

Resilience through the lens of long-term research: a critical assessment of LTER site proposals

C.L. Gervasi¹, L. Kemmerling², N. Haddad², J.A. Hogan^{1,3}, B.N. Harvey⁴, J. Guinnip⁵, T.M. Perez¹ ¹Florida Coastal Everglades, ²Kellogg Biological Station, ³Luquillo, ⁴California Dept. Water Resources, ⁵Konza Prairie

Introduction

- Accelerating global change makes it crucial that we understand how ecological systems adapt or are impacted by disturbance.
- **Resilience** has been defined as *resistance* to change, recovery from change, the time required to return to a reference state, or the *capacity* to absorb disturbance & maintain functioning.
- Multiple definitions and methods for measuring resilience make it difficult to understand and generalize.
- When we understand resilience, we can understand:
 - how systems respond to change
 - how to support and create resilient systems
 - when to adaptively manage or transform systems that are not resilient

The LTER network provides a unique situation where resilience can be assessed and contrasted over extended time periods and across diverse biomes.

GOAL: Evaluate various definitions and approaches to assessing resilience across the LTER network and how these have changed over time

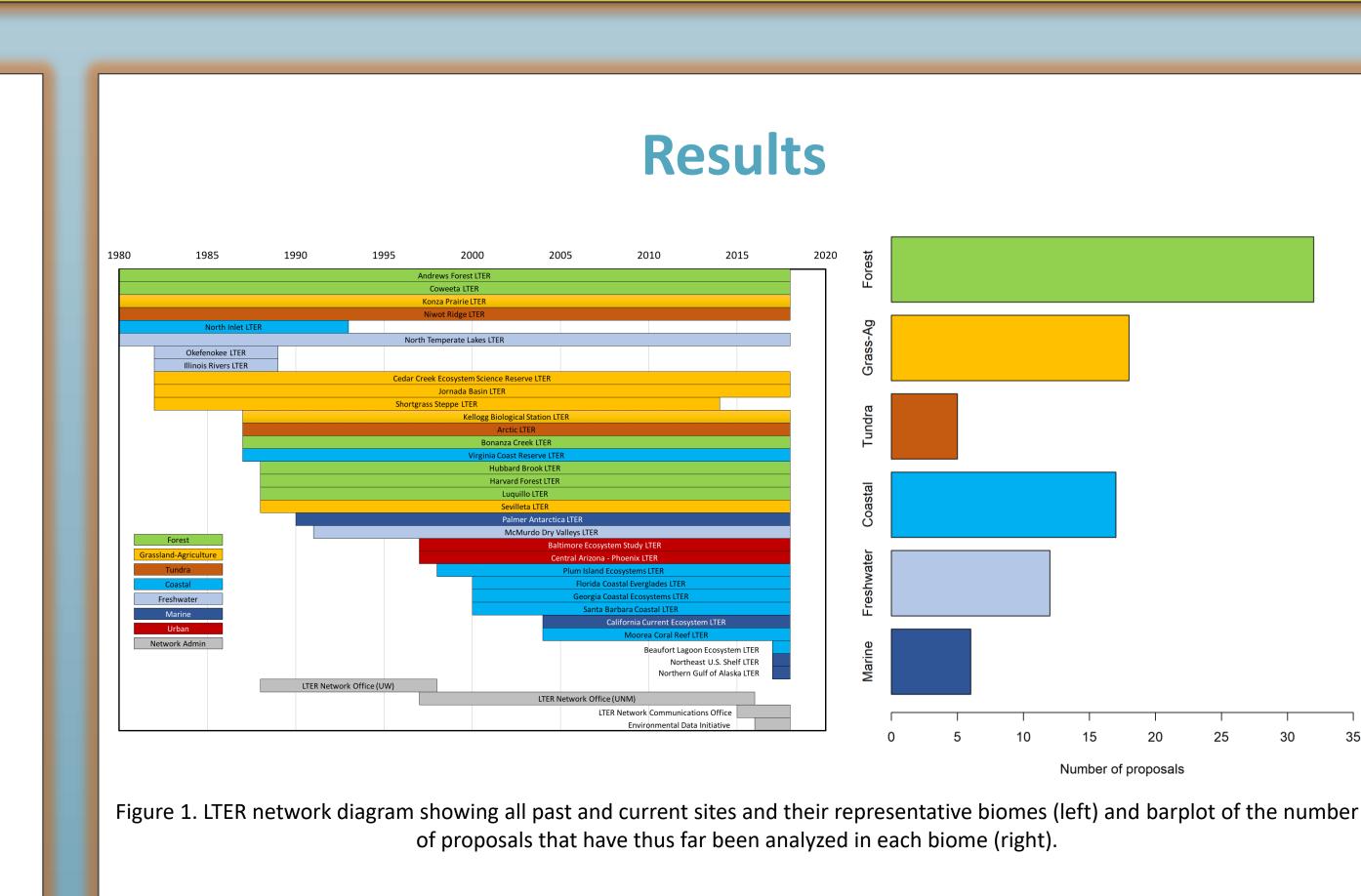
Methods

All LTER proposals were analyzed for use of 'resilience':

- definition of resilience
- number of times word 'resilience' was used
- location of use within the document
- number of unique citations related to resilience
- subject of resilience (ecosystem processes, populations, individuals, etc.)

