Local Resilience of Community Water Systems and Severe Weather Patterns

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Roadmap of Discussion

- Abstract
- Acknowledgements
- Outline
- Methodology
- Results
- Summary

Abstract

Natural disasters and changing patterns of severe weather events are presenting mounting challenges for communities who need to define and agree upon a resilience plan.

To respond to this need, an on-line decision support system tool for deliberative risk ranking was tested on the Community Water Systems of two coastal communities in the US. This tool, by breaking down the risk ranking process into phases, reconciles local experiences with recorded hazard scenarios.

Water system risks defined and prioritized qualitatively in a first phase, are recursively compared to the effects that past local hazards had on the local community. The process enables communities to prepare for climatologically induced changes and to prioritize the actions they can take locally to protect valuable systems and resources.

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  - Chunn-kit Ngan, Penn State
  - Antonio De Nicola, ENEA –Italy
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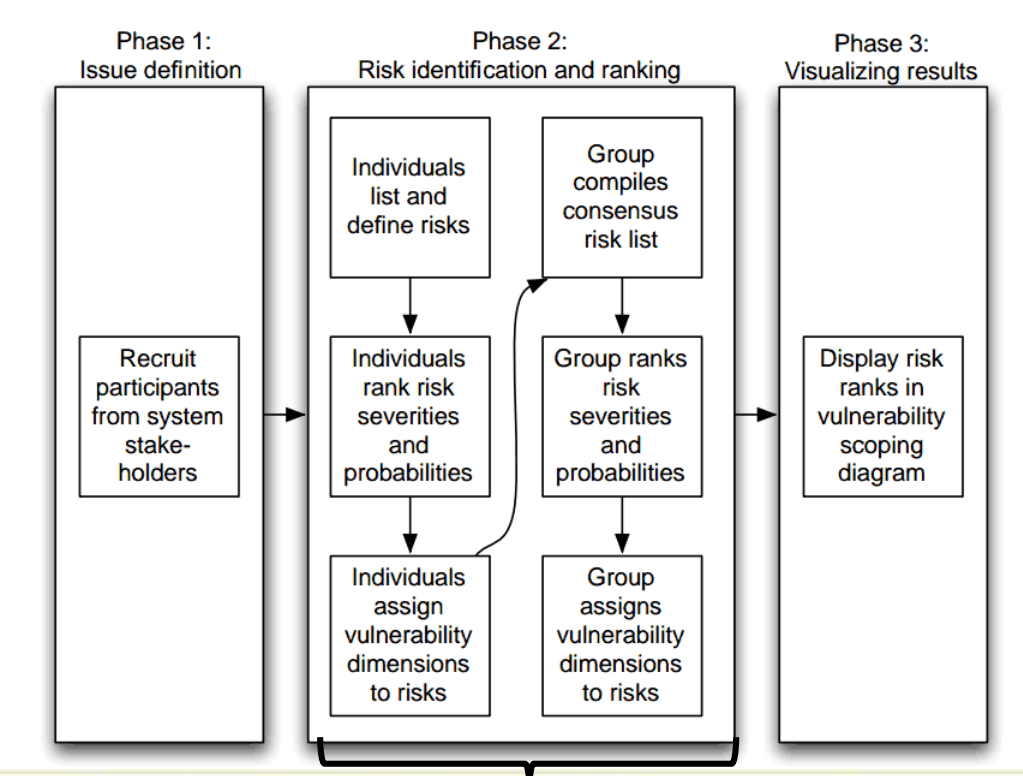
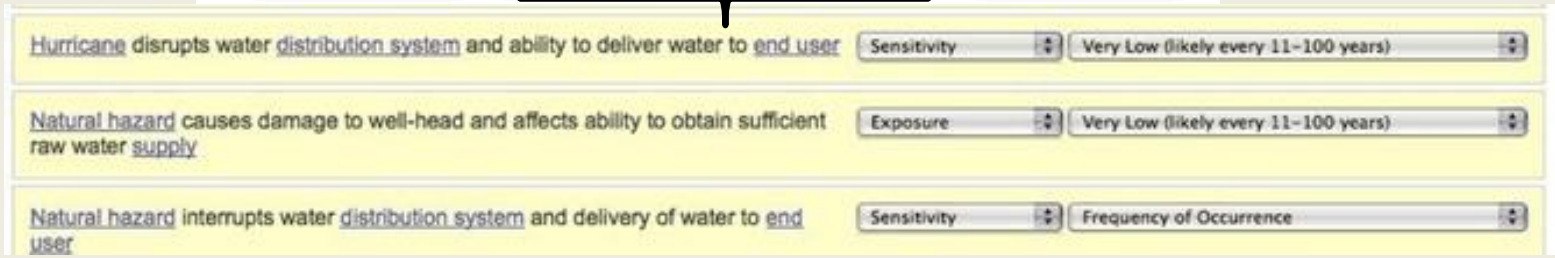
  - NOAA ‘s Climate Program Office
  - SM Resources
  - Syneren Technologies Corp

