Webinar: Why Conduct a Climate Change Vulnerability Assessment?

Presented by the
Institute for Tribal Environmental Professionals
&
Desert Research Institute and Ohio Unversity

Thursday July 26, 2018,
11 am MDT

ITEP's Climate Change Webinar Series
2.0 Advanced Topics in Adaptation

Three Bi- Monthly Webinars

July, September, November

Introduce tribal climate adaptation and resilience leaders working in:

- ❖ Policy
- ❖ Climate science and adaptation planning
- ❖ Across a variety of scales and sectors

Participants will gain:

- ❖ Better understanding of why and how to act now to adapt to climate change
- ❖ An appreciation for the role of vulnerability assessments in the adaptation process
- ❖ Increased knowledge of how to enhance local resilience and overcome modern challenges related to climate change

Today's Panelists

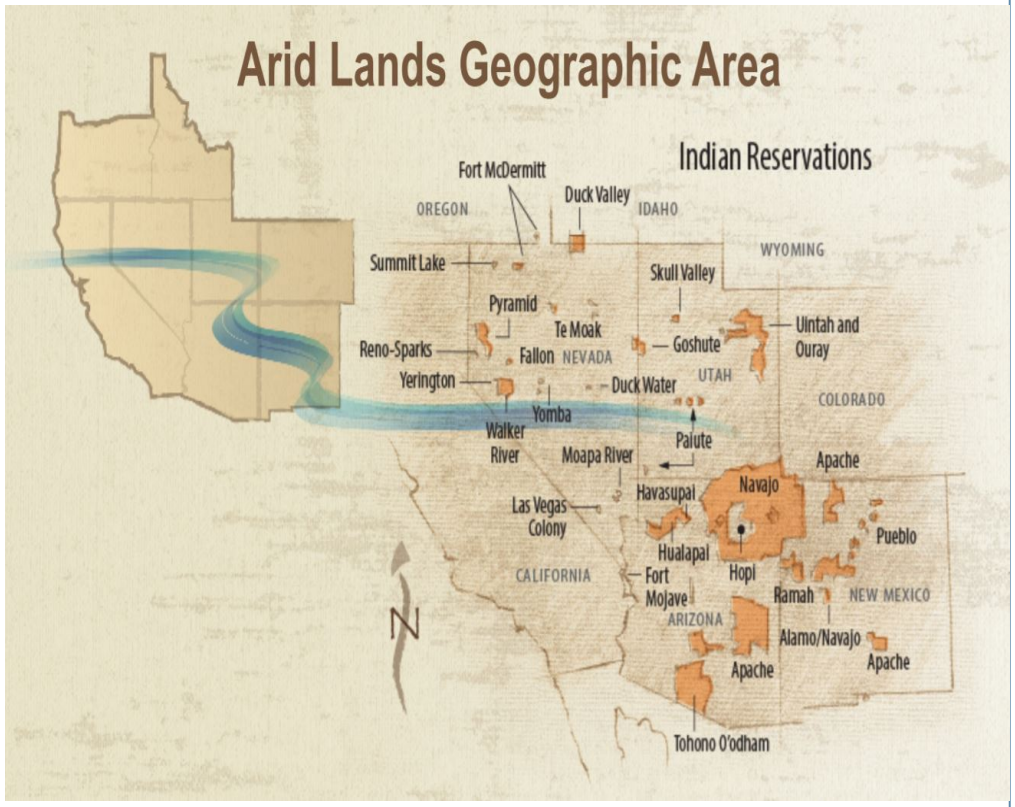
Derek Kauneckis, PhD., Associate Professor, Voinovich School of Leadership and Public Affairs- Ohio University. Research in institutional analysis, public policy, resilience theory and collaborative governance.

Anna Palmer, MSES, Research Faculty, Earth & Ecosystem Science- Desert Research Institute. Conducted the first large scale Vulnerability Assessment to support Native American communities influenced by drought and climate change in Western North America for the Native Waters on Arid Lands project.

