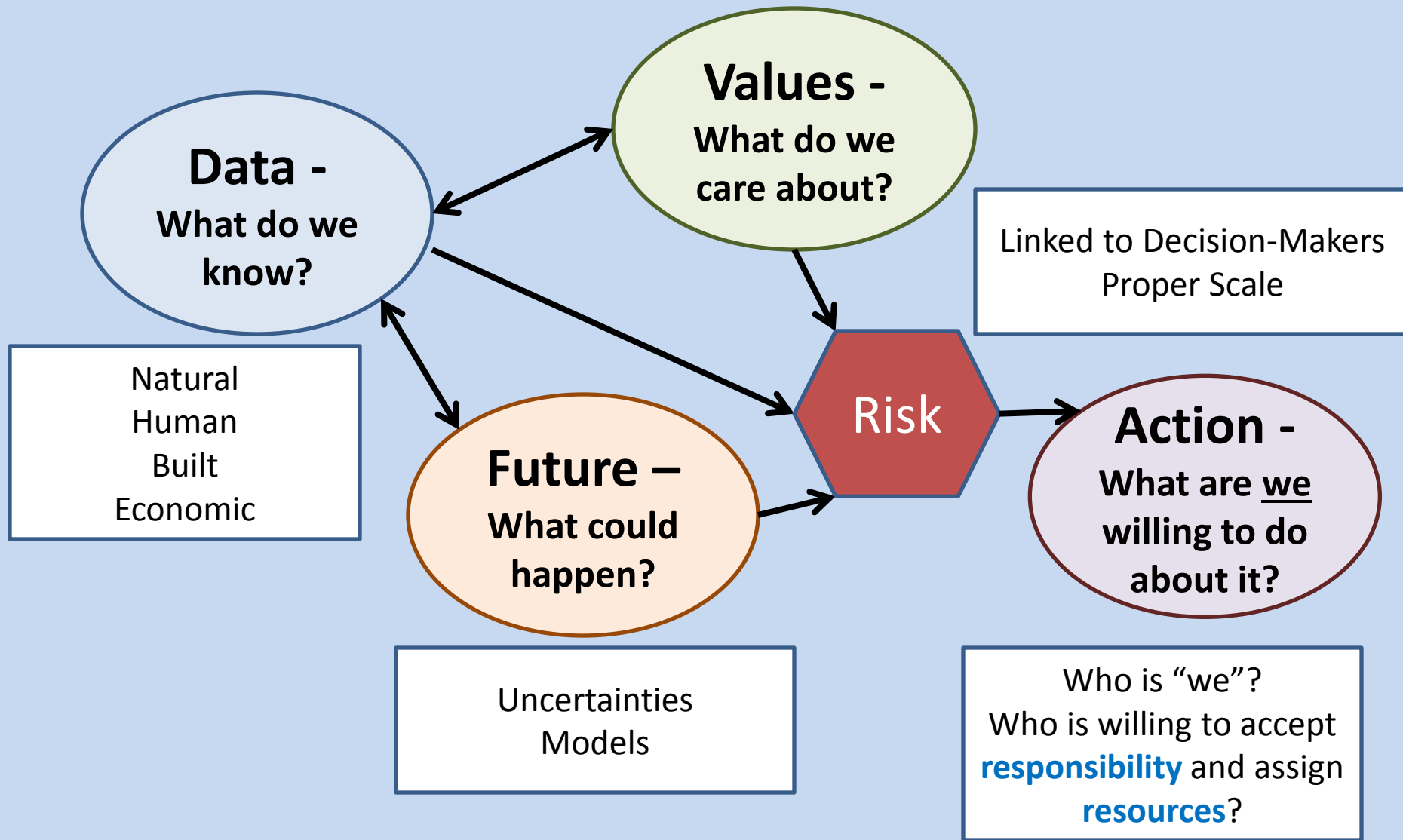

Average Annual Precipitation (1981 - 2010)

- **Vulnerability – water services**

- 2002 drought
  - Impacted 200 municipalities

- 2007 drought
  - Worst on record since 1895
  - 7,200 wildfires
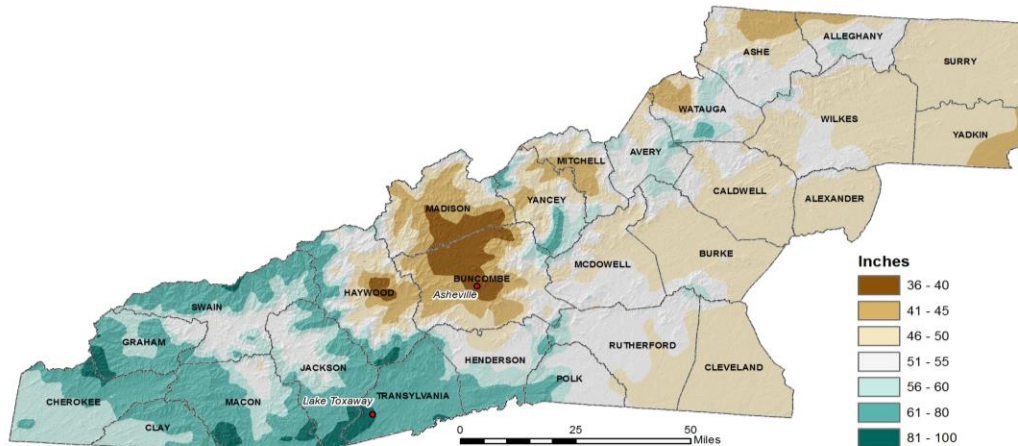
The two droughts led several towns to initiate projects to ensure adequate future water supply