Outline

- Focus Group Methodology
- Vulnerability Assessment Experiment
- Process Model Quality Parameters (complete, transferrable, verifiable)
- CWS Risks in Relation to Weather and Climate
- Vulnerability Assessment Collaborative Environment: Key features of fact based decision making

Focus Group Methodology





Focus Group Output

Risks are prioritized according to:

- Probability
- Severity

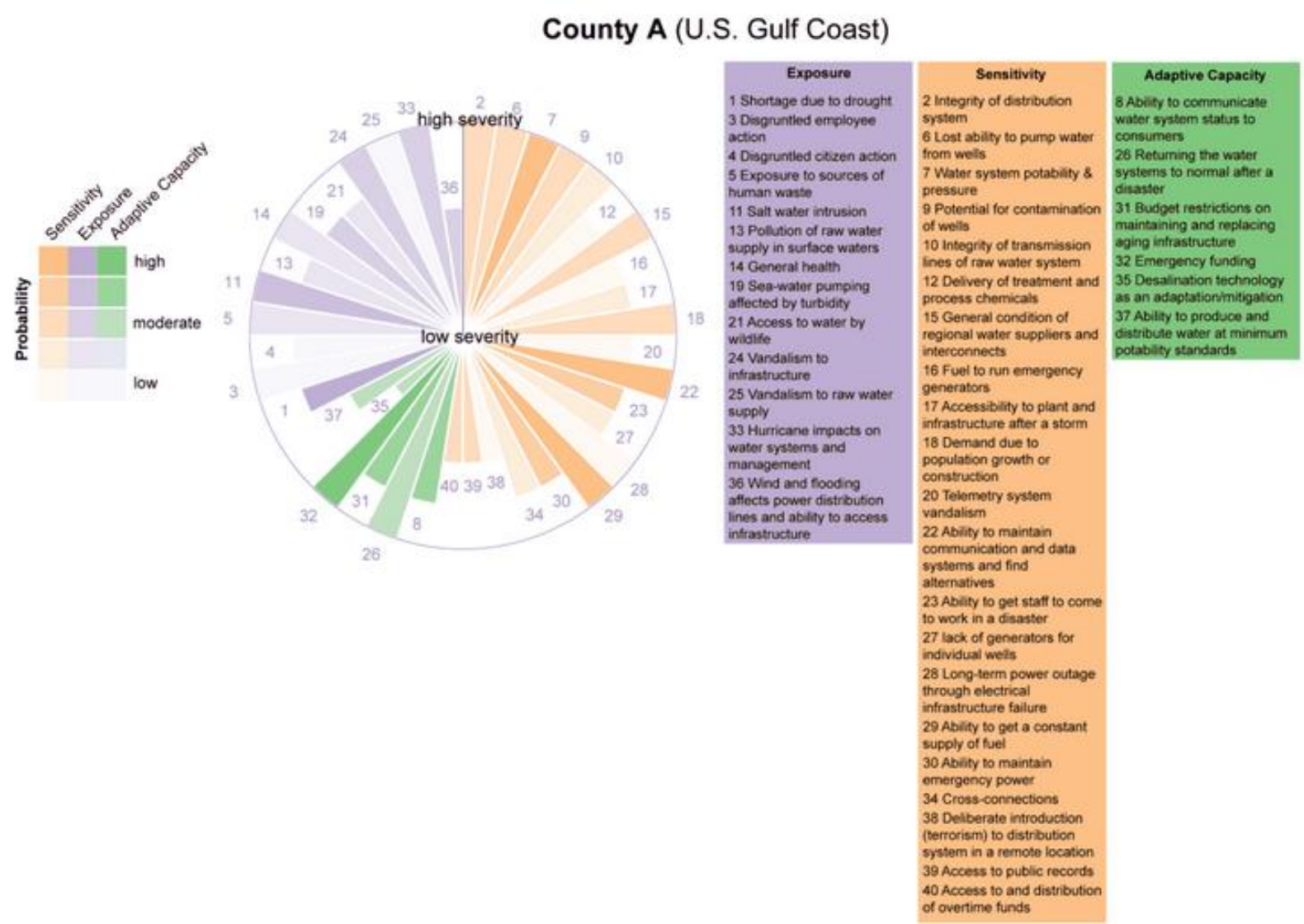
Probability and Severity provide transferrable information on local experiences.