Today's information and training session will guide decision-makers through the process of assessing vulnerability

Native Waters on Arid Lands

- Five year (2015-2020) project dedicated to enhancing climate resilience on tribal lands in the American Southwest and Great Basin.
- Tribal Summit- Reno NV
  October 17-18, 2018
  http://nativewaters-aridlands.com/events/



Sponsoring Agencies

Partnering Institutions

Conceptual Framework

- **Definition**- "*Vulnerability:* the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes"

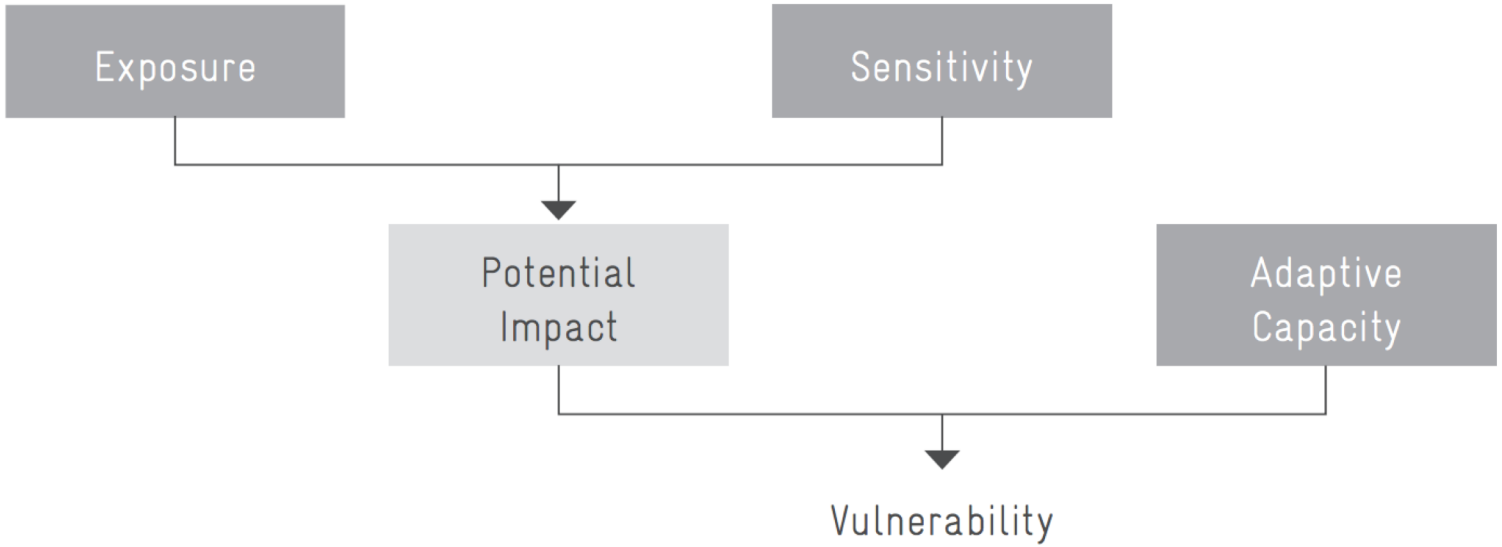
- **Vulnerability** = Exposure + Sensitivity - Adaptive Capacity

ipcc
INTERGOVERNMENTAL PANEL ON climate change
WMO UNEP

U.S. National Climate Assessment

What are vulnerability assessments?

