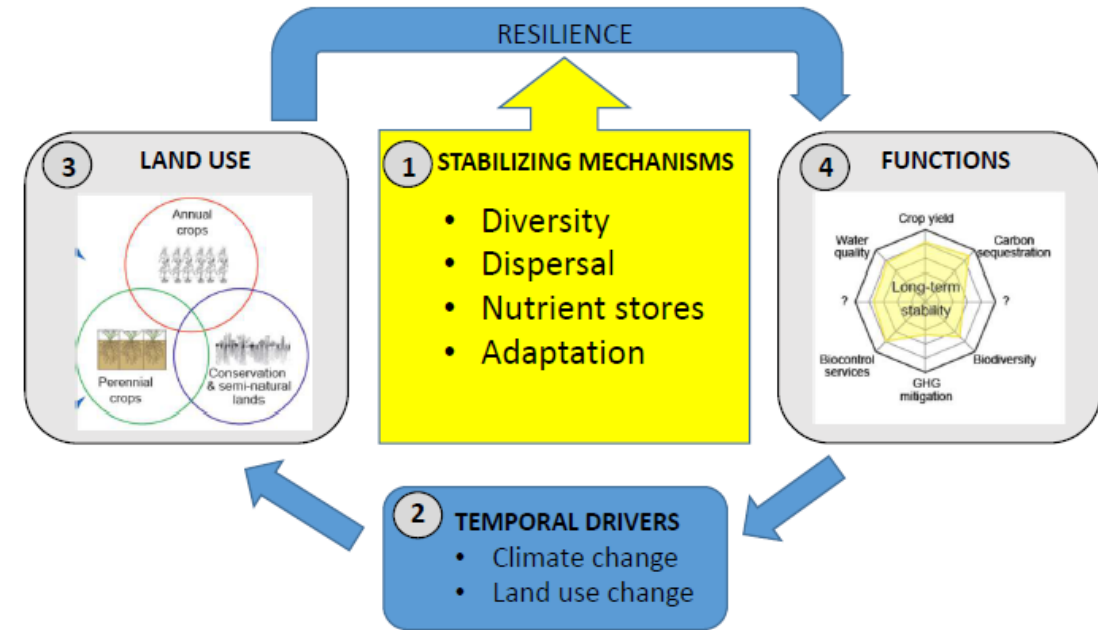


Biodiversity, ecosystem stability, & function



Sarah Evans
Kellogg Biological Station

Theories predict different diversity-stability relationships

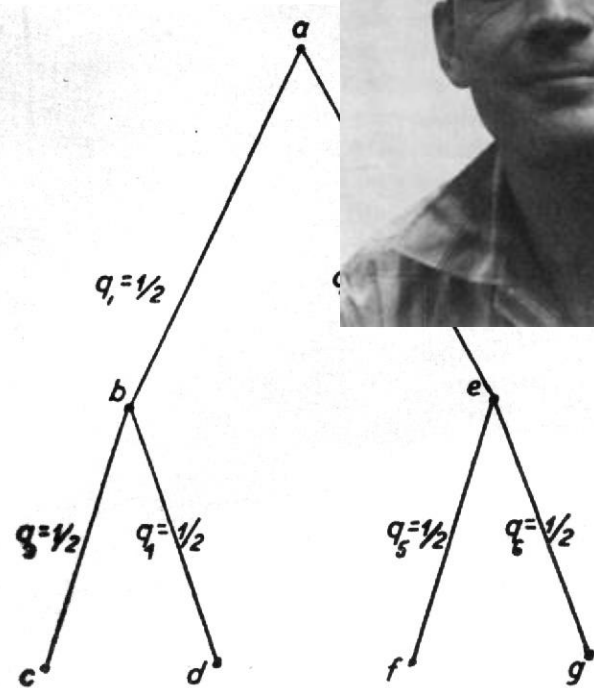
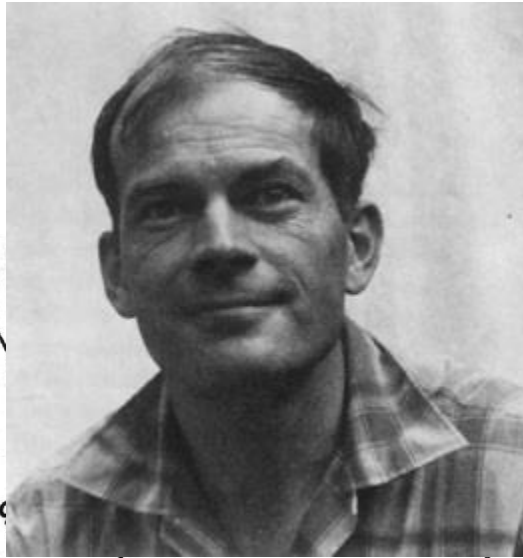


FIG. 3. A food web. a, b, c, d, e, f and g are species, and q on the line joining predator and prey signifies that fraction of the total number of prey species formed by the prey species in consideration.