Risks are categorized by vulnerability dimensions

- Exposure
- Sensitivity
- Adaptive Capacity

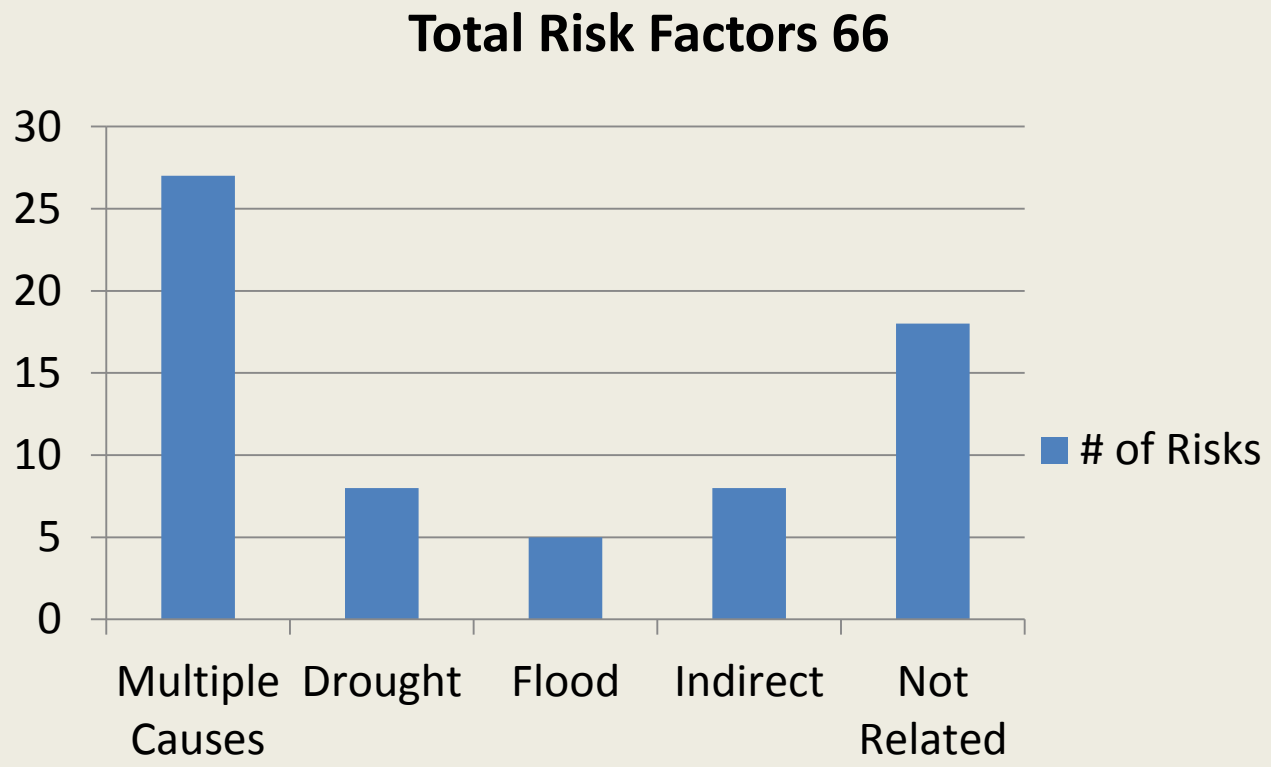
Vulnerability dimensions facilitate the compilation of a complete list of risks by the focus group and describe how risks are perceived.

Scoping Diagram (P-VSD)

