Challenges, Research Needs, and Gaps in Understanding Socio-Ecological Consequences of Wildfire



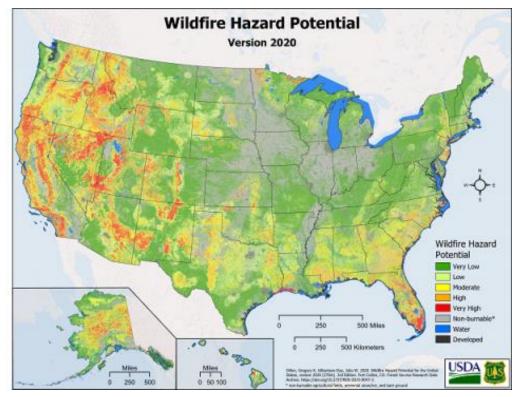
Susan L. Cutter
Hazards Vulnerability & Resilience Institute, University of South Carolina

National Academies Workshop Irvine, CA June 13-14, 2024

Site and Situation

- All places are unique
- Place and its geographic context influence vulnerability and coping capacity/resilience

Site → Influences hazard exposure

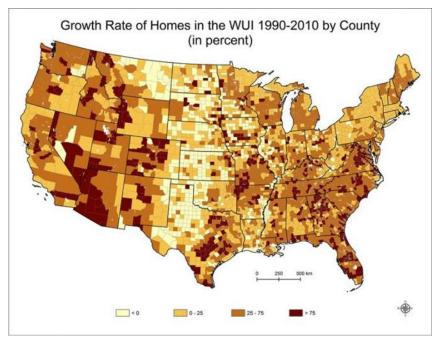




Site: the exact location on Earth's surface, physical attributes of the place (topography, climate, soils, water bodies, flora/fauna)

Situation: location relative to the surroundings and other places (accessibility, connectivity, proximity)

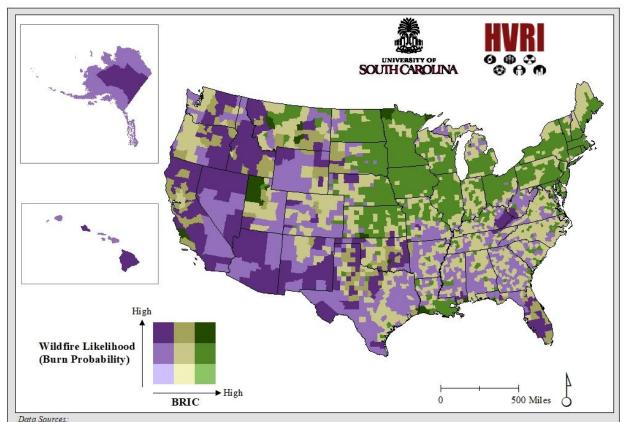
Situation → Diversity in at risk places and human consequences



https://www.eurekalert.org/news-releases/883050

Challenge 1: Recognize Diverse Consequences

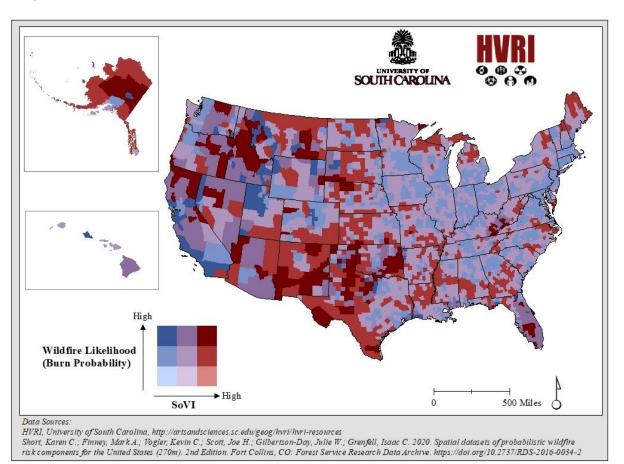
Evidence to support socially-vulnerable populations: (Social Vulnerability Index or SoVI)