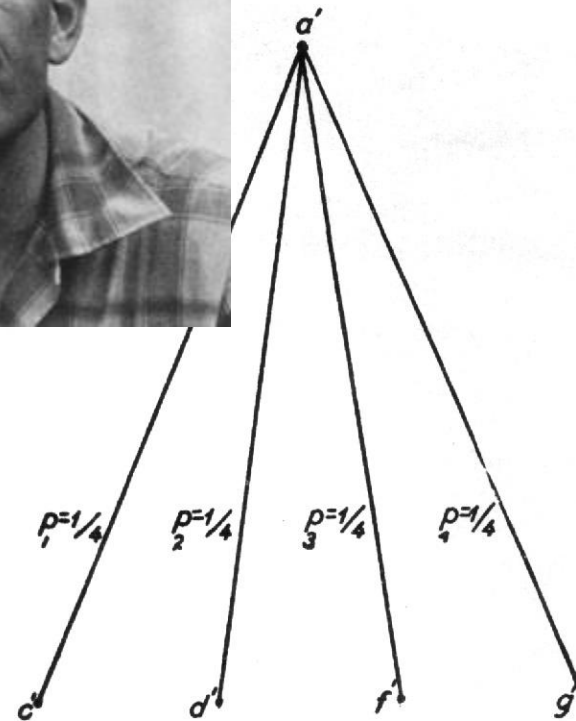
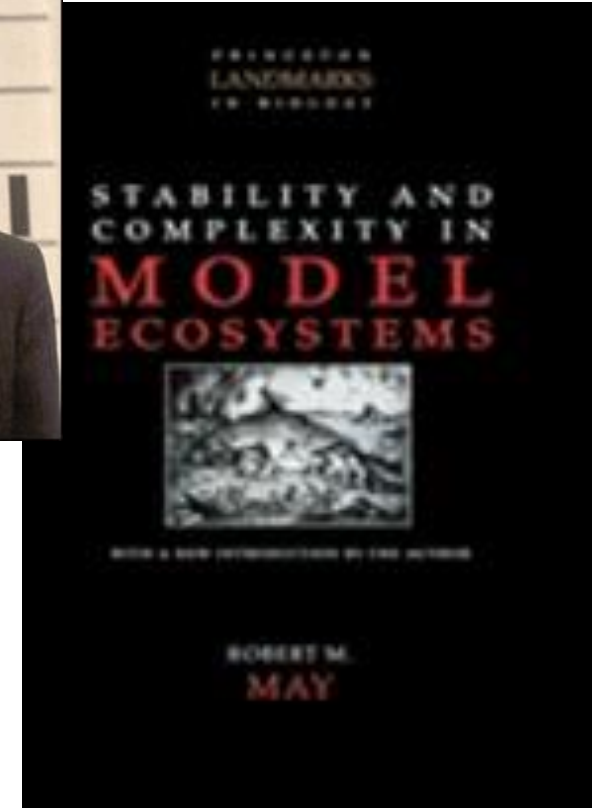
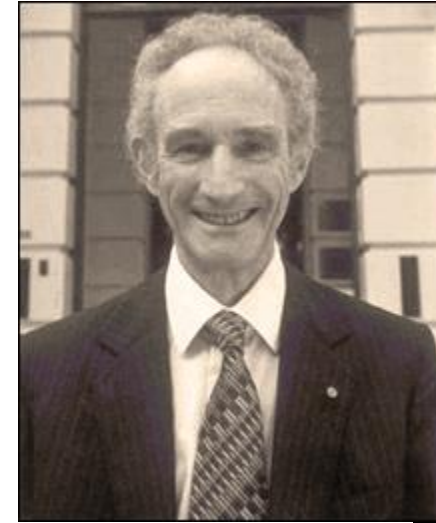