Decision Making Building Blocks

3D MODELING AND VISUALIZATION TOOLS (BROWARD COUNTY - FT. LAUDERDALE, FL)

- **Purpose of study**: Develop 3D-based tools and simulations to enhance effective decision making

- **Scale**: City & County

- **Use of Climate Data**: Flooding, precipitation, sea-level rise, storm surge

Visual Tools – Situational Awareness

FOREST CHANGE ASSESSMENT VIEWER (SOUTHEASTERN UNITED STATES)

- **Purpose of study**: Ingests remotely sensed data to assess forest change and health

- **Scale**: Regional – Southeast

- **Use of Climate Data**: Precipitation, drought, temperature extremes

Website for Visualization and Story Telling

2011 Drought Effects on Forest Vegetation

TX

OK

AR

Primary affected area

AL

GA

SC

LA

Primary affected area

FL

ForWarn 9/29/2011
8 year baseline

9/27/2011
US Drought Monitor
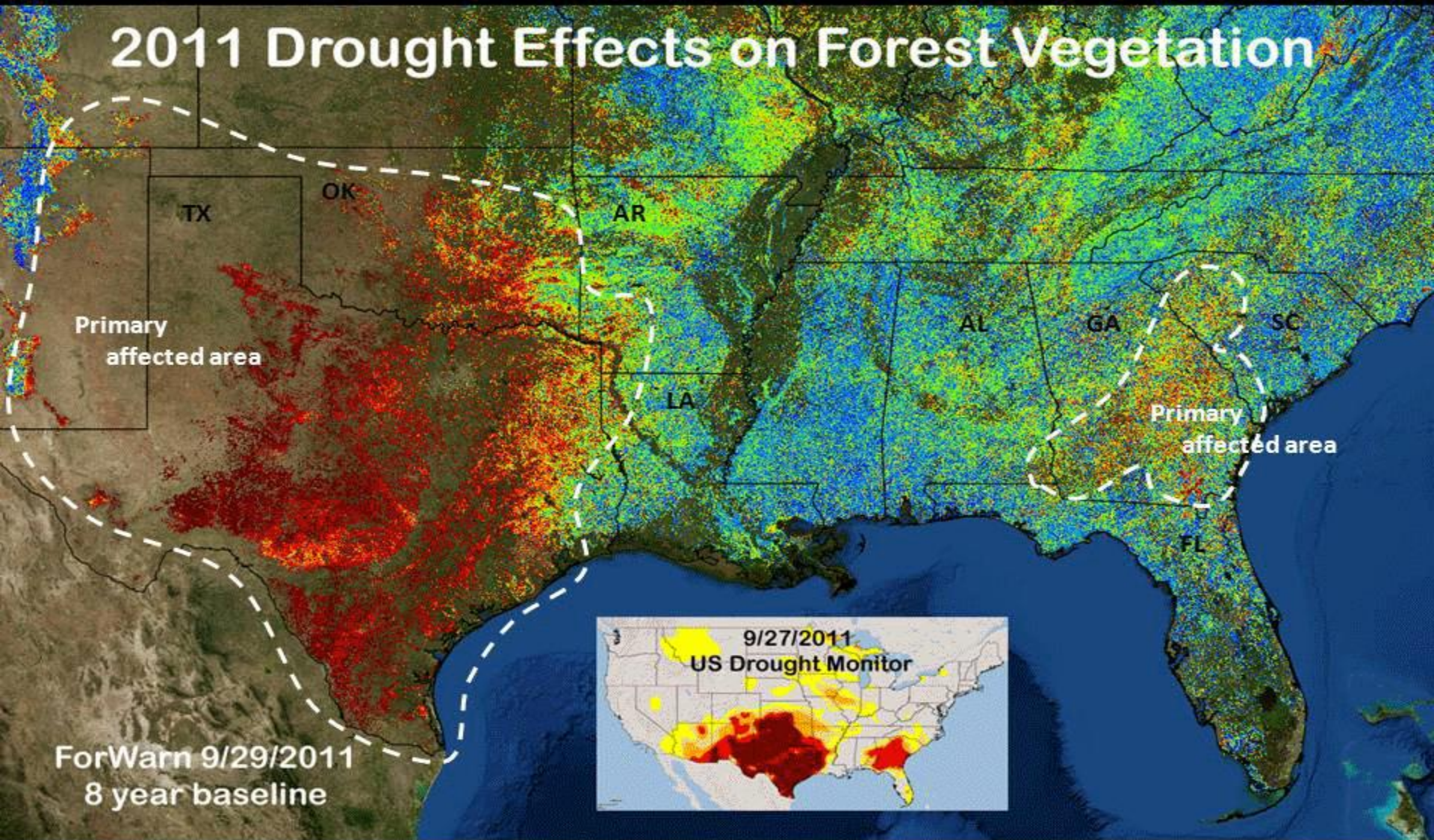
Storytelling on the web to support the GIS Viewer

