Data to Action: Questions, Frameworks, Tools.

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Action requires Data-Driven Decisions

Data-driven decision-making relies on analyzing collected data to answer questions and find insights that can inform action.

Action Requires Information

First Step: A reverse approach

- Know what we want to know
- Develop questions
- Distinguish Information that answers those questions
- Distinguish models to provide the information
- Distinguish initial data for the models
- Plan to attain and prepare initial data

Heat-Health Projects: Example of Many to Many Relationship between Data and Action

Goals of Heat-Health Studies

- Early Warning systems
- Focused Educational plans
- Organizational preparedness
- Cooling Centers accessibility
- Health measurement systems
- Mitigation strategies
- Continuous evaluation of the plan

Environmental Protection Agency (EPA)

World Health Organization (WHO)

Project 1:

Building Community Resilience to Extreme Heat
Brookline, Massachusetts

SUSTAINABILITY & DATA SCIENCES LAB

THRIVING EARTH EXCHANGE
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American Geophysical Union

Developed Questions

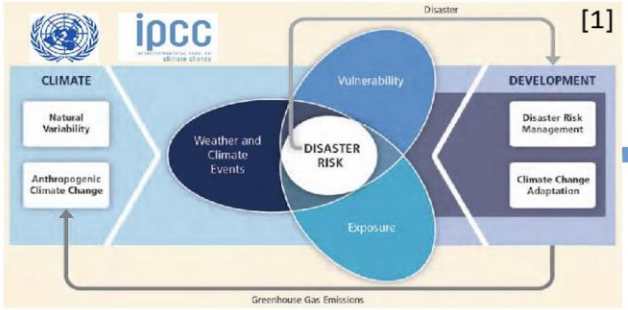
1. What population will be impacted, and by how much?
2. How vital are infrastructural and social metrics?
3. How are heat waves and urban heat islands expected to exacerbate?
4. How critical are vegetated open spaces?
5. What are the possible adaptation measures?
6. What can be done for mitigation?
7. What are the new research directions and data requirements?

Agreed Deliverables

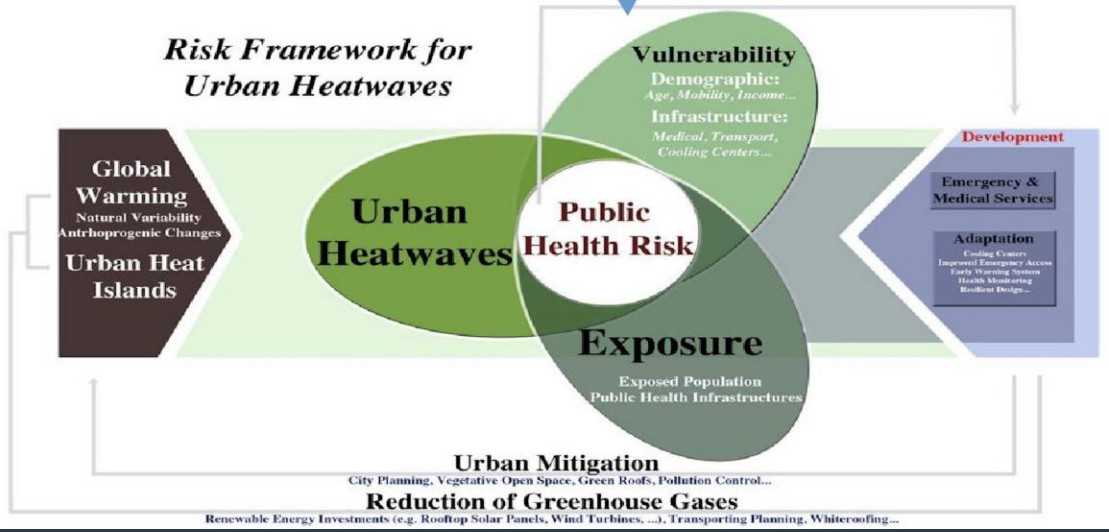
Deliverables:

- Narrative (targeted for non-scientific but educated audiences)
  - Definition of terms
  - Methodology
  - Data-driven: Maps; Graphs / Charts; Analysis; Insights
    - Heat Waves including Urban Heat Island Effects
    - Topography; Tree Inventory
    - Population including Vulnerable People
    - Infrastructures & Open Spaces
  - Key Results and Insights
  - Uncertainties and Caveats
  - Need for Research and Data
  - 10-20 page main report with appendices (as needed)
- 15-slide Presentations (one for lay public and one for climate literate non-specialists)
  - Milestone 1: Mid Fall (Presentation to Climate Action Committee of Brookline)
  - Milestone 2: November (Presentation to Metro Mayors Summit)
- Methodology:
  - IPCC approved Climate Risk Framework (Threat / Hazards; Vulnerability; Exposure)
  - Current (Remote Sensing; GIS; Census; Health Relevant Heat Indices; Open Spaces)
  - Future (2030s and 2070s): Climate and Weather Models; Climate Projections (with uncertainty); Projections of Population and Demographics (where available; e.g., available for 2030s; or use What-If Scenarios); Infrastructures & Vegetated Open Spaces (Based on What-if Scenarios specified by Experts & Stakeholders)

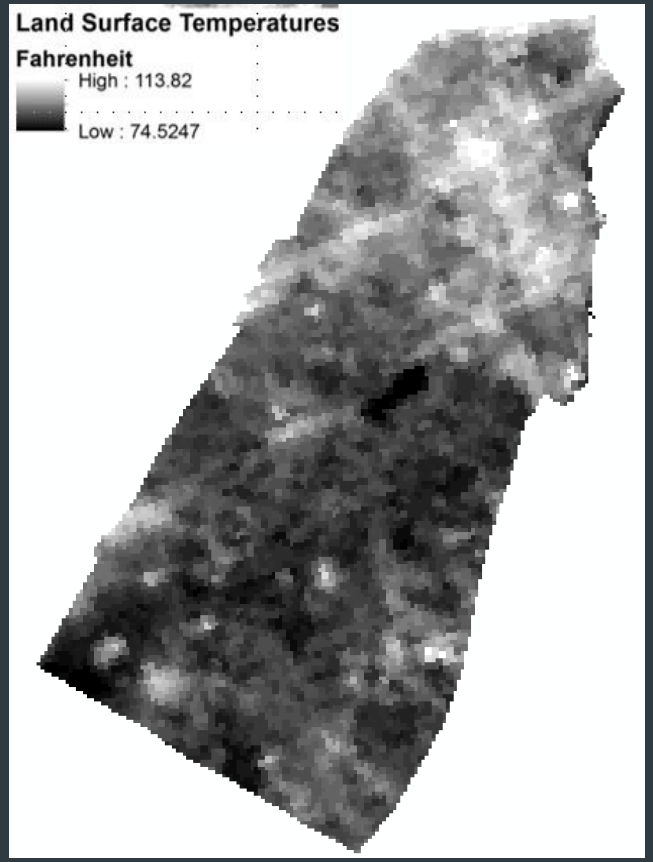
Adaptation of IPCC Risk Framework



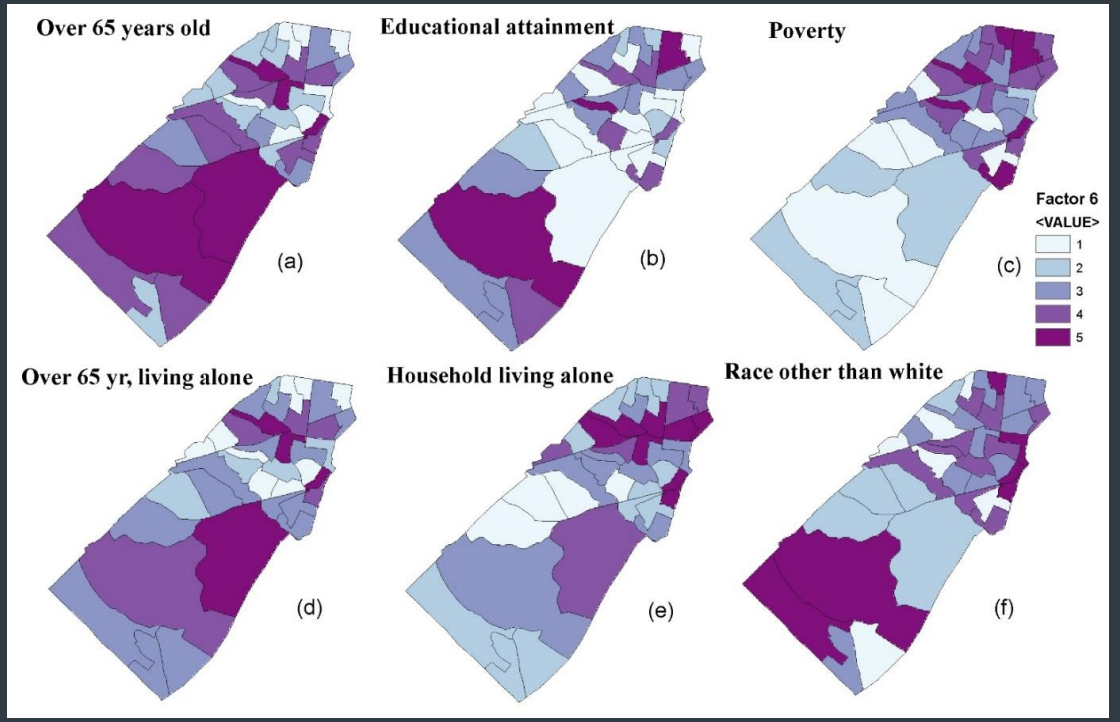
Use adapted IPCC Risk Framework to guide research