Additional measures:

- biome of site
- major stressors investigated
- number of times word 'resistance' was used



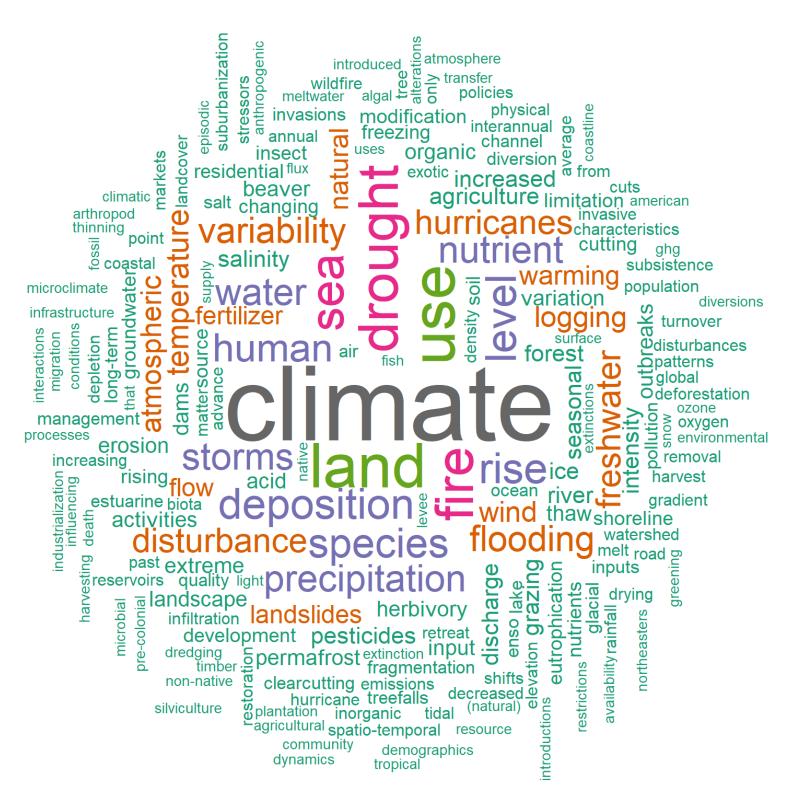


Figure 2. Word cloud showing the most common stressors impacting the LTER network sites according to mentions within site proposals.

