

Spatial dynamics of biodiversity and ecosystem function in a S. African savanna: a structural equation modeling approach

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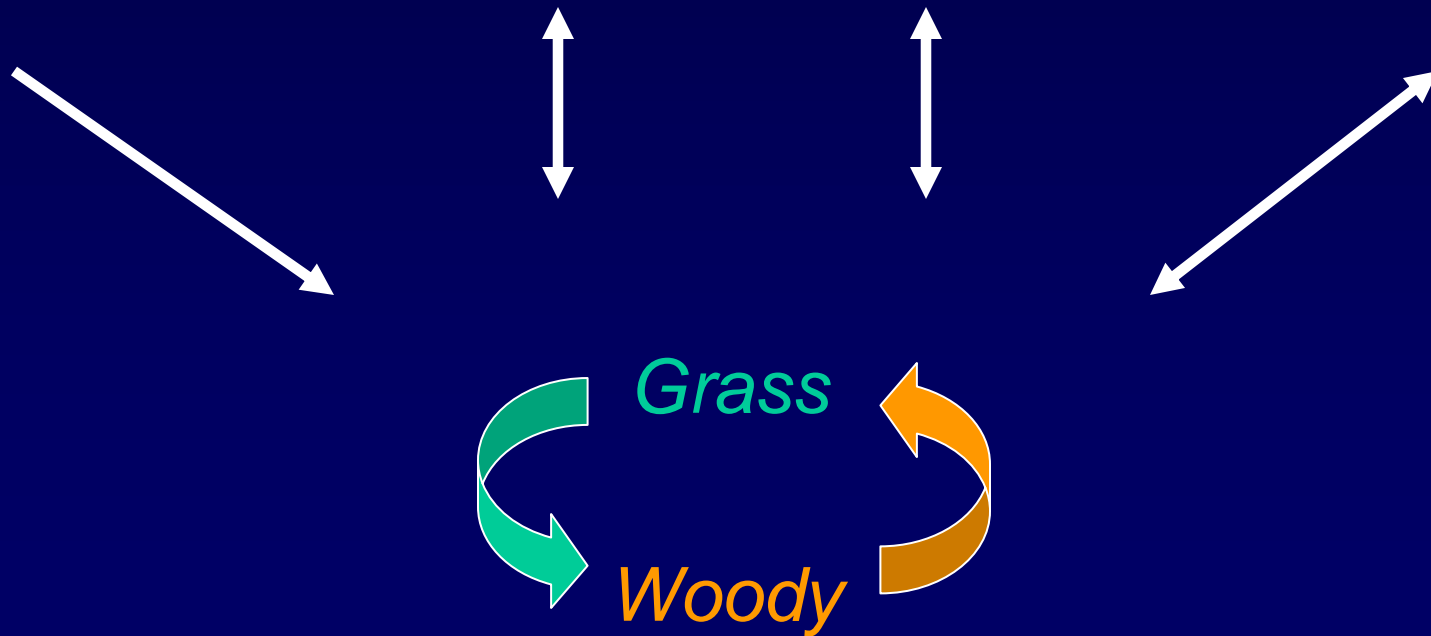
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National Science Foundation