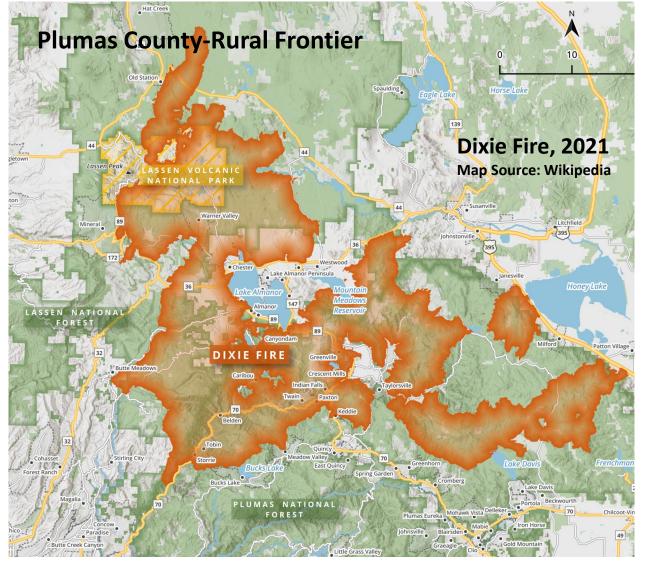
Data Sources:

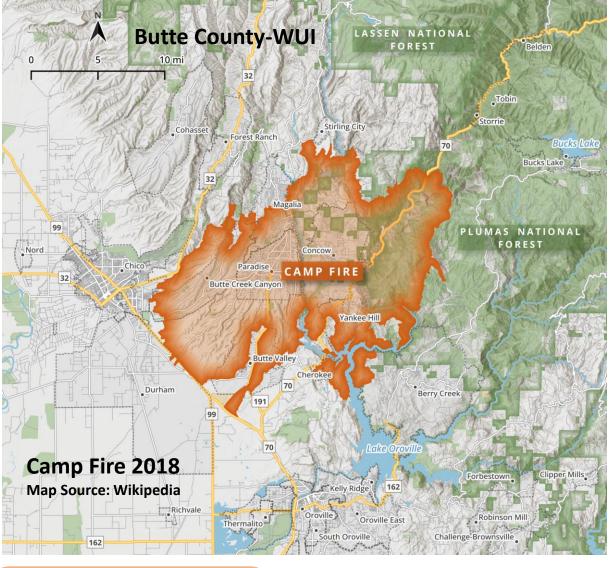
HVRI, University of South Carolina, http://artsandsciences.sc.edu/geog/hvri/hvri-resources

Short, Karen C.; Finney, Mark A.; Vogler, Kevin C.; Scott, Joe H.; Gilbertson-Day, Julie W.; Grenfell, Isaac C. 2020. Spatial datasets of probabilistic wildfire risk components for the United States (270m). 2nd Edition. Fort Collins, CO: Forest Service Research Data Archive. https://doi.org/10.2737/RDS-2016-0034-2



Evidence to support pre-existing resilience capacities: (Baseline Resilience Indicators for Communities or CBRIC)





1 death
9,500 evacuated
1329 structures destroyed
\$1.15 B (\$2021)

Density: 7.8 people/square mile Housing units destroyed (9.1%)

85 deaths
52,000 evacuated
18,804 structures destroyed
Damage: \$16.65B (2018\$)

Density: 129 people/square mile Housing units destroyed (20%)



PLUMAS BANK

Greenville, CA May 2023 Photos by S. Cutter





Paradise, CA May 2023 Photo: S. Cutter

Homes leveled by the Camp Fire line the Ridgewood Mobile Home Park retirement community in Paradise, Calif., Monday, Dec. 3, 2018. (AP Photo/Noah Berger, File)



Empty rows line the Ridgewood Mobile Home Park, Wednesday, Oct. 25, 2023, five years after the Camp Fire leveled the Paradise, Calif., retirement community. (AP Photo/Noah Berger)

Source: Adam Beam and Olga r. Rodriguez, 2023. 5 years after California's deadliest wildfire, survivors forge different paths toward recovery, AP, November 7, 2023. https://apnews.com/article/paradise-wildfire-california-anniversary-five-years-