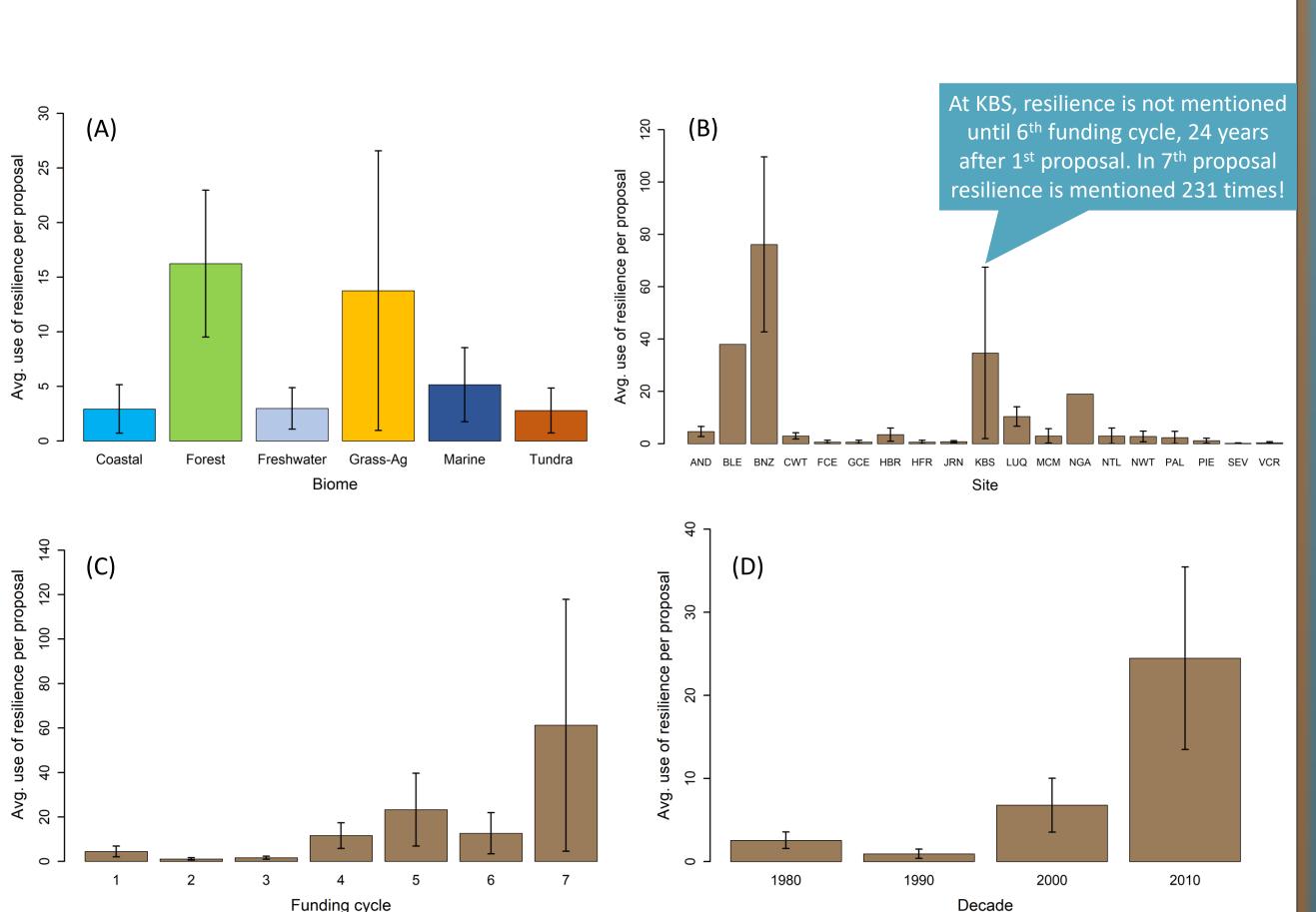
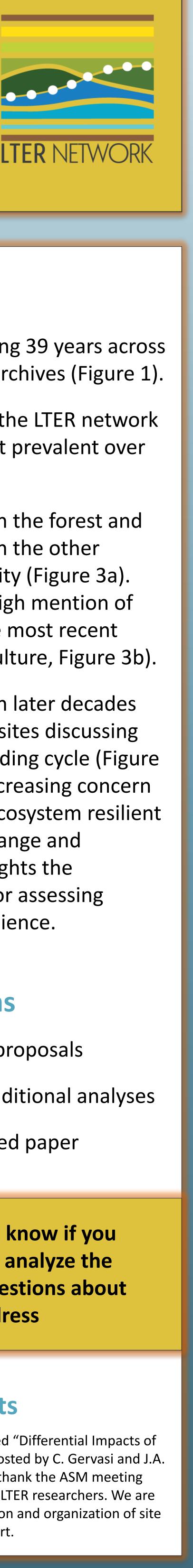


Figure 3. Average number of times the words "resilient" and "resilience" are mentioned by biome (A), site (B), funding cycle (C), and decade (D). Error bars are +/- one standard error.



Discussion

- There are 139 site proposals spanning 39 years across 7 biomes within the LTER network archives (Figure 1).
- There are many stressors acting on the LTER network sites, but climate change is the most prevalent over all sites combined (Figure 2).
- Resilience is discussed more often in the forest and grassland-agriculture biomes than in the other biomes, but there is a lot of variability (Figure 3a). This variability is mainly driven by high mention of resilience at BNZ (forest), and in the most recent proposal from KBS (grassland-agriculture, Figure 3b).
- Resilience is discussed more often in later decades and later funding cycles, with most sites discussing resilience very little until the 4th funding cycle (Figure 3c, d). This shows the recent and increasing concern for understanding what makes an ecosystem resilient in the face of accelerating global change and frequency of disturbance and highlights the importance of long-term datasets for assessing ecosystem properties that lend resilience.

Future Directions

Complete analyzing the remaining proposals

- Run analyses with full data set & additional analyses
- Synthesize our findings in a published paper

We need your help! Please let us know if you have any suggestions for how to analyze the proposals and what important questions about resilience we should address

Acknowledgements

The idea for this project came from the workshop entitled "Differential Impacts of the Anthropocene on Protected vs. Unprotected Areas" hosted by C. Gervasi and J.A Hogan at the 2018 LTER ASM in Pacific Grove, CA. We thank the ASM meeting organizers for giving us a platform to collaborate among LTER researchers. We are especially grateful to Marty Downs for facilitating collection and organization of site proposals and for logistical support.