Drivers of Savanna Vegetation



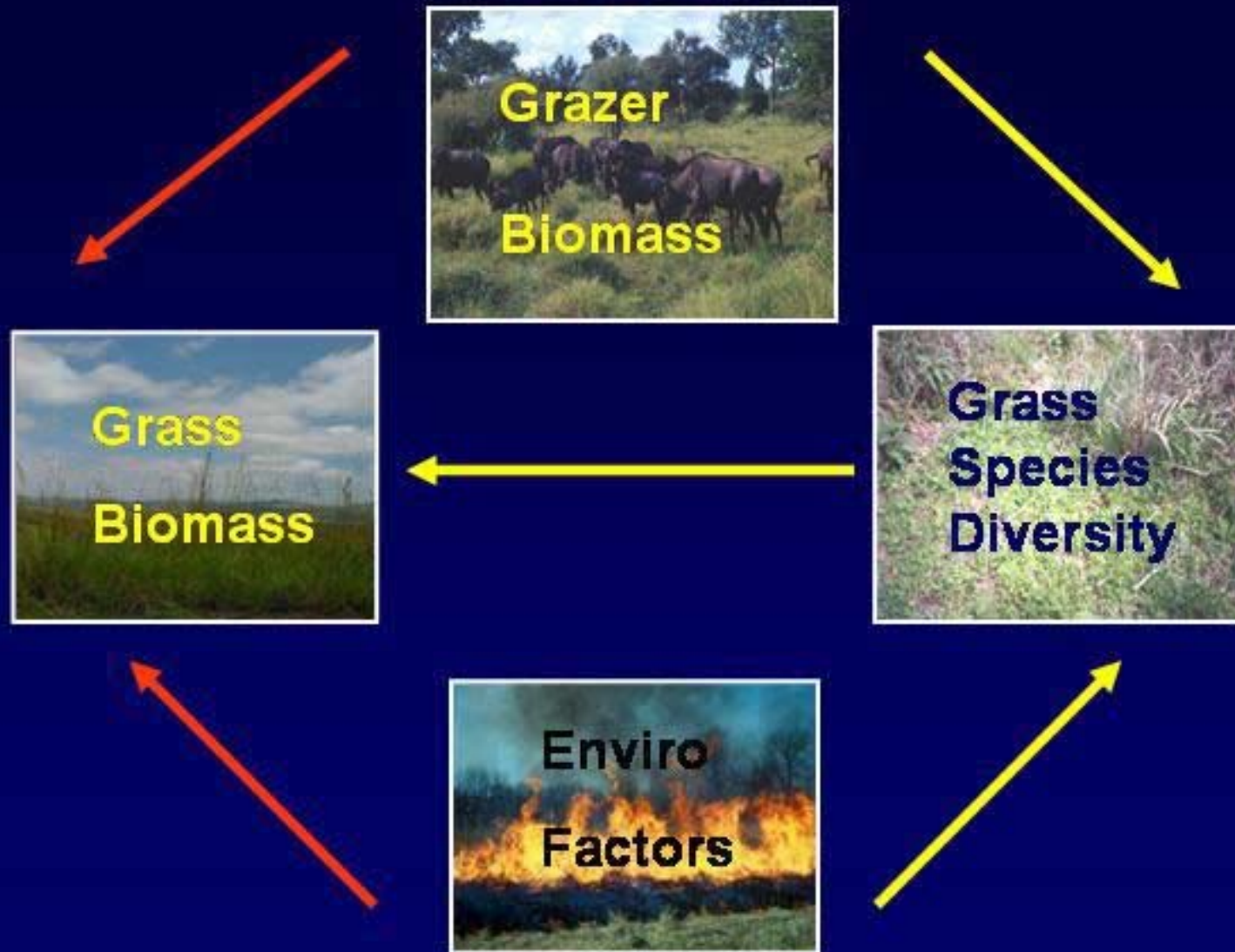
Structural Equation Modeling: Evolving Ecological Questions and Answers

Factors Affecting Grass Diversity and Biomass

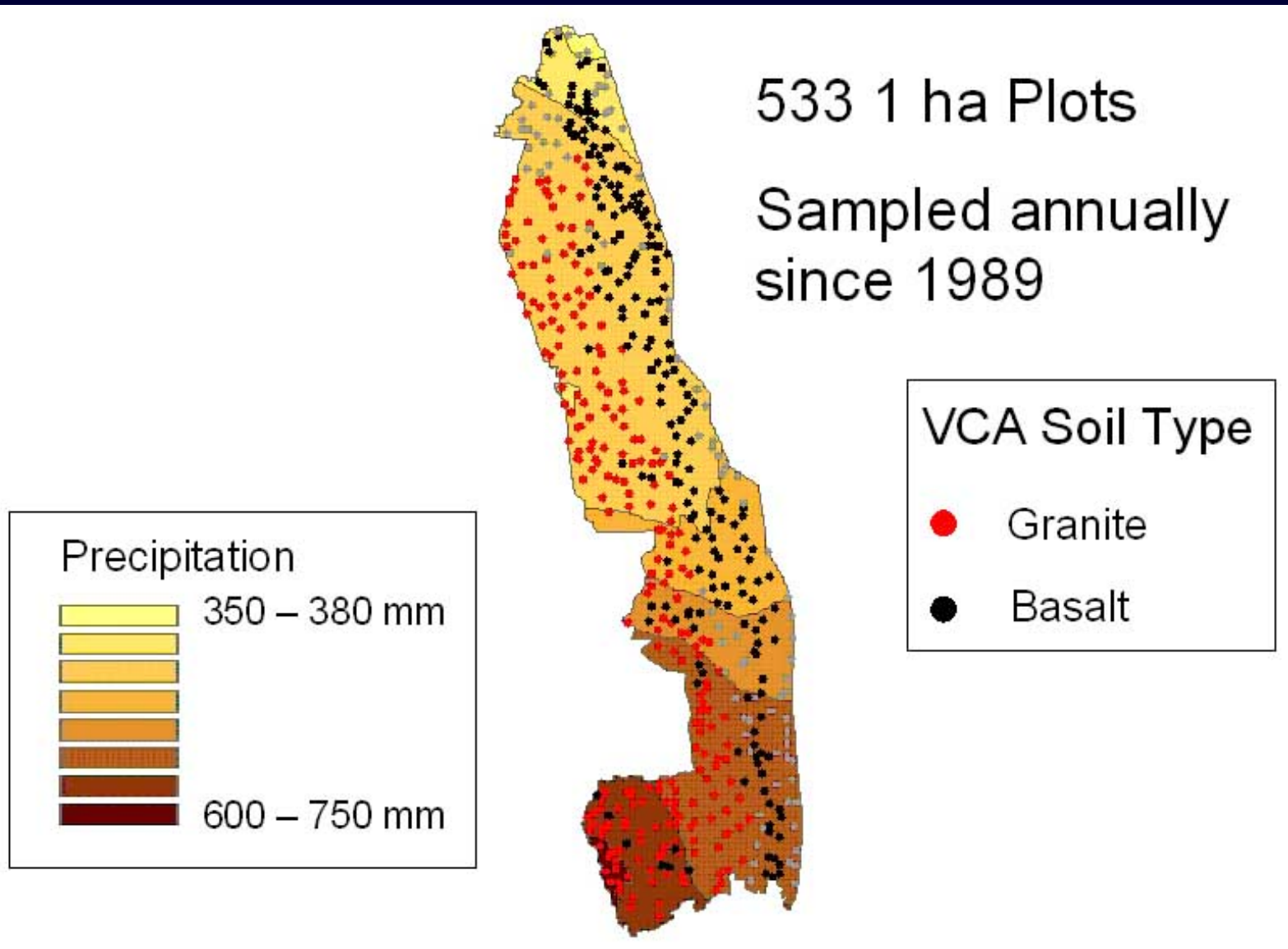
Factors Affecting Other Components of Biodiversity
and Ecosystem Functioning (e.g., large herbivores,
trees)