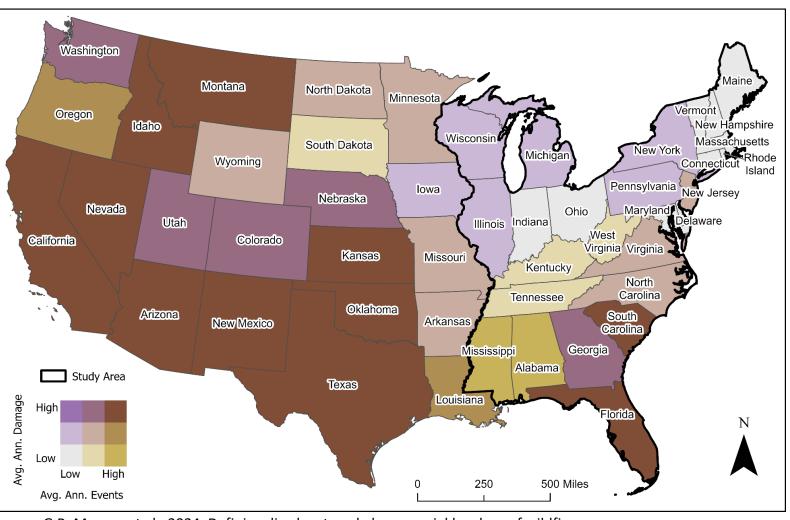
b4434481c38e6a02e9f2d376ac172b04#

Challenge 2: Understand Proximal and Distal Impacts

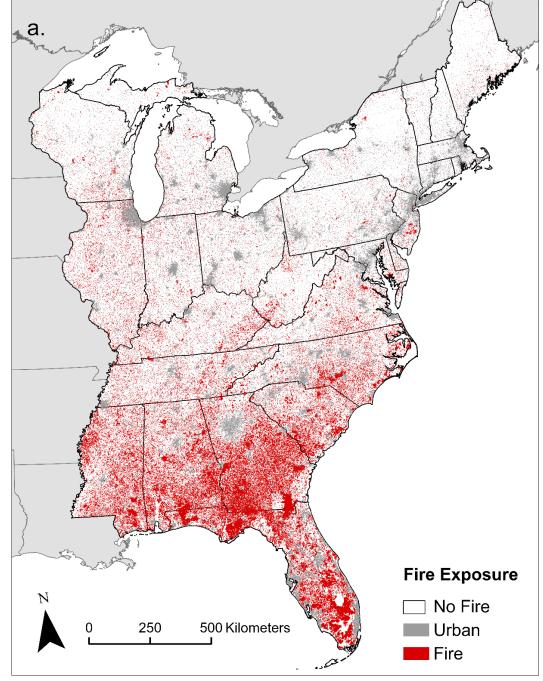


2016 Gatlinburg, TN

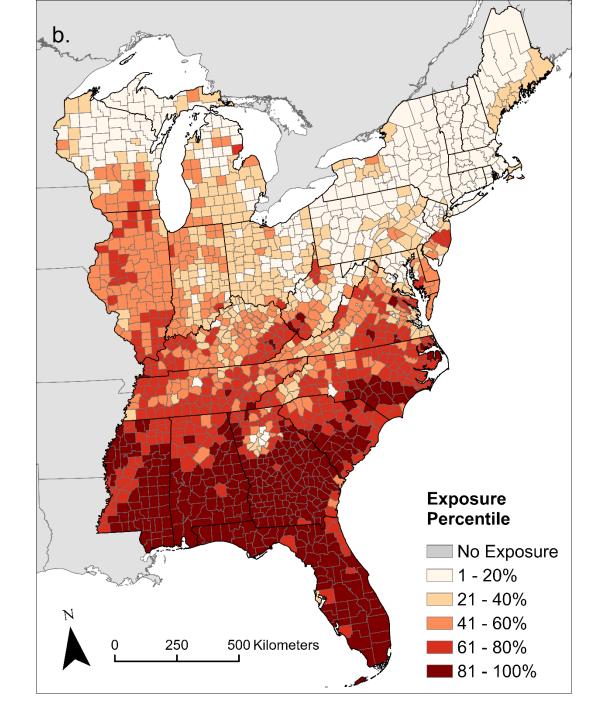
https://www.nbcnews.com/news/photo/tennessee-flames-spare-dolly-patron-s-hotel-n689851. Photo by Bruce McCamish