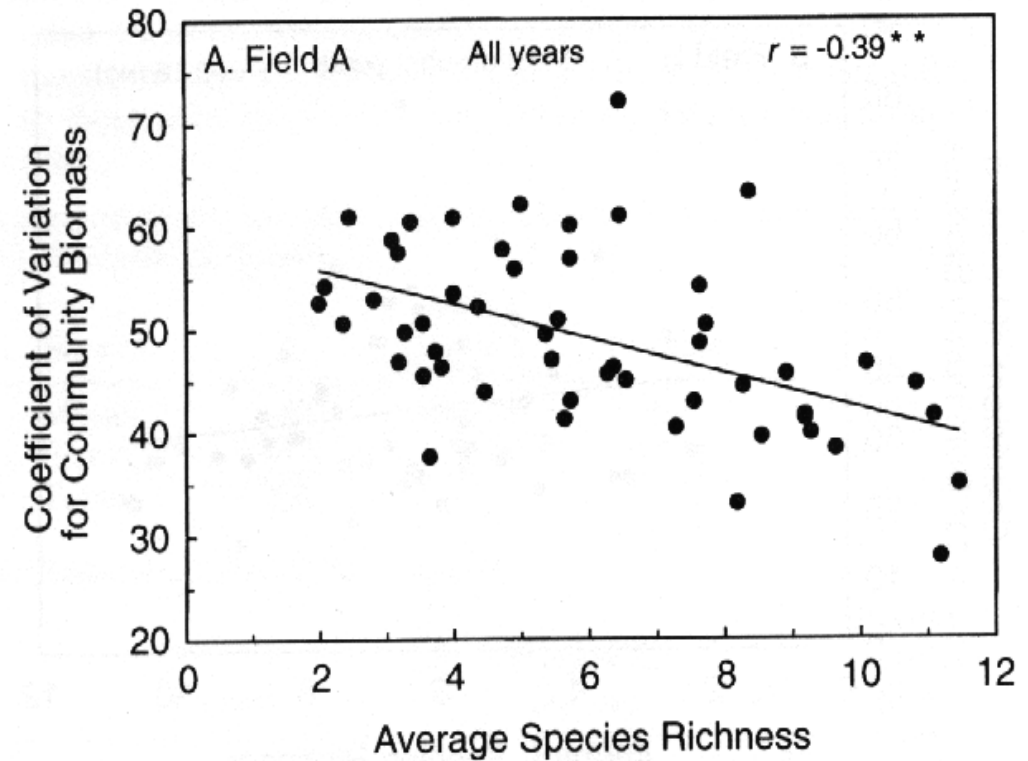
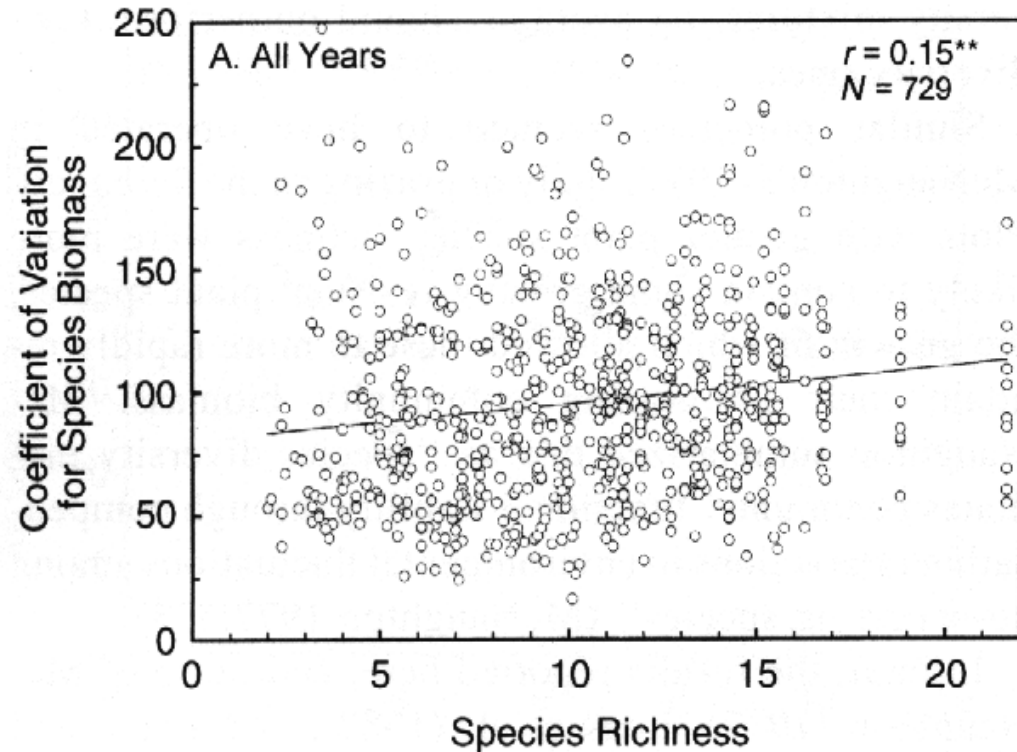
FIG. 4. A food web with stability equal to that of the food web in Figure 3.



