RestREco
Restoring Resilient Ecosystems

Restoring forwards: understanding diversity-complexity-resilience as a new measure of success

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Natural Environment Research Council

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Forest Research

Cranfield University

UNIVERSITY of STIRLING

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National Trust

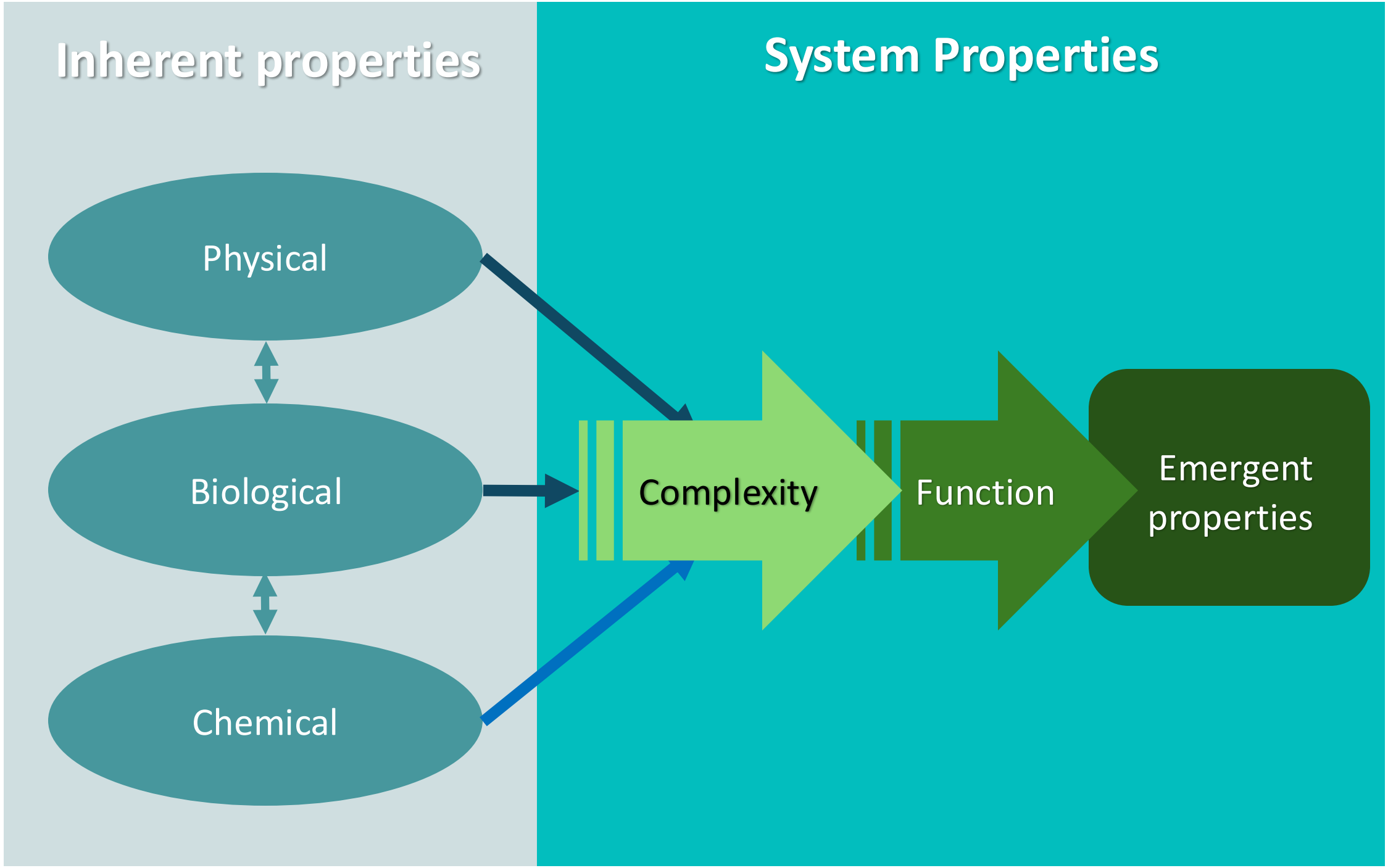
Acknowledgments – Funders – Natural Environment Research Council (NERC). **Landowners** for access to survey sites. **Students and volunteers** who helped with field and labwork