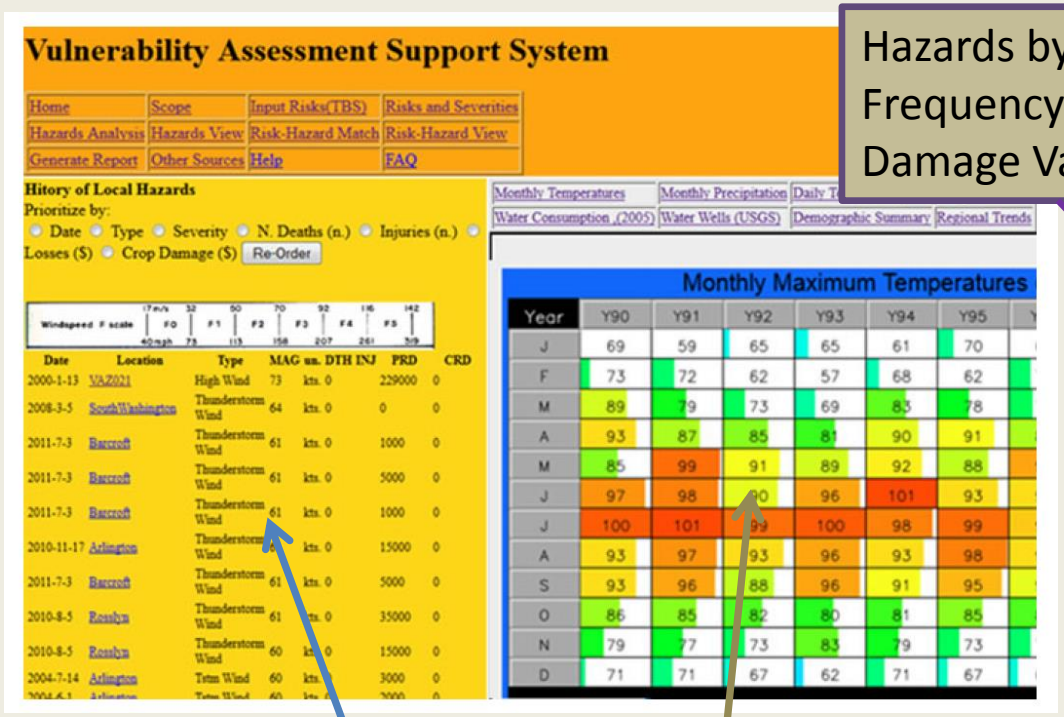


Risks in Relation to Severe Weather

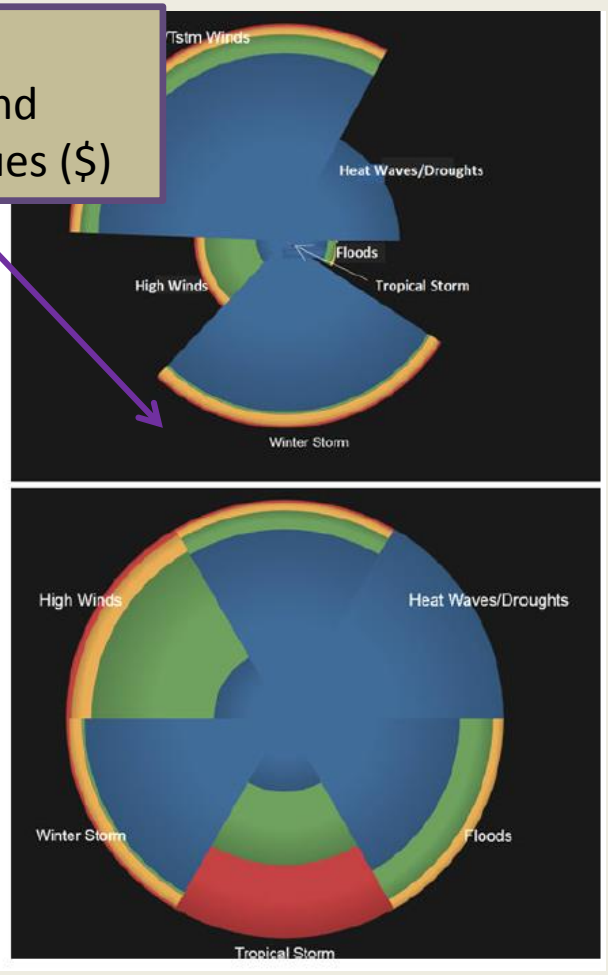
Weather accounts for 2/3 of the vulnerabilities to community water systems