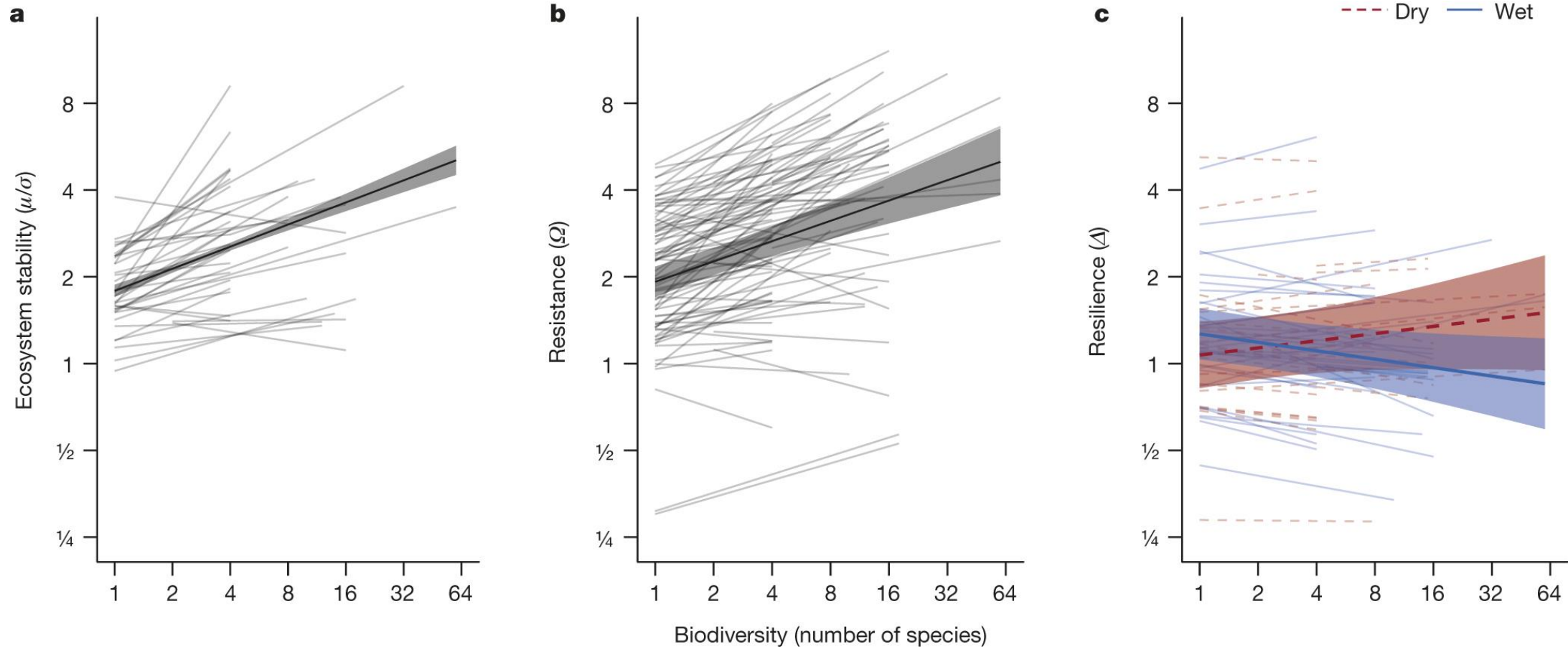
Stability increases with the number of trophic links and the equitability of energy flow up various food chains