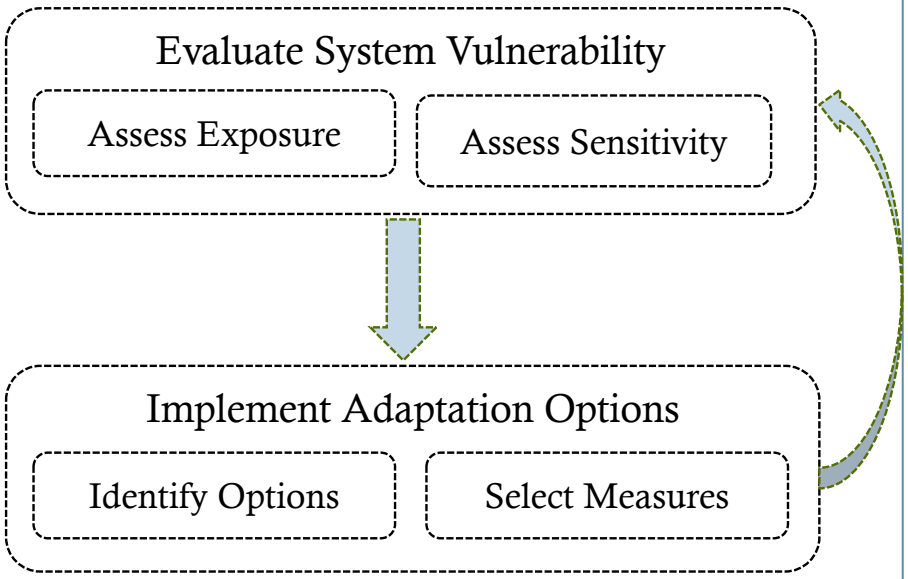
- A tool for synthesizing information on biophysical conditions, community assets, social characteristics and other locally important factors
- A framework and iterative process for examining vulnerabilities and evaluating potential interventions
- Fundamental support for other planning efforts.



Why measure vulnerability?

Vulnerability commonly is measured to-

1. Understand the magnitude of threats imposed by climate change;
2. Inform decision-making on aid and investment;
3. Prioritize aid for climate adaptation;
4. Identify measures that effectively reduce vulnerability;



Exposure

The nature and degree of climate stress upon a particular unit of analysis

- long-term climate conditions
- climate variability
- magnitude and frequency of extreme events

Image Sources- Indian Country Today Media Network 2017, 2013

Sensitivity

The degree to which a system is affected, either adversely or beneficially, by climate related stimuli.

High Sensitivity Source- California Water Blog

Colorado River Indian Tribe Farms Source- AZ Water.gov

Adaptive Capacity

The ability of a system to adjust to climate change to moderate potential damages, to take advantage of opportunities or to cope with the consequences.