Data Output Visualization



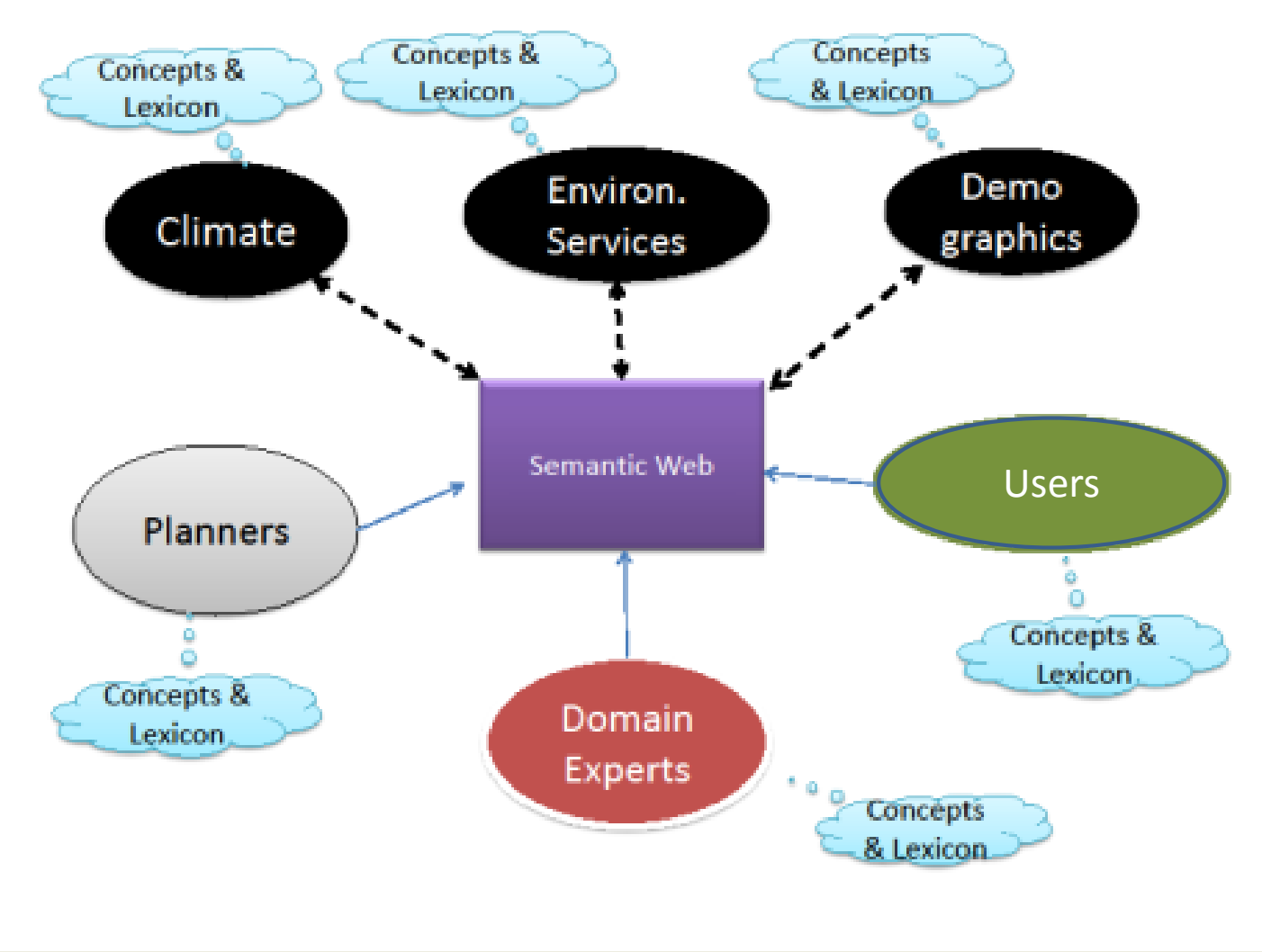
Hazards by Frequency and Damage Values ($)



Dates, Events, Severity, Damages

Local Station Historical Records (temp, Precipitation)

Semantic Web Service



Fact Finding for Planning

Example of Risk Scenario: flood water enters drink water system

Vulnerability Type	Definition and Use Case Scenario
Sensitivity	Design requirements fail under unfavorable conditions (e.g. Water contamination exceed filtration ability, Flood level tops water source barriers)
Exposure	Identify points of entry into system (e.g. Flood water enters one or more of the system intakes)
Adaptive capacity	Sensitivity and exposure define range of available actions (e.g. Access alternate water system , Boil water)

Summary

- Vulnerability assessment protocols can be adapted to web-based tools
- Web-based Vulnerability Assessments can be complete and transferrable
- Critical to define verification methods are needed to reconcile viewpoints of multiple stakeholders (expert knowledge, planners, users)
- Semantic Web and Recommendation Algorithms Provide Viable Solutions to Verification and Planning

"Even in a world too complex to fully describe, rules that express learnable regularities can be acquired"

(Leslie Valiant "PAC: Nature's Algorithms for Learning and Prospering in a Complex World")