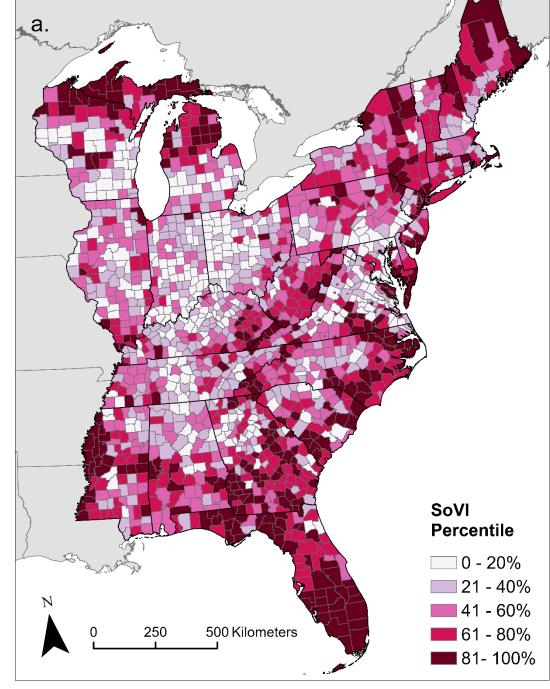


Source: G.R. Morgan et al., 2024. Defining disadvantaged places: social burdens of wildfire exposure in the Eastern United States, 2000-2020, *Fire* 7, 124, https://doi.org/10.3390/fire7040124