Appropriate Spatial and Temporal Scales to Maintain &
Monitor Biodiversity

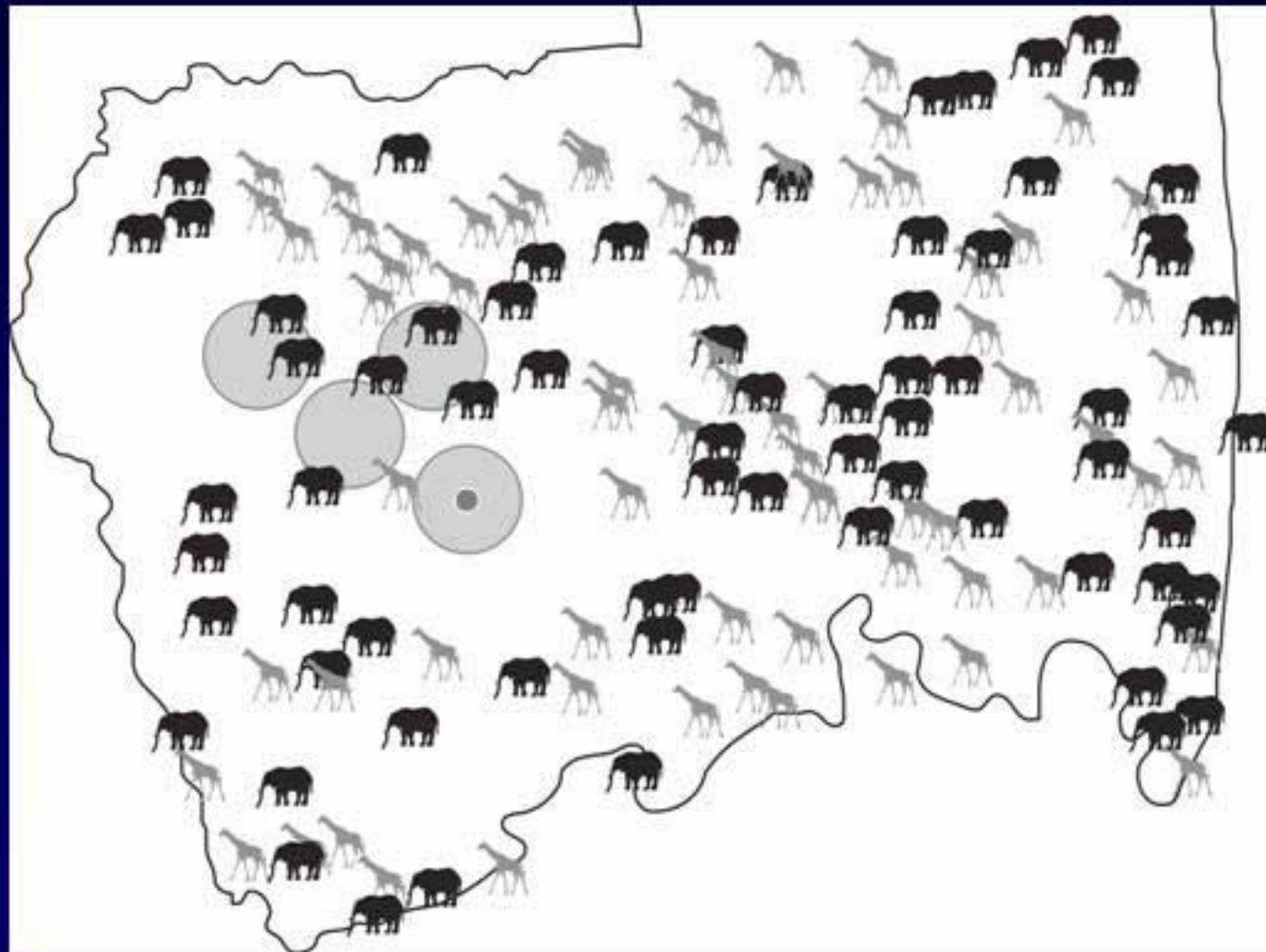