Tribal communities are extraordinarily adaptive

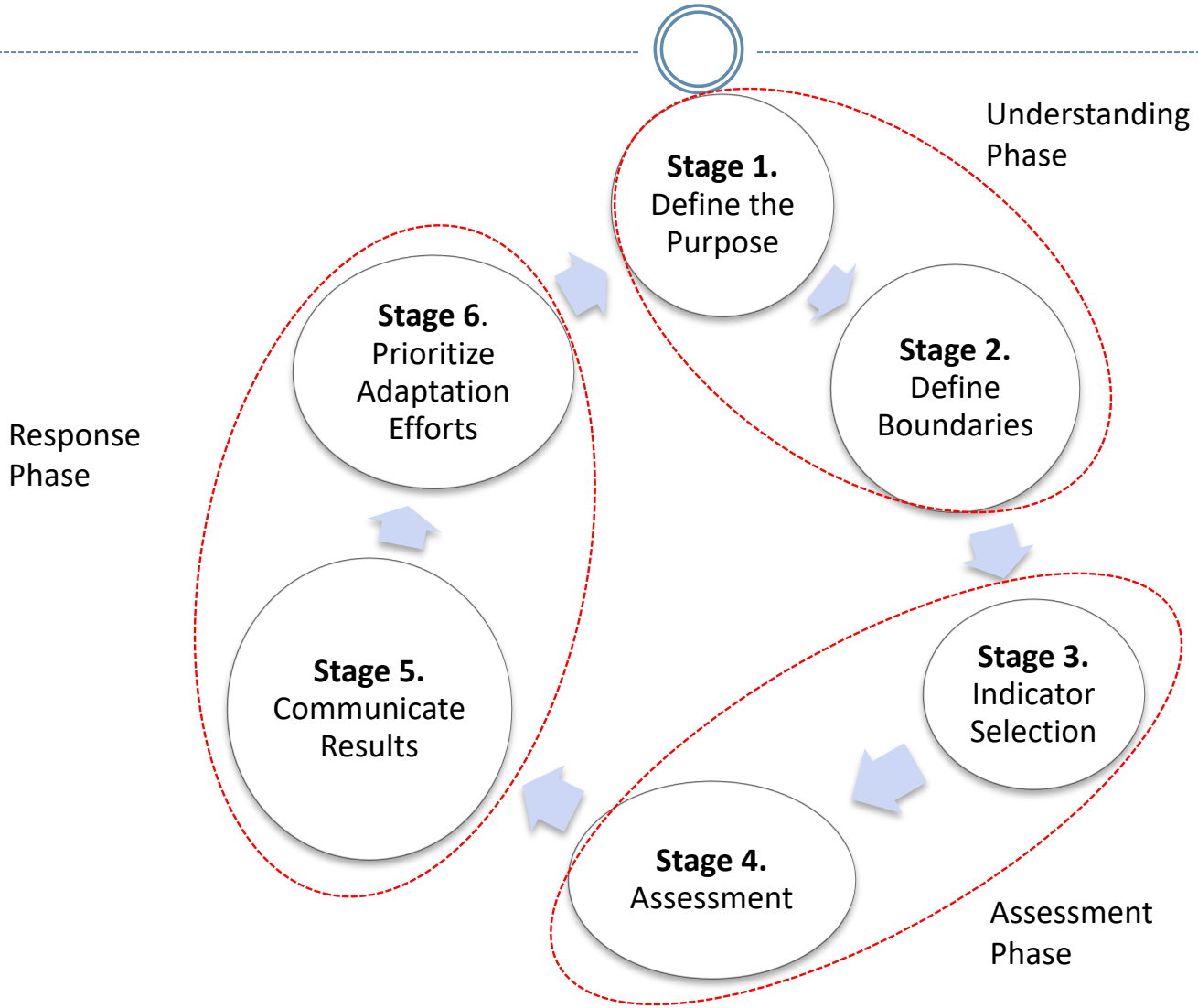
Low Adaptive Capacity

Source- Hualapai 2003

High Adaptive Capacity

Source-Whitescarver Natural Resources Department 2014

Making the concept of vulnerability tangible



Stage 1. Define the Purpose

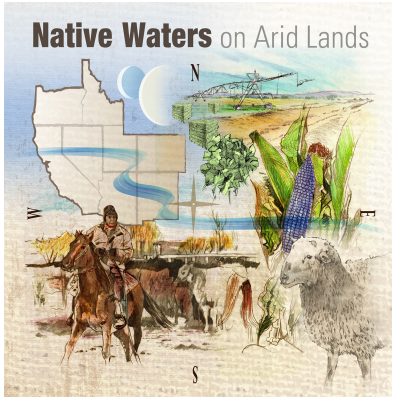
Steps – Formulate **questions** to be answered by the assessment

- What do we want to know and why?

- Six broad categories of purpose -
  1. Identify targets for reducing risk
  2. Distinguish particularly vulnerable people, regions or sectors
  3. Raise awareness of climate change
  4. Prioritize adaptation funds
  5. Monitor adaptation interventions
  6. Prioritize research in a culturally relevant manner

Stage 1. Define the Purpose

Steps – Formulate **questions** to be answered by the assessment



For Example the purpose of our research was to understand vulnerabilities to climate change across tribal nations in the American west and how resilience can be strengthened.

Stage 2. Set Boundaries

Step 1. Set the Boundary

Step 2. Define General Approach

1. Set the Boundary
   - Define the system of interest and geographic scope. Can be done at the sovereign national, regional or sectoral level.

2. Define General Approach
   - (Top-Down vs. Bottoms up)

- Also consider the availability of data, financial and human resources during this stage.