Calculating (current) Risk levels

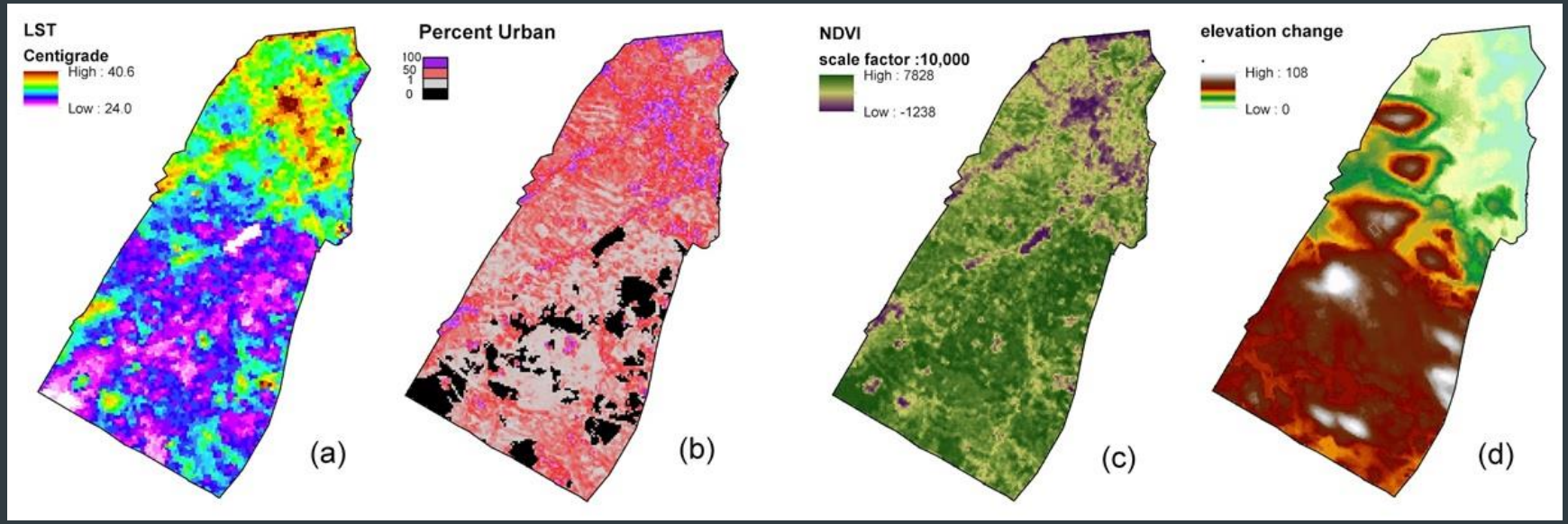


LST calculated from LandSat image on a heatwave day (30m x 30m resolution)