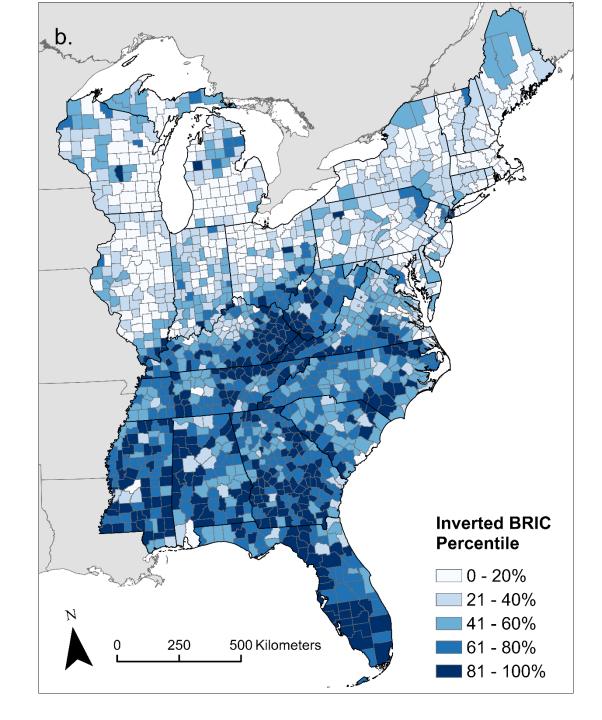


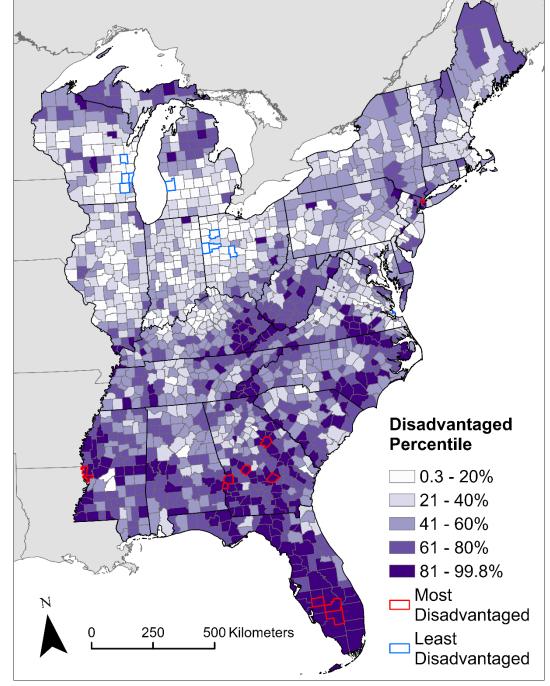
Source: G.R. Morgan et al., 2024



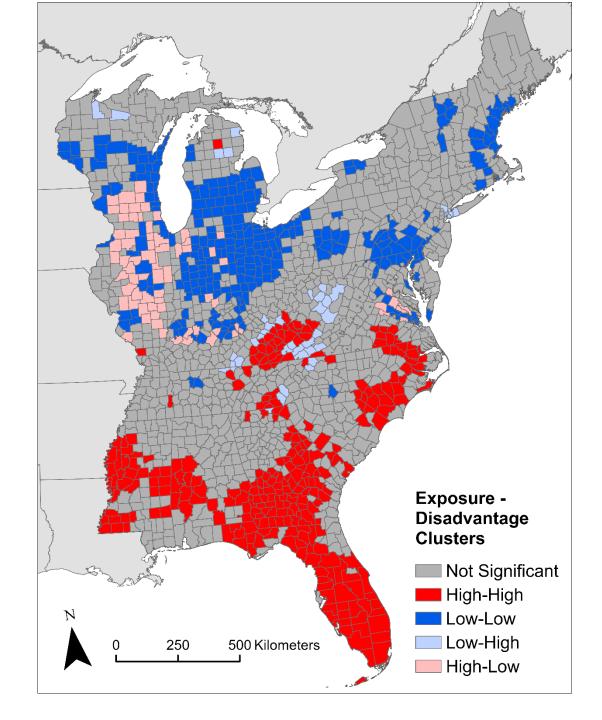


Source: G.R. Morgan et al., 2024



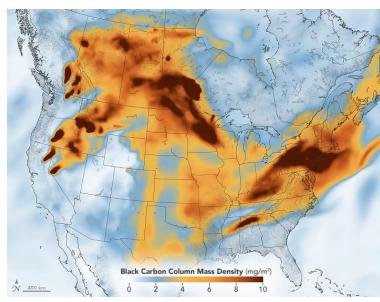


Source: G.R. Morgan et al., 2024





Proximal → Distal Transboundary impacts



https://earthobservatory.nasa.gov/images/148610/smoke_-across-north-america 2021



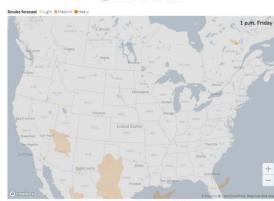
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https://media-cldnry.s-nbcnews.com/image/upload/t_fit-760w,f_auto,q_auto:best/rockcms/2023-06/230607-new-york-smog-mb-0814-a99131.jpg

Maps: Tracking Air Quality and Smoke From Wildfires

By Madison Dong, Bea Malsky, Lazaro Gamio, Matthew Bloch, Scott Reinhard, Leanne Abraham, Martin Gonzále. Gómez, Judson Jones, John-Michael Murphy and Marco Hernandez Updated June 7, 2024



Challenge 3: Know Antecedent Conditions and Local Changes

Lahaina



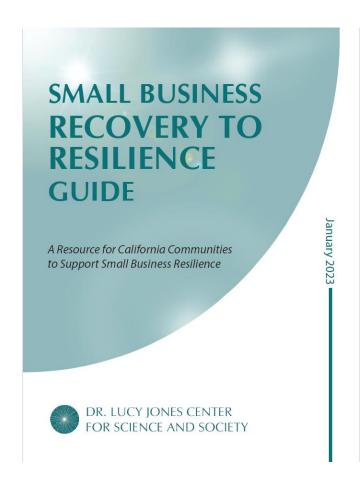
https://cdn.cnn.com/cnn/interactive/2023/08/hawaii-wildfires-timeline-maui-lahaina-dg/media/timeline/10_Ge.webp