Stage 2. Set Boundaries

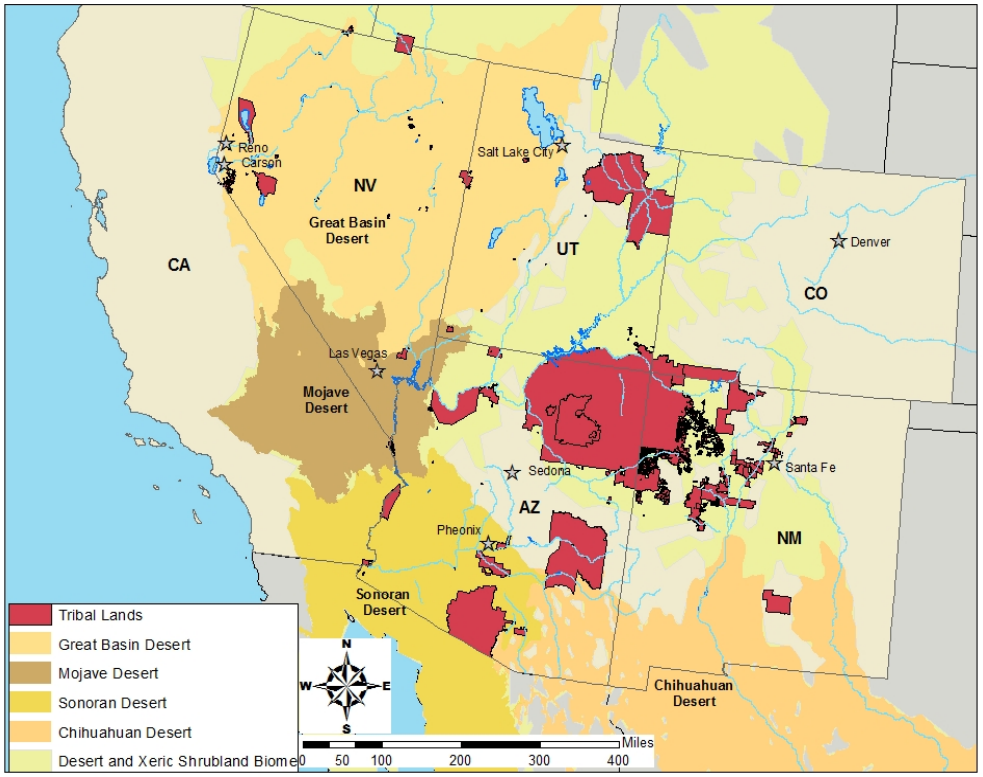
Step 1. Set the Boundary

Step 2. Define General Approach

Boundary-
72 tribal entities
representing 64 tribes
nations pueblos, bands &
colonies
in 25 climate divisions.

Top-Down approach

Tribal Study Area Located in a Semi-Arid Climate



Data Source: Deserts- the World Wildlife Fund (WWF) Terrestrial Ecoregion
Tribes, Cities, States- US Census
Rivers,Lakes- USGS National Hydrography

Map prepared by: Anna Palmer
Coordinate System: NAD 1983 2011 Contiguous USA Albers