Stability decreases with complexity

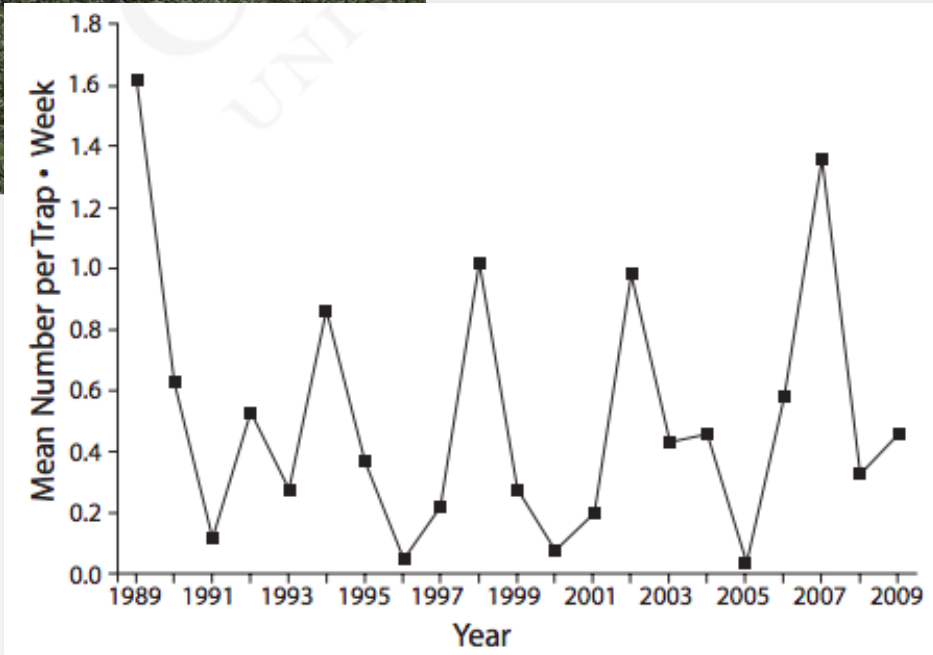
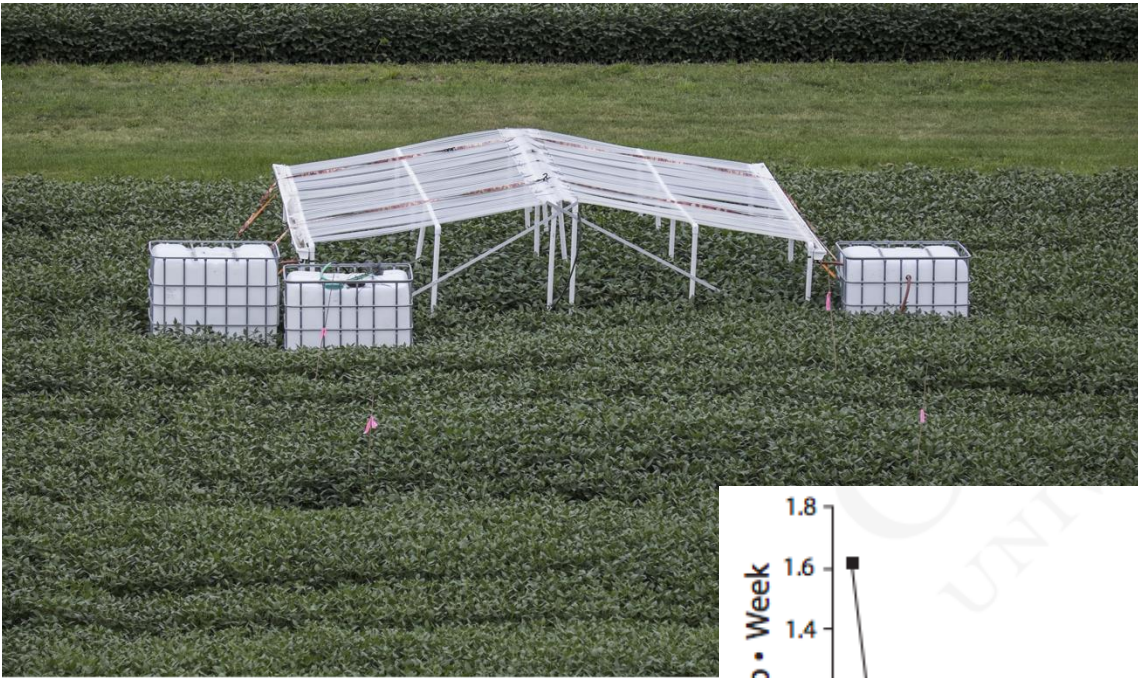
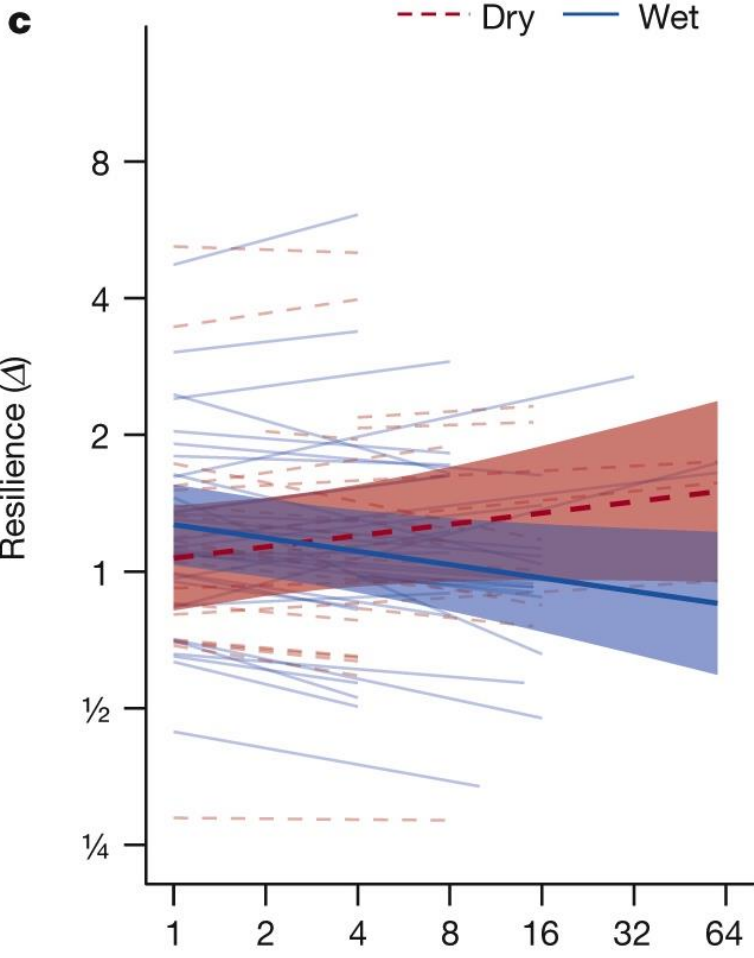
Tilman “resolved the debate”: species richness increases the stability of community biomass, but destabilizes populations



Empirical studies show substantial variation in strength and direction of diversity-stability relationships.