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What is it all about?
Our starting point

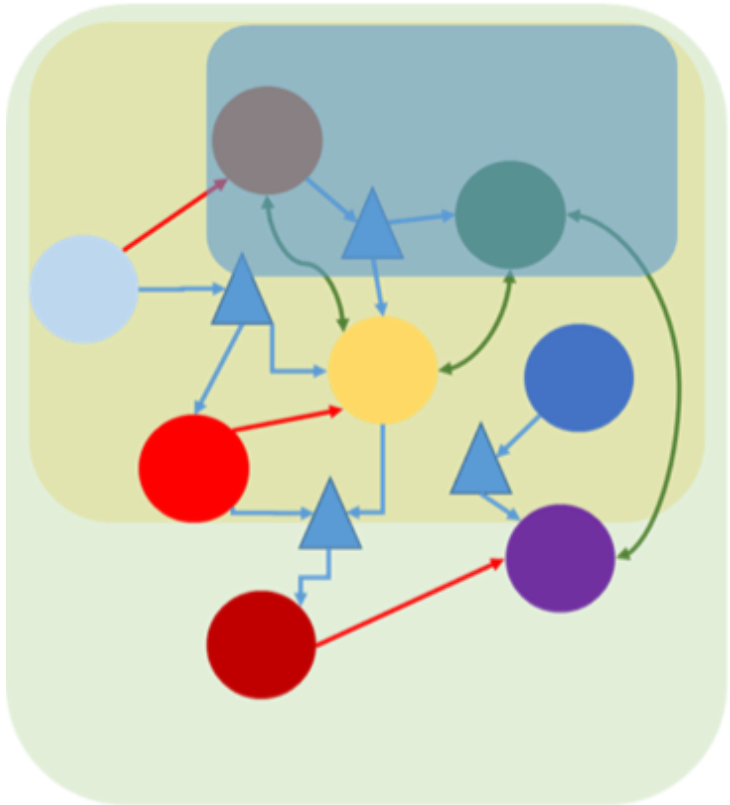
- We need a new paradigm for goal-seeking in ***ecological restoration*** which goes beyond ***reference systems***, agnostic as to prior assumptions of intactness, integrity and system "health"
- We intend to measure ***biodiversity***, ***architecture*** and ***multifunctionality*** in ecosystems in different stages of transition from a degraded state
- We shall identify determinants and measures of ***complexity***, and seek signals of ***emergent properties*** - especially ***resilience*** to perturbation, across a ***range of trophic levels***
- ***We shall explore*** *a new set of target restoration trajectories including* ***novel ecosystems,*** *going beyond historicity and perceived pristine environments*


Inherent properties
System Properties
Physical
Biological
Chemical
Complexity
Function
Emergent properties