Considered Vulnerability variables

Tree Canopy Analysis Scenario

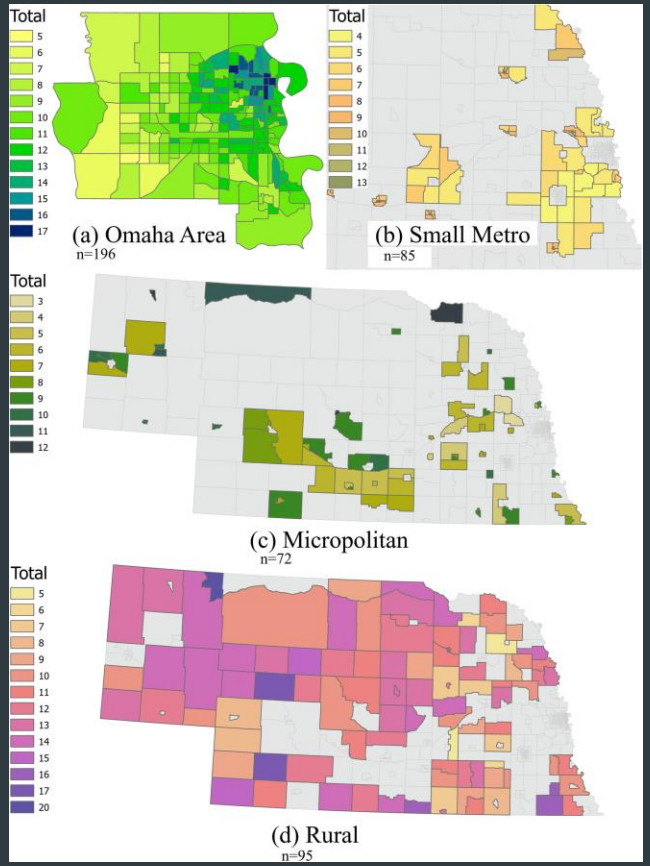


$$T_a = a_0 + a_1 T_{L,i} + a_2 U_i + a_3 N_i + a_4 El_i$$

Project 2

Heat Vulnerability Index (HVI) mapping for Nebraska

HVI Maps for Different Urban Groups



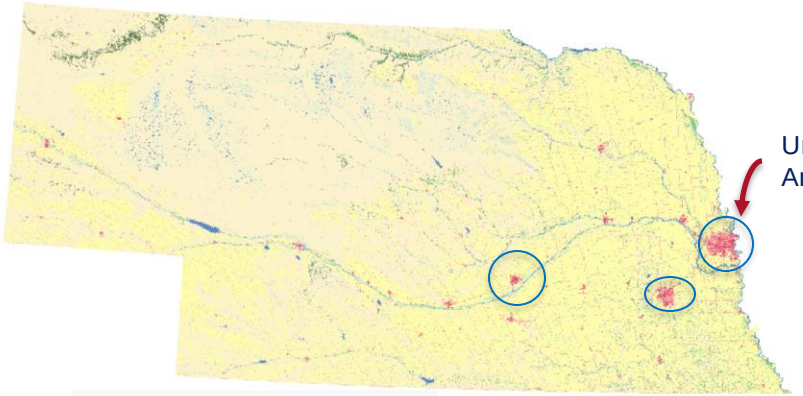
Datasets Used

- LandSat-Derived NLCD
- American Community Survey (ACS) 5-year estimate

Insights:

- suggested separate heat strategies for urbanization levels

How NLCD data was used

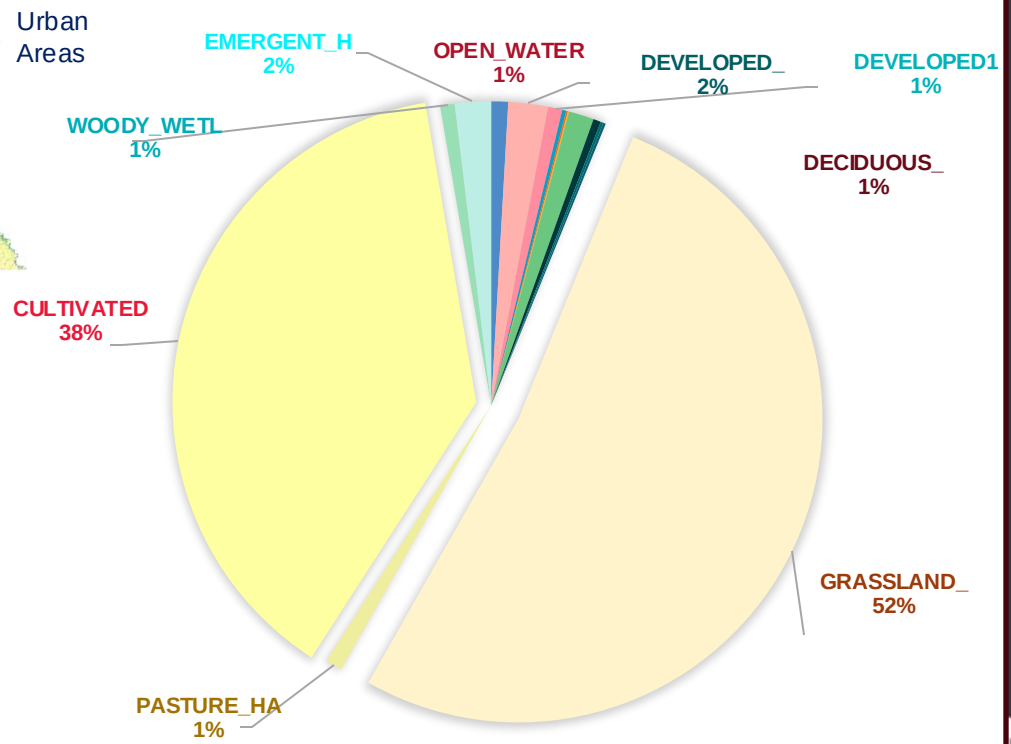


- Open Water
- Developed Open Space
- Developed Low Intensity
- Developed Medium Intensity
- Developed High Intensity

Not Green Space

- Barren Land
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Shrub/Scrub
- Grassland/Herbaceous
- Pasture/Hay
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