Marshall Fire

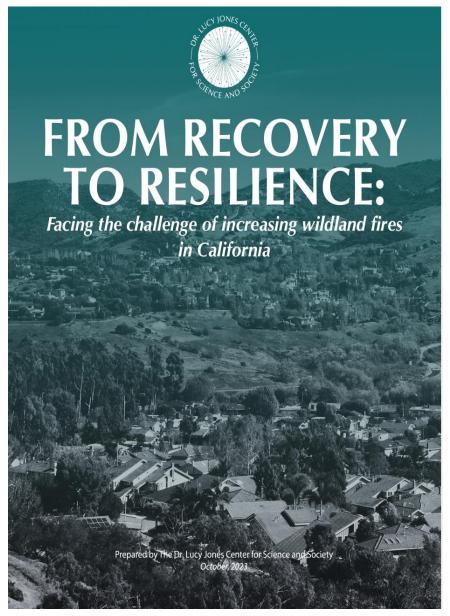


https://research.noaa.gov /2024/01/08/lookingback-at-coloradosmarshall-fire/

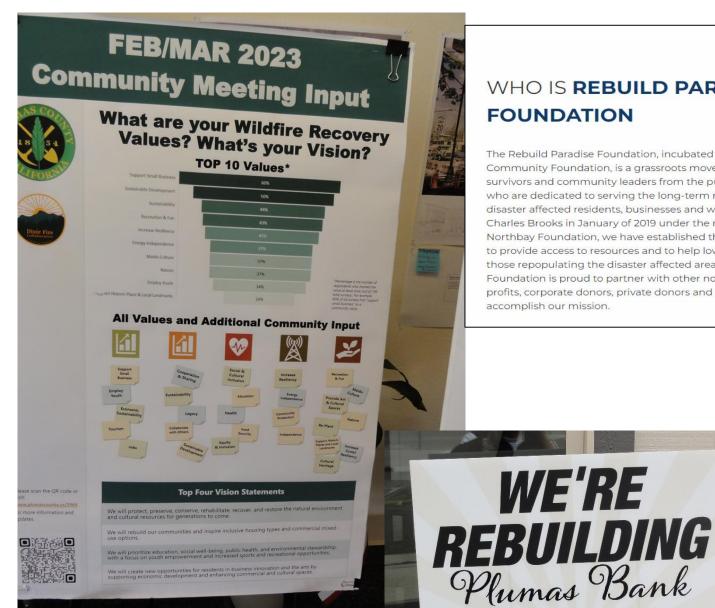
Challenge 4: Prepare for Recovery



https://drlucyjonescenter.org/news/recovery-to-resilience-guide/



https://drlucyjonescenter.org/resources/#from-recovery-to-resilience-report



WHO IS REBUILD PARADISE **FOUNDATION**

The Rebuild Paradise Foundation, incubated through the North Valley Community Foundation, is a grassroots movement of Camp Fire survivors and community leaders from the public and private sectors who are dedicated to serving the long-term needs of Butte County's disaster affected residents, businesses and workforce. Founded by Charles Brooks in January of 2019 under the mentorship of Rebuild Northbay Foundation, we have established this non-profit foundation to provide access to resources and to help lower barriers to entry for those repopulating the disaster affected areas. The Rebuild Paradise Foundation is proud to partner with other non-

profits, corporate donors, private donors and government agencies to accomplish our mission.

WE'RE

www.PlumasStrong.com



Obstacles and Lessons Learned:

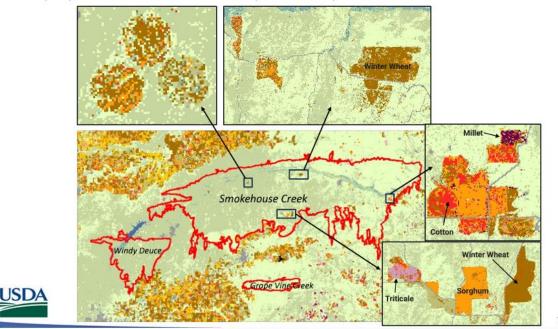
- **Rural frontier vs WUI**
- Leadership
- **Navigation of government programs**
- **Capacity**
- **Disaster case management**
- **Trauma**
- Measure and document losses

https://drlucyjonescenter.org/news/recovery-to-resilience-tour

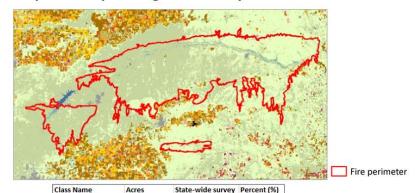
Gaps in Understanding

- Rurality remains a key underlying correlate/driver of consequences
- Recovery has different timelines and trajectories
- Proximate and distal impacts become more prominent in future
- Dynamic changes in vulnerability and resilience among populations
- Antecedent conditions of social, demographic and environmental changes
- Measuring loss and damage
- Understanding, communicating, and trusting risk information





Texas impacted crops during the February - March 2024 wildfires











Research and Policy Needs

- Role of a national hazard insurance policy
- Need for local recovery guide for rural communities
- Enabling legislation for national recovery guidance (Stafford Act and HUD process not work)
- Better improvements and documentation of losses
- Consistent assessment of differential preparedness, response, and recovery abilities



Topophilia and Solastalgia

Changing livelihoods and livability of places