THREE TIER ARCHITECTURE
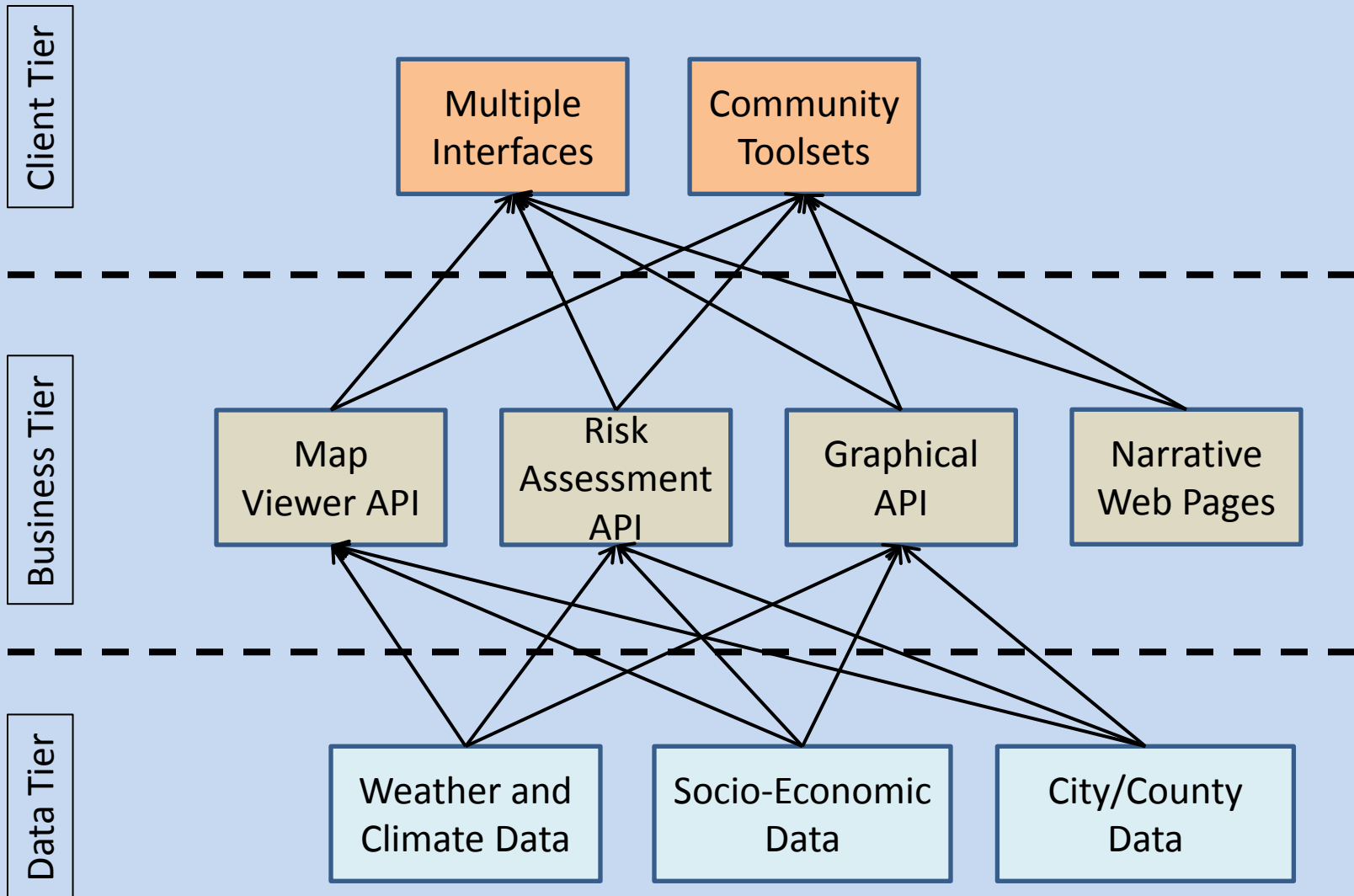
SUMMARY

- **Tools and solutions should be driven by values that are based on climate and non-climate data**
- **Ensure that tools are flexible enough to work across municipal departments**
- **New and innovative solutions – 3D visualization**
- **Work with the end user to design tools that are exactly what they need**
  - Not black boxes that don't meet their needs

QUESTIONS?

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