Risks, Decisions, and Extreme Events: From Droughts to Flash Floods

Heather Lazrus

National Center for Atmospheric Research

US THORPEX, College Park MD

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Outline

- Social science for risk communication and decision making
- Why interdisciplinary science?
- Case study: Drought predictions and decisions
- Case study: Flash flood communication
Risks, Decisions, and Extreme Events

Applying research results to provide better information in better ways to *enhance people’s decision-making* and *reduce their risk* to life, property, and harm.
Types of decision makers

- Policy
  - International, Federal, State, Regional, Local
- Private sector
- Individual
  - Your family, neighbors, hikers etc.

Types of decisions

- Risk management
- Adaptation
- Other factors
Interdisciplinary research

- Important research ideas often transcend the scope of a single discipline
- Brings together diverse disciplinary perspectives, theories, and methods
- Teams work closely to understand each others’ language, process, and goals
Interdisciplinary work integrates the social sciences

- The study and understanding of **human cognition, culture & behavior**

- Social scientists follow the scientific method
  - Theories, hypotheses, research questions,
  - Data collection instruments, sampling, error
  - Reliability (are we consistent?) validity (are we measuring what we think we’re measuring?)
Case study: Water Decisions for Sustainability of the Arbuckle-Simpson Aquifer

Research Question: How do stakeholders perceive drought risks across weather and climate scales given

1) diverse cultural beliefs,
2) valued ecosystem services,
3) past drought experience, and
4) uncertainties in climate projections?

Funded by the NOAA Climate Program Office
Stakeholder interviews
Risk, memory and expectations (n=40)

- Decision makers and managers (i.e., Oklahoma Water Resources Board, Cities of Ada, Sulphur, and Tishmingo)
- Community leaders
- Industry association members (i.e., ranching, farming, mining)
- Engaged citizens (i.e., Citizens for the Protection of the Arbuckle-Simpson Aquifer (CPASA))
- Chickasaw Nation
Cultural Theory of Risk Perception

- How people identify and understand risks motivates their decisions; e.g.,
  - Driving through flooded areas
  - Conflict over resource management

- Egalitarianism index:
  - The world would be a more peaceful place if its wealth were divided more equally among nations.
  - In my ideal society, all basic needs (food, housing, health care, education) would be guaranteed by the government for everyone.
  - I support government programs to get rid of poverty.
  - Discrimination against minorities is still a very serious problem in our society.

- Individualism index:
  - If the government spent less time trying to fix everyone's problems, we'd all be a lot better off.
  - Our government tries to do too many things for too many people. We should just let people take care of themselves.
  - The government interferes too much in our everyday lives.
  - Government regulation of business usually does more harm than good.
  - People should be allowed to make as much money as they can, even if it means some make millions while others live in poverty.

Interview Questions: Meteorological memories

10. [EXPERIENCE] Have you experienced drought(s) in the past? [YES/NO]
   a. *If yes, WHEN was the worst drought?*
   b. *WHY was it bad?* [OPEN ENDED. PROMPT: impacts, severity, drought duration, drought frequency]
   c. *Other droughts? WHEN? Why were they bad?* [OPEN ENDED. PROMPT: impacts, severity, drought duration, drought frequency]
NRCM’s Performance & Projection over south-central Oklahoma
11. [EXPECTATIONS] Do you expect dry periods to increase or decrease in the future? [INCREASE/DECREASE]
   a. Why is that your expectation? [OPEN ENDED]
   b. Will it be drier/less dry in summer or winter or both? [OPEN ENDED]

12. [EXPECTATIONS] Do you agree or disagree that in the future water supplies in this area ...
   a. Will be adequate for human and environmental needs even if we don’t enforce limits on current water use
      i. Please explain [OPEN ENDED]
      ii. Please evaluate:
Water decisions for sustainability

- Ranching in south-central Oklahoma
  - Planning for next year – can seasonal predictions help manage resources?

- Water management in south-central Oklahoma
  - Adaptive management – seasonal predictions can help allocation decisions such as more water used in wet years and less in dry years?
  - Long term planning for infrastructure development – decadal predictions?
Case study: Warning Decisions in Extreme Weather Events – Flash floods

- **Research Questions:** What are the key differences between experts’ and laypeople’s conceptualizations of flash flood risk and their understandings of risk messages?
- Mental model interviews and survey
- Designed to improve risk messages
- Initial findings in Boulder, CO:
  - Late summer flash flood potential
  - Time available for response
  - Need to take protective action immediately
Conclusions

- **Forecasting and prediction** – meaningful time and space scales to inform decision making
  - i.e., 1 year, 1 decade in Oklahoma case study

- **Communication** – relevant information about risks to enhance decision making
  - i.e., people not aware of summer flash flood potential in Boulder case study

Thank you!

Hlazrus@ucar.edu