Stage 3. Indicator Selection

Step 1. Identify Indicators for E, S and AC

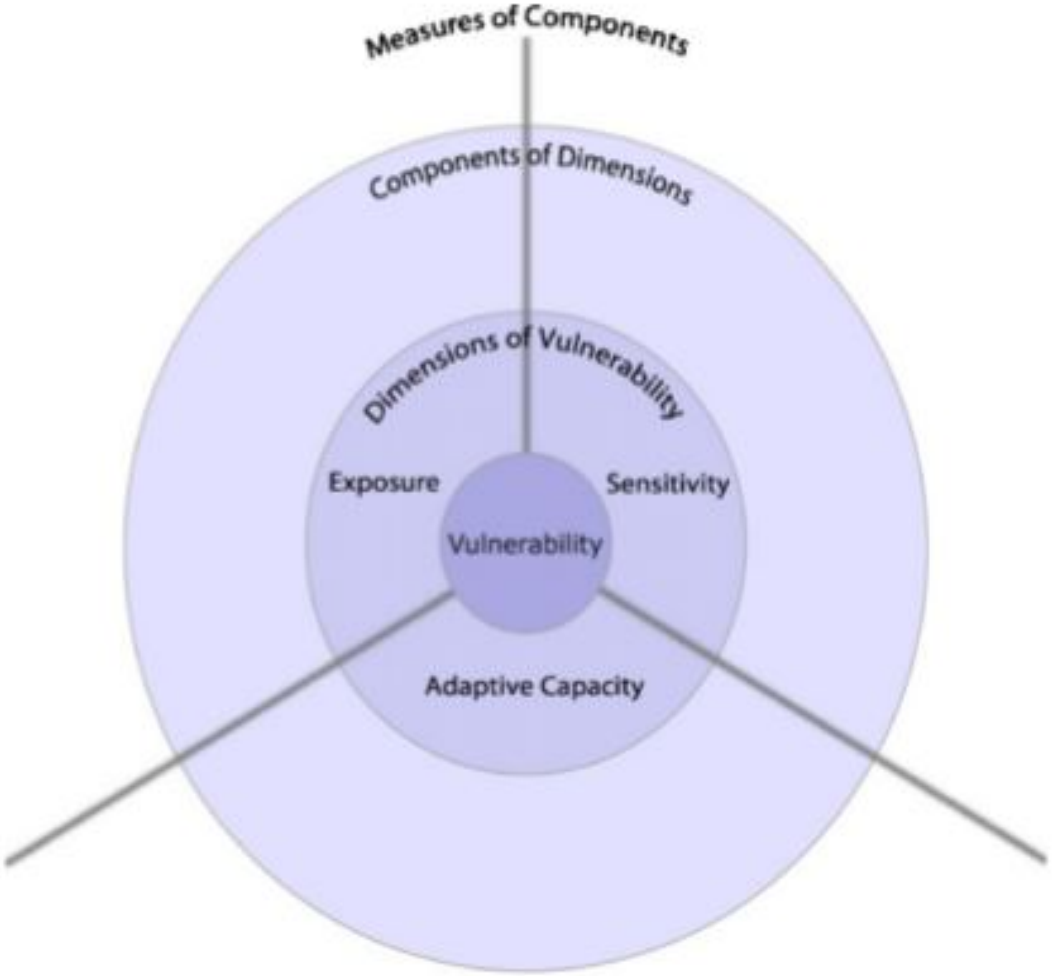
Step 2. Determine functional relationship to Vulnerability