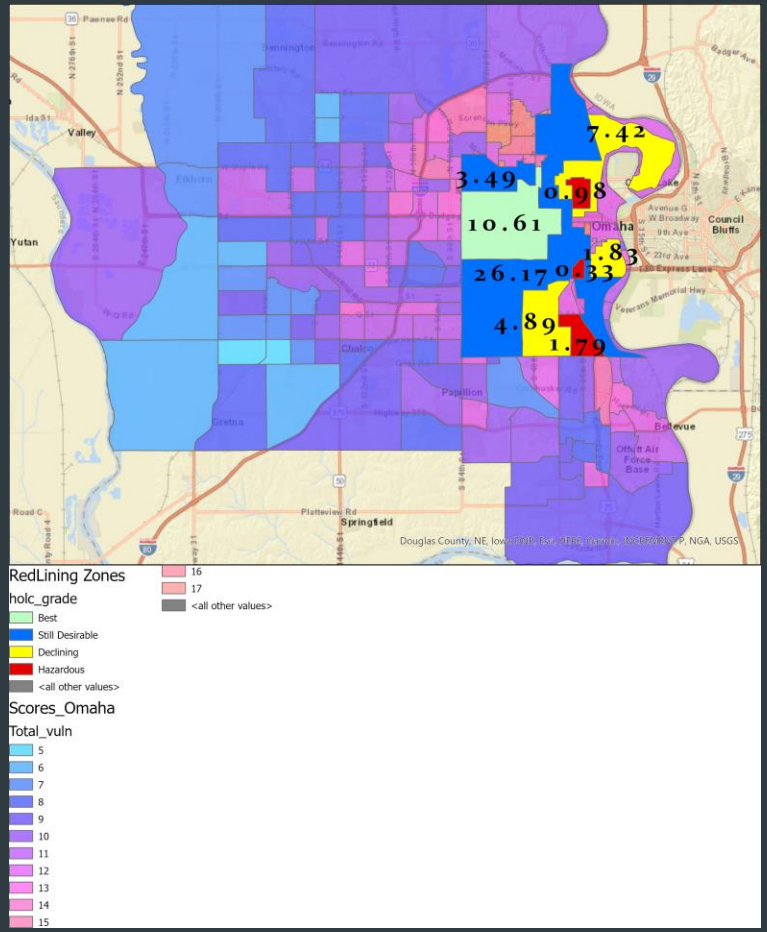
Green Space*



Project 3

Omaha Urban Heat Campaign – Aug 2022

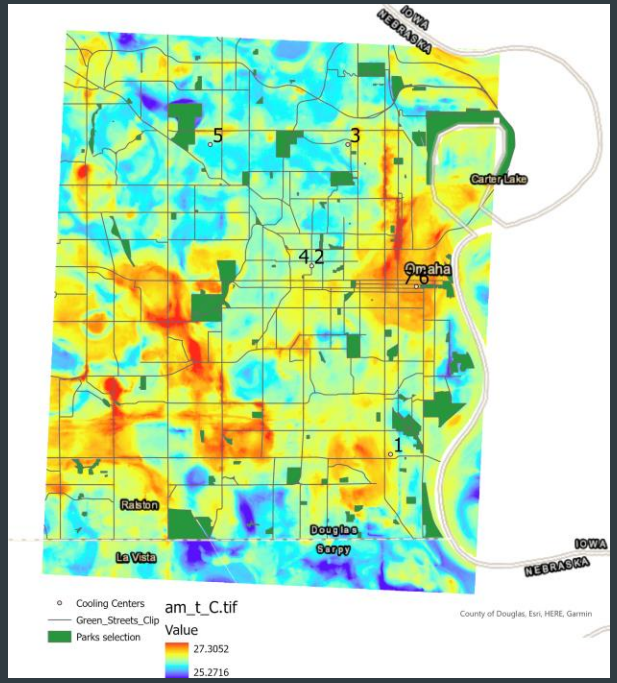
Previous Data Helped to Define the Area

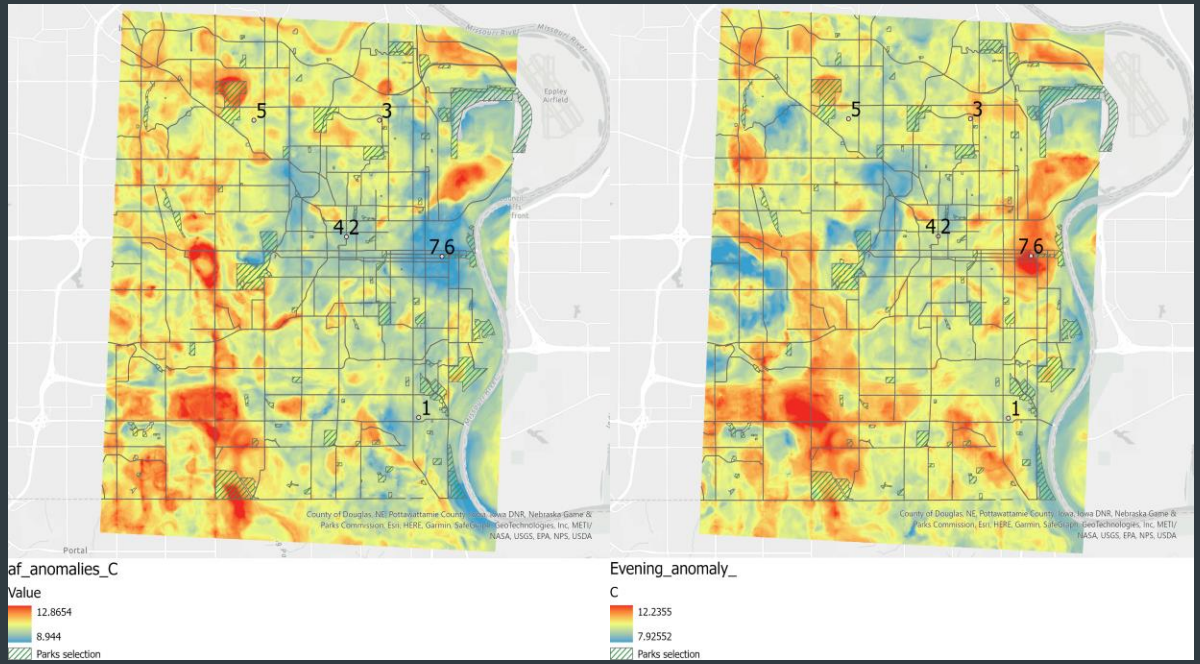


- Historical Redlined Areas
- HVI map for Omaha

The primary outcome of that project was the **involvement of the community** members in capturing the data.

Results





The results are being used to evaluate different adaptation and mitigation strategies.