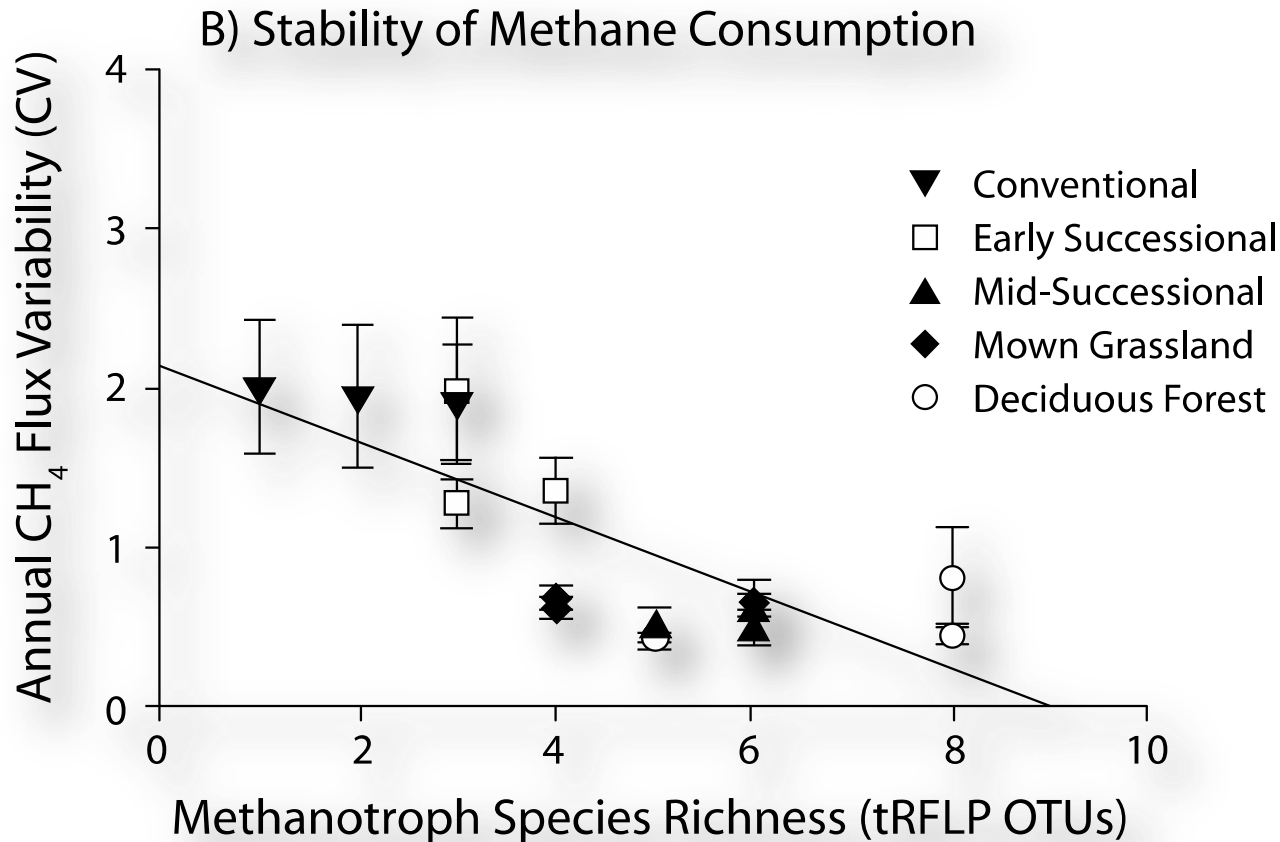


Q: How does the strength and direction of diversity-stability relationships vary across land-use & ecosystem functions?