Step 3. Collect Data

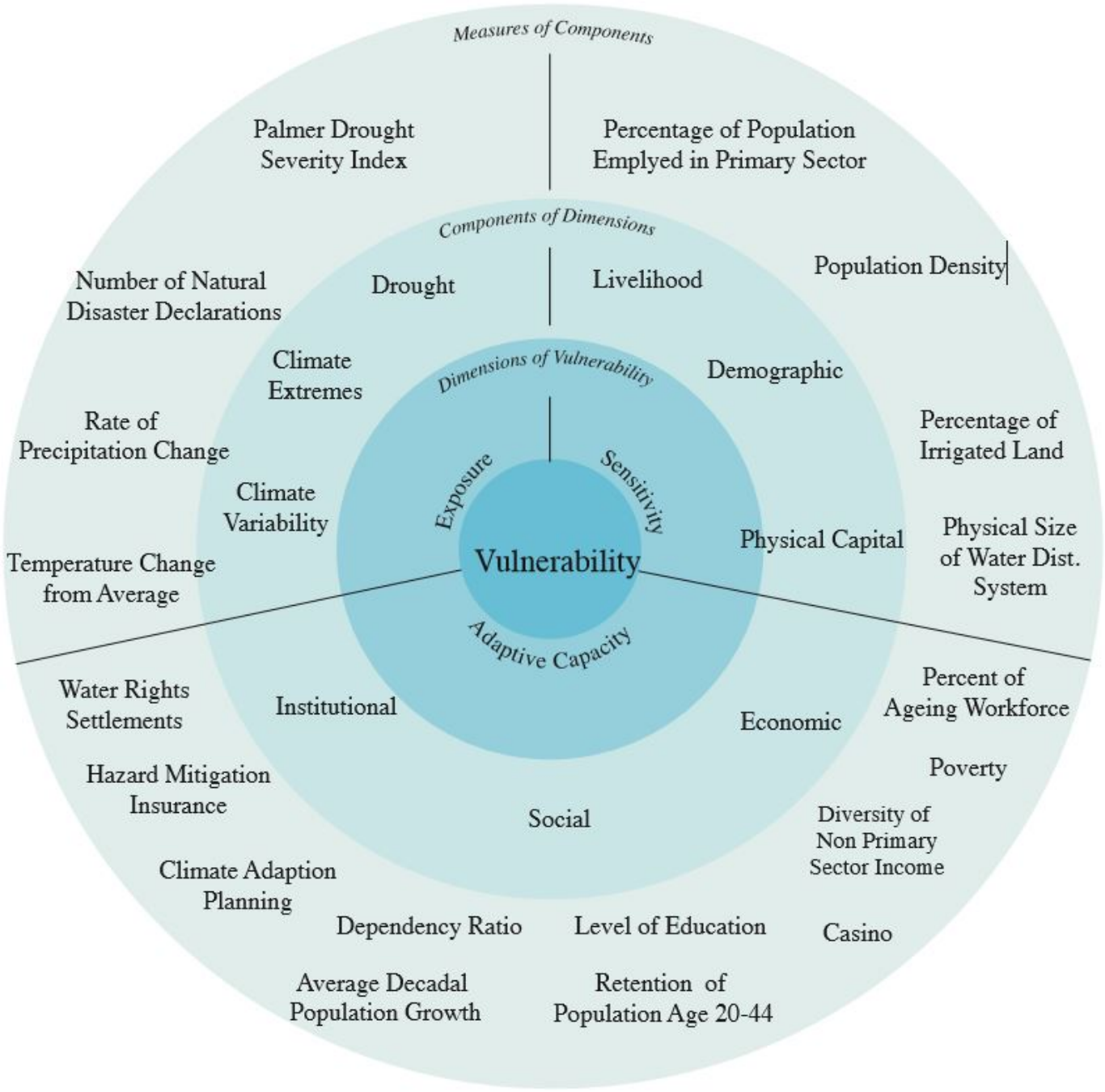
Questions to ask

- What are the known climate stressors to your systems?
- How exposed is the system you care about to the impacts of climate change?
- How is your natural or built resource sensitive to present day climate variability?
- How do these climate conditions affect the systems you have identified?
- What is the projected change in the climate conditions you have identified (and by what time period)?
- Are the systems associated with this planning area already able to accommodate changes in climate?
- Alternatively what are the barriers to adaptation?

Vulnerability Scoping Diagram



Polsky, Neff, Yarnel (2004)


Measures of Components
Palmer Drought Severity Index
Percentage of Population Emplyed in Primary Sector
Components of Dimensions
Number of Natural Disaster Declarations
Drought
Livelihood
Population Density
Climate Extremes
Dimensions of Vulnerability
Demographic
Rate of Precipitation Change
Percentage of Irrigated Land
Exposure
Sensitivity
Climate Variability
Physical Capital
Physical Size of Water Dist. System
Temperature Change from Average
Vulnerability
Adaptive Capacity
Water Rights Settlements
Institutional
Economic
Percent of Ageing Workforce
Hazard Mitigation Insurance
Poverty
Social
Diversity of Non Primary Sector Income
Climate Adaption Planning
Dependency Ratio
Level of Education
Casino
Average Decadal Population Growth
Retention of Population Age 20-44

Important Take Away's- Purpose of VA's

VA's are a tool that can help communities to….

- Take a fundamental first step in adaptation
  - Begins a dialogue
- Prioritizes data collection
  - Provides useful information
- Identify pro-active solutions
  - Take seemingly insurmountable problems and make them manageable

Helpful Resources

Factsheets will be made available online

What is a Climate Change Vulnerability Assessment?

Why should we care about climate change?

Climate change is not a distant problem. It is an immediate regional and local phenomenon that must be taken into account by local governments, cities, states and nations around the world. This fact sheet describes a useful tool that can be used by decisionmakers to meet the emerging climate challenges.

What is Vulnerability?

Vulnerability has emerged in recent years as a central organizing concept for facilitating a structured process to identify and assess relative risks.

Vulnerability is defined as the "degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes"(IPCC, 2001).

Vulnerability (V) is measured as function of Exposure (E), Sensitivity (S), and Adaptive Capacity (AC)

$$V = f(E, S, AC)$$

Vulnerable systems are usually both sensitive to climate and are less able to adapt.