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The importance of scale

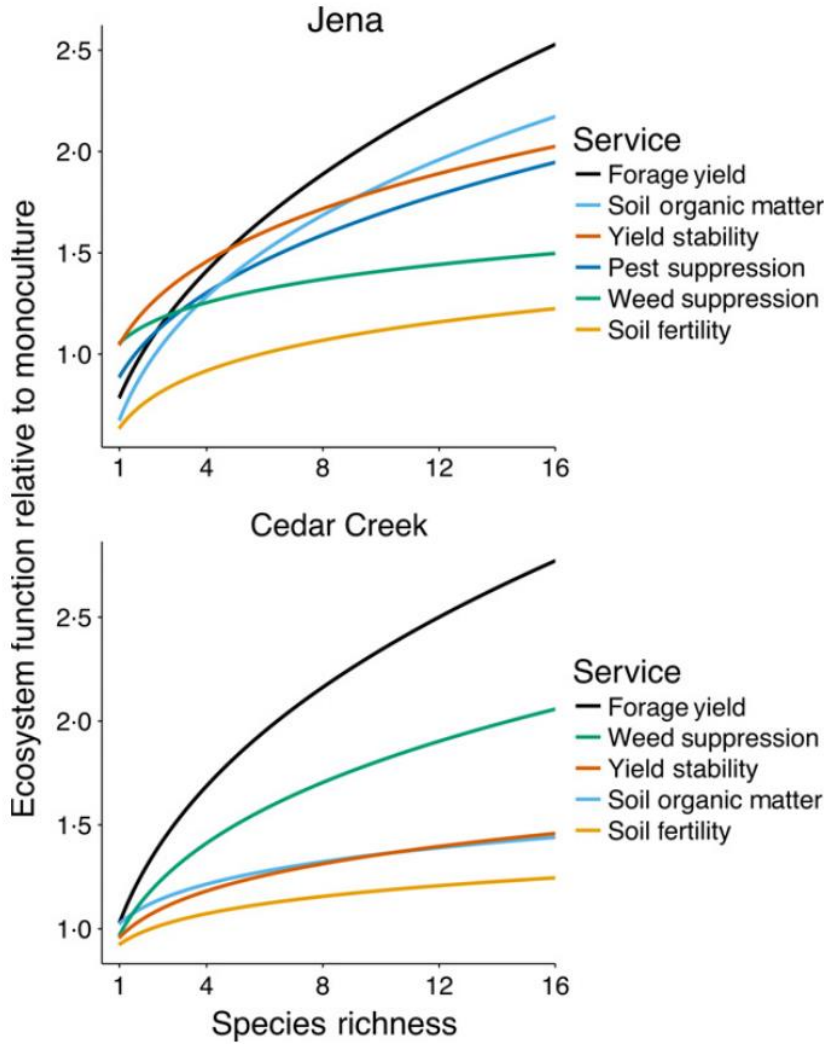


At this scale of inspection only part of the system is observed therefore some complexity but no emergence can be detected

At this scale of inspection more of the system is observed therefore greater complexity but little if any emergence can be detected

At this scale of inspection all of the system is observed therefore all of the complexity and emergence can be detected

Diversity



Journal of Ecology

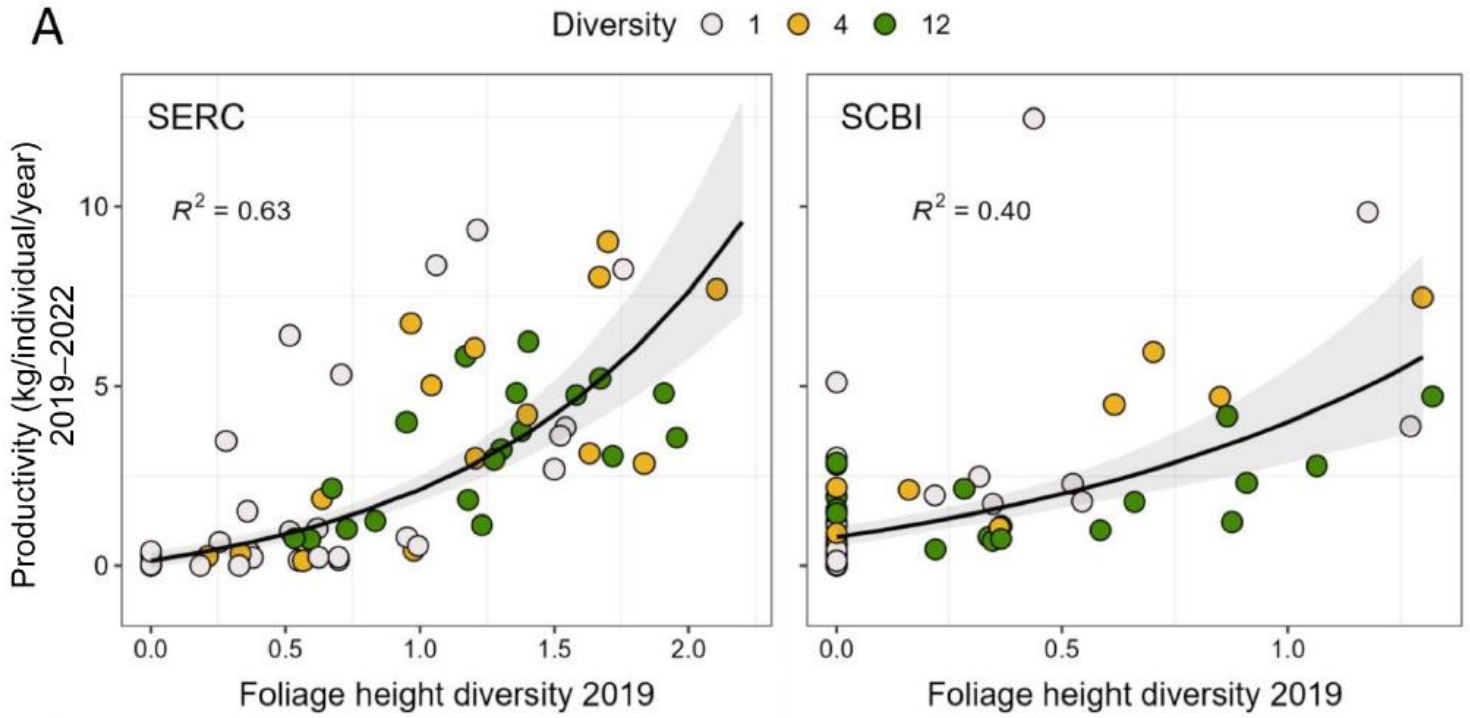
Journal of Ecology 2017, **105**, 871–879 doi: 10.1111/1365-2745.12789