Links to existing KBS LTER data

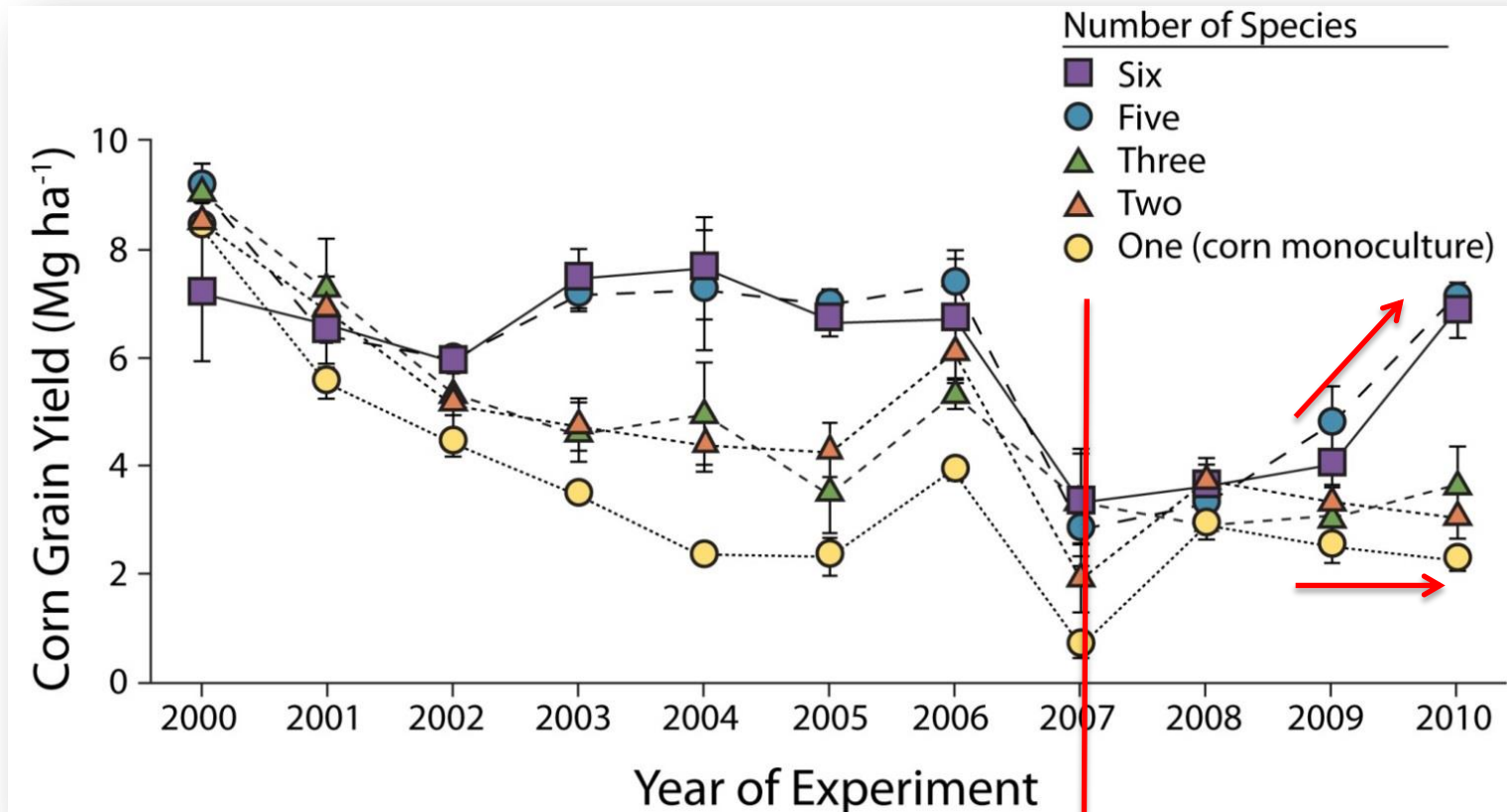
- Microbes: main cropping system



- Also: Crop rotational diversity enhances microbial diversity & soil function¹
- But: mechanisms?
 - Stability mediated by soil properties or microbial diversity?

Links to existing KBS LTER data

- Plants: biodiversity experiment



- But also: stability can depend on dominant species¹

Next steps

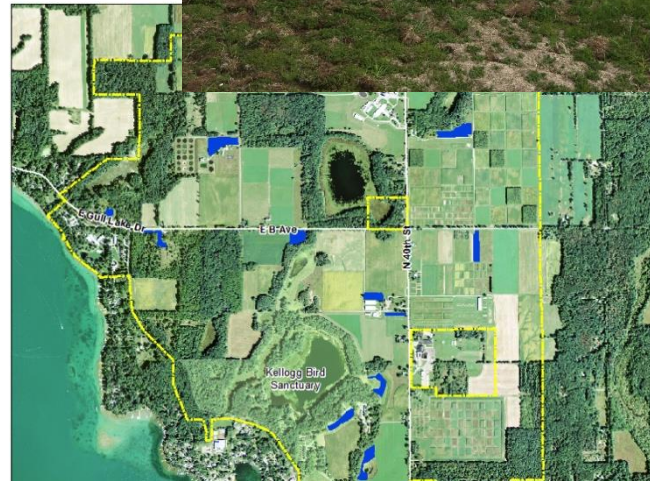
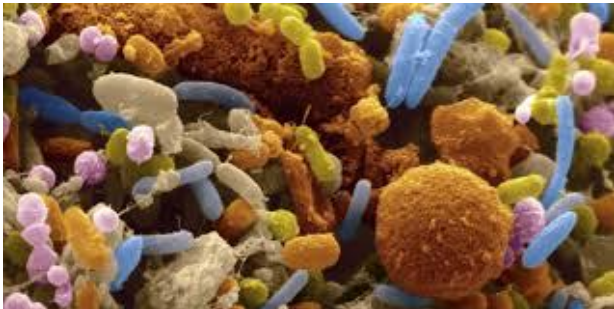
1. Expand definition of diversity
2. Isolate mechanisms, including at landscape scale
3. Integrate with social science – analogous concepts