Project 4

Covid-19 Dashboard for Decision Support Spring 2020

(A Showcase of Frameworks and Tools)

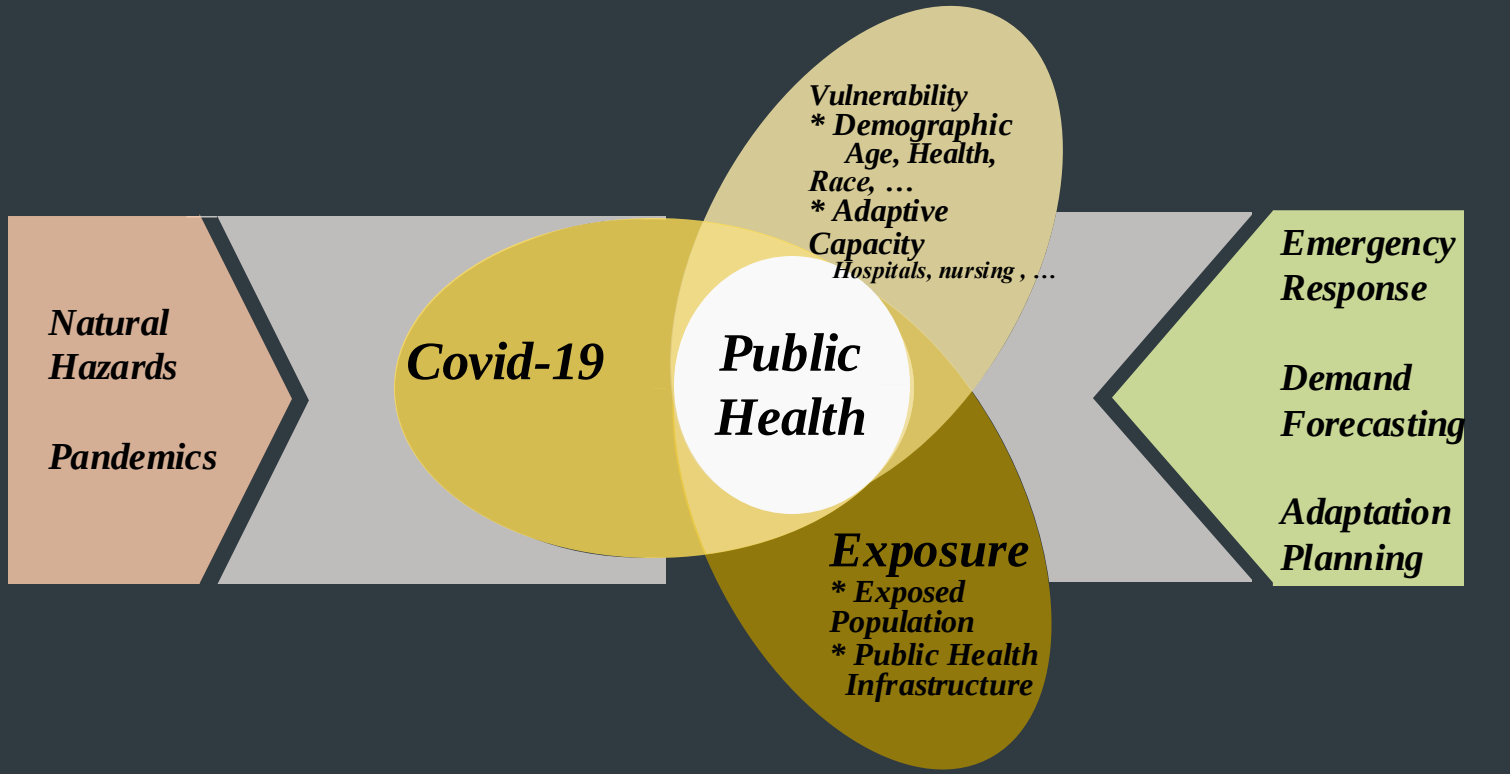
4-1

COVID-19 Decision Support Platform for DHHS Region 7

4.2

COVID-19 Decision Support Platform for Nebraska

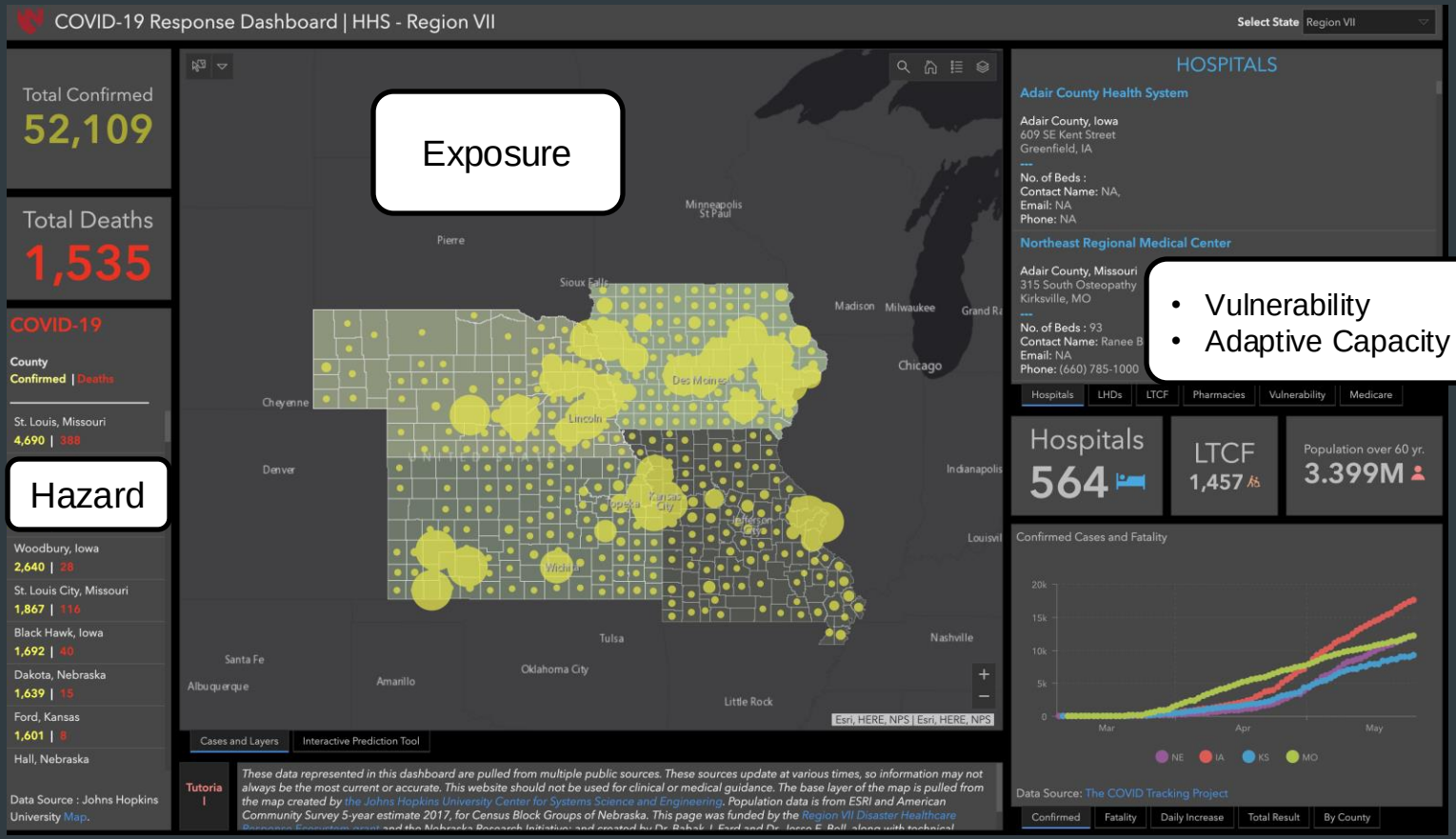
COVID-19 Dashboard – Future (Concept)



Closing Remarks

- Correct Decision making requires information.
- Distinguishing required data begins with developing questions.
- Using (standard) frameworks can organize and make experiences and tools adaptable
- Collaborative tools such as online mapping and data integration systems are necessary.

Closing Remarks (Cont.)



- Vulnerability
- Adaptive Capacity

Consider how this system/ framework can be used for other community-level projects incorporating NASA Earth Data.

Region-VII Covid-19 dashboard (https://arcg.is/0r4bXe)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