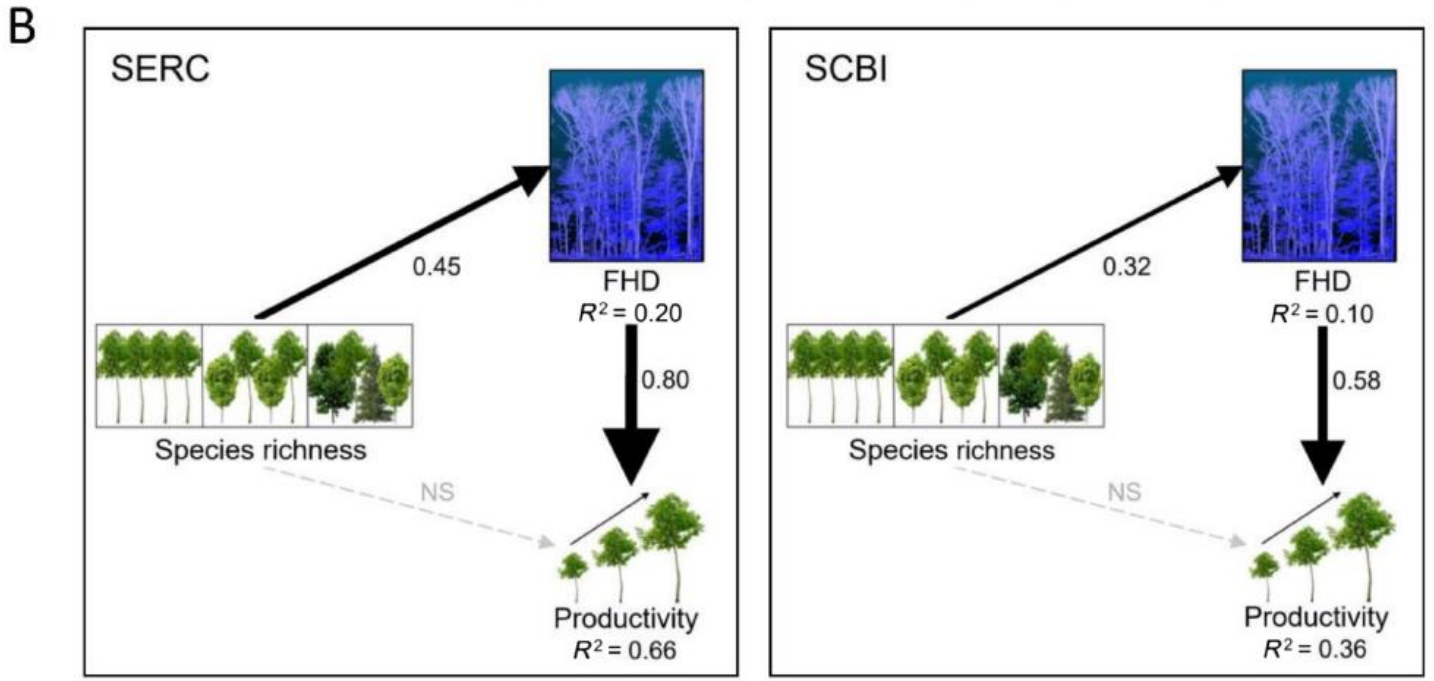
MINI-REVIEW: ECOLOGICAL SOLUTIONS TO GLOBAL FOOD SECURITY

Benefits of increasing plant diversity in sustainable agroecosystems

Forest Isbell*[,1], Paul R. Adler[2], Nico Eisenhauer[3,4], Dario Fornara[5], Kaitlin Kimmel[1], Claire Kremen[6], Deborah K. Letourneau[7], Matt Liebman[8], H. Wayne Polley[9], Sandra Quijas[10] and Michael Scherer-Lorenzen[11]