What is a Vulnerability Assessment?

Vulnerability assessments (VA)'s are an approach for synthesizing information on biophysical conditions, infrastructure, economics, social characteristics and other locally important factors. They provide a framework and iterative process for examining vulnerabilities and evaluating potential intervention

Who Uses Them?

To prepare for the risks imposed by climate change VA's are used in a variety of sectors including – disaster management, public health, poverty, food security, ecology and climate change research. Practitioners include land, water utility, and natural resource managers, local authorities, planners, policymakers, academics, scientists, as well as agricultural producers.

Vulnerability Assessments are useful for?

- ***Identifying and prioritizing threats*** - that are regional; and assessing local vulnerability across different sectors.
- ***Guiding decision-making*** - for prioritizing specific mitigation strategies that reduce vulnerability.
- ***Advancing your own discourse*** - and dialog about adaptation and resilience using language and indicators that reflect local concerns.
- ***Identifying and strategizing funding*** - for the accompanying range of adaptation measure that need to be taken.

General Steps-

Step 1 **DEFINE** the concepts and criteria for VA together with stakeholders. Hypothesize who is vulnerable to what- identify biophysical drivers, sectors, and the spatial and temporal scale.

Step 2 **COLLATE** the required Information for indicators representing E, S, and AC.

Step 3 **INTERGRATE** Operationalize model with normalization and aggregation of indicators

Step 4 **ASSESS** Visualize results with chloropleth maps or radar charts. Results can be both socially and spatially referenced which is useful for understanding outcomes as vulnerability is associated with social and environmental phenomena, which often have locational components.

Step 5 **COMMUNICATE** use the outputs of assessment to explore and communicate adaptation options.

Conclusion – Take Away Points

1. VA's are used for informing the decision-making of specific stakeholders about adapting options
2. Completion of a VA provides a diagnosis. With this information decision-makers are better equipped to identify threats, communicate challenges and respond to emerging concerns pro-actively.
3. **NEXT STEPS-** Attend our next two webinars with ITEP, or contact Anna (apalmer@dri.edu) or Derek (kaunecki@ohio.edu) for more information.

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For more information please visit www.nativewaters-aridlands.com

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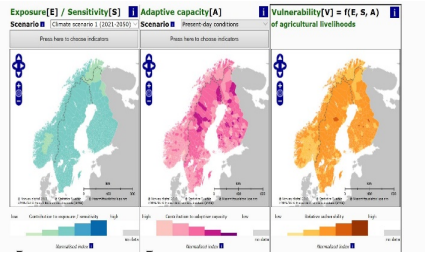
More Helpful Resources

Explore Regional Climate Threats - National Climatic Assessment
- https://nca2014.globalchange.gov/report#section-1948

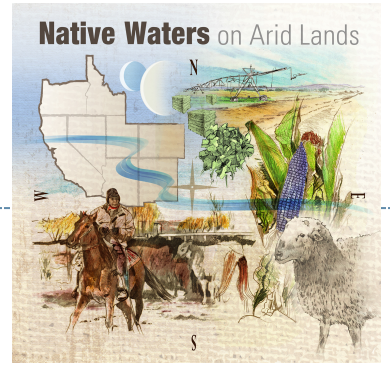
IPCC Summary for Policy Makers - http://ar5-syr.ipcc.ch/topic_summary.php
VA Framework - http://www.ipcc.ch/ipccreports/tar/wg2/index.php?idp=650

Forest Service Resources and National Climate Change VA Story Map!
- https://www.fs.fed.us/managing-land/sc/vulnerability-assessments
- https://usfs.maps.arcgis.com/apps/MapJournal/index.html?appid=4d52ad331fe4442a875709856048033c



Data visualization - Vulnerability Map with Indicators
- http://www.iav-mapping.net/CARAVAN/CARAVAN.html

Additional Tribal Resources
- http://nativewaters-aridlands.com/resources/adaptation/
- https://tribalclimate.uoregon.edu/publications/



THANK YOU!

A recording of this webinar and the slide presentation will be available soon at
http://www7.nau.edu/itep/main/tcc/Training/Webinars_2018

Discussion/Q&A