1) Expand definition of diversity

Species:

Intraspecific:

Functional trait:



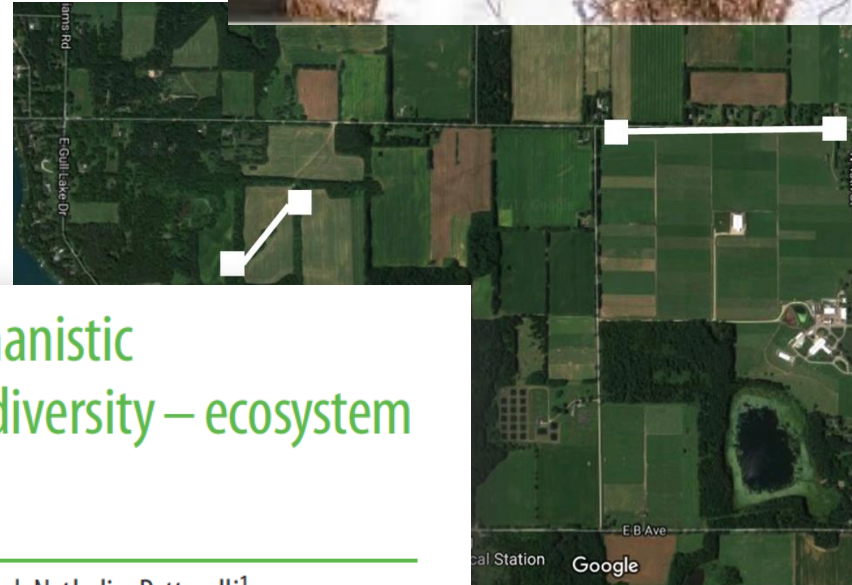
Expand sampling

Effect of genetic variation on prairie restoration

May be better predictor of stability of certain functions

2) Isolate mechanisms

- Microbial diversity manipulation
 - Soil properties vs. microbial?
- Broadening spatial scale to metacommunity dynamics



PROCEEDINGS B

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Review



The quest for a mechanistic understanding of biodiversity – ecosystem services relationships

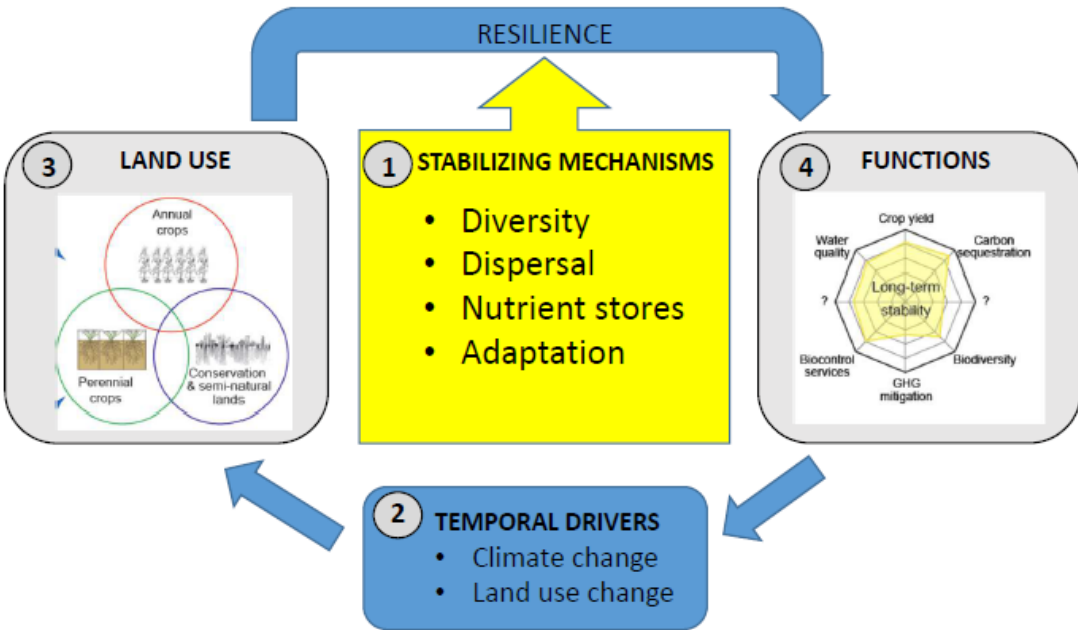
Clare Duncan^{1,2}, Julian R. Thompson² and Nathalie Pettorelli¹

3) Integrate with social science

- How do farmers deal with increased variability?
- “Diversifying” through portfolios, insurance, futures options
- Farmer decision-making influences ecology



Questions?



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