Complexity



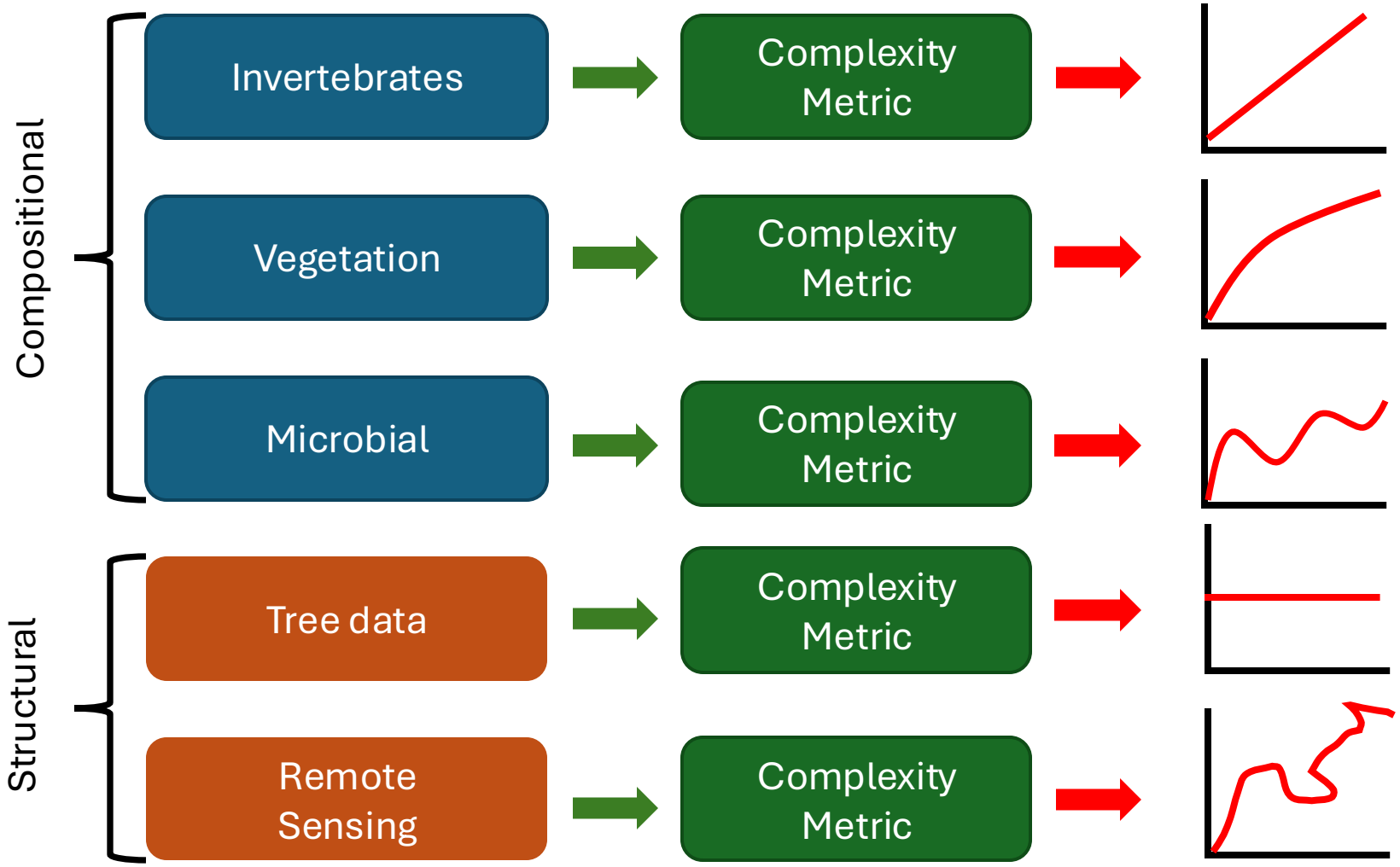


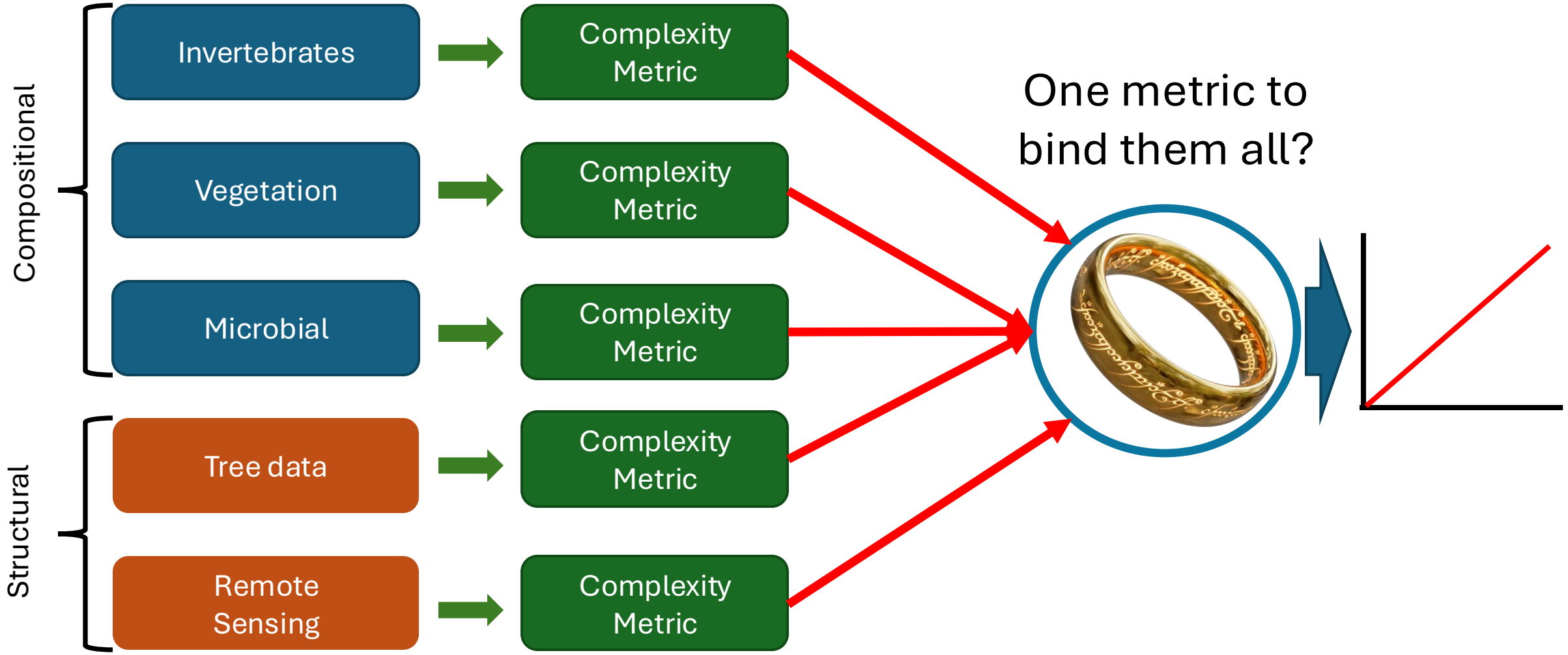
REPORT

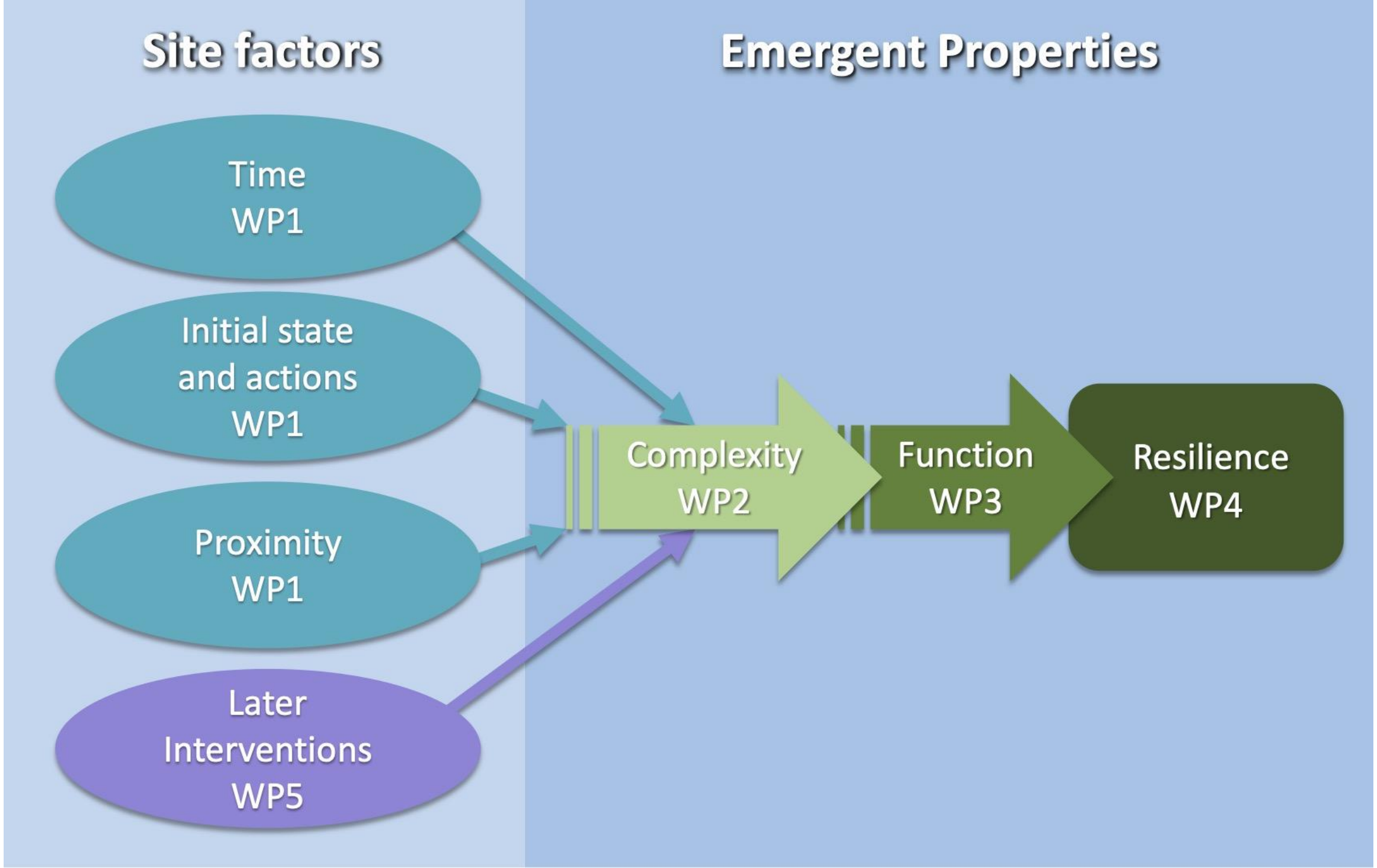
ECOLOGY
ECOLOGICAL SOCIETY OF AMERICA

Canopy complexity drives positive effects of tree diversity on productivity in two tree diversity experiments

Catherine Fahey[1] | Dennis Choi[2] | Jianmin Wang[2] | Grant M. Domke[3] | Joseph D. Edwards[4] | Songlin Fei[2] | Stephanie N. Kivlin[4] | Elizabeth A. LaRue[5] | Melissa K. McCormick[1] | William J. McShea[6] | Richard P. Phillips[7] | Jamie Pullen[1] | John D. Parker[1]


Compositional
Invertebrates
Vegetation
Microbial
Structural
Tree data
Remote Sensing
Complexity Metric
Complexity Metric
Complexity Metric
Complexity Metric
Complexity Metric


Compositional
Structural
Invertebrates
Vegetation
Microbial
Tree data
Remote Sensing
Complexity Metric
Complexity Metric
Complexity Metric
Complexity Metric
Complexity Metric
One metric to bind them all?


Site factors
Emergent Properties
Time
WP1
Initial state
and actions
WP1
Proximity
WP1
Later
Interventions
WP5
Complexity
WP2
Function
WP3
Resilience
WP4

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If you have been …

… thank you for listening!