Direct Versus Indirect Effects

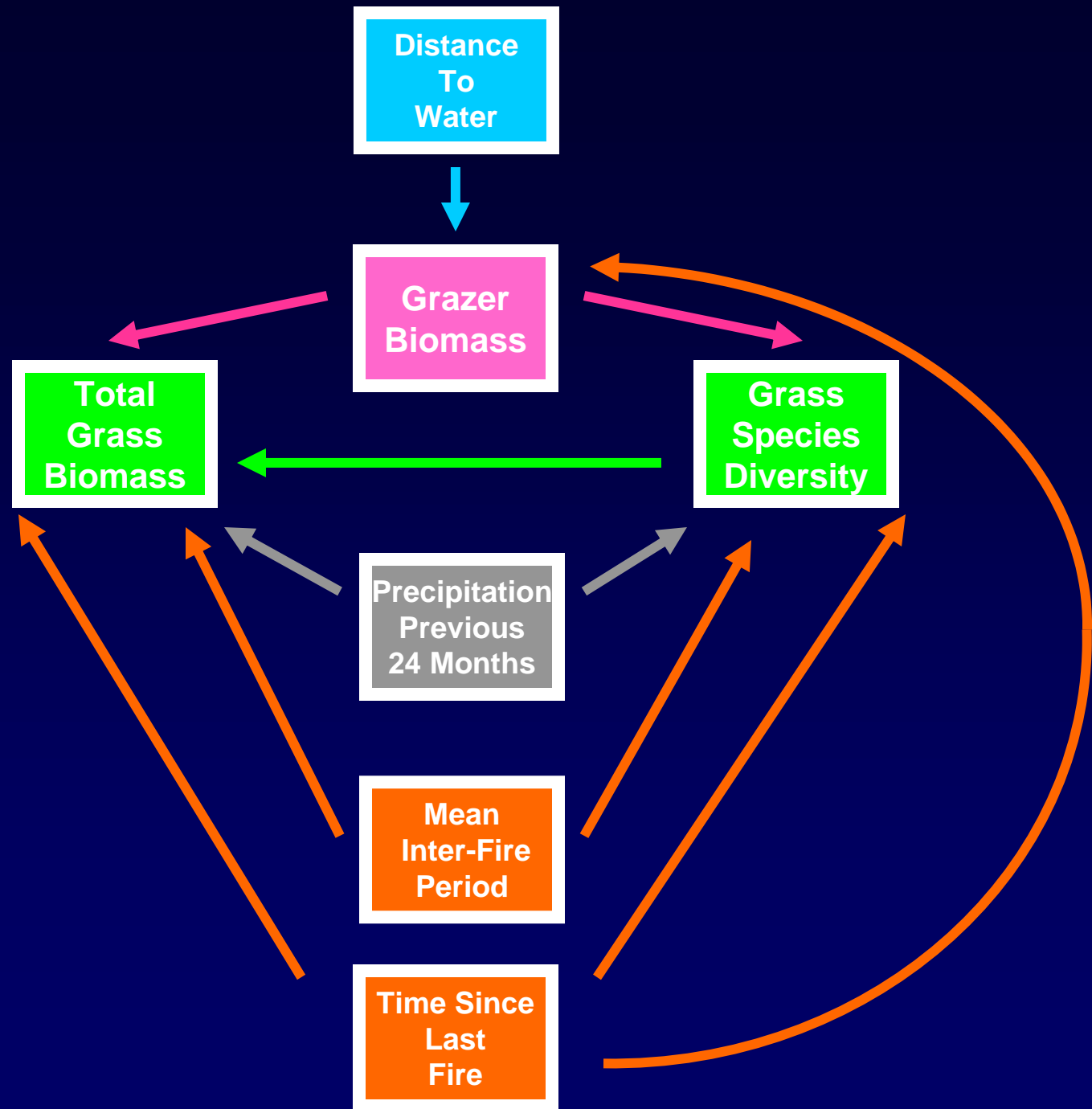


Sampling Protocol for Vegetation



Sampling Protocol for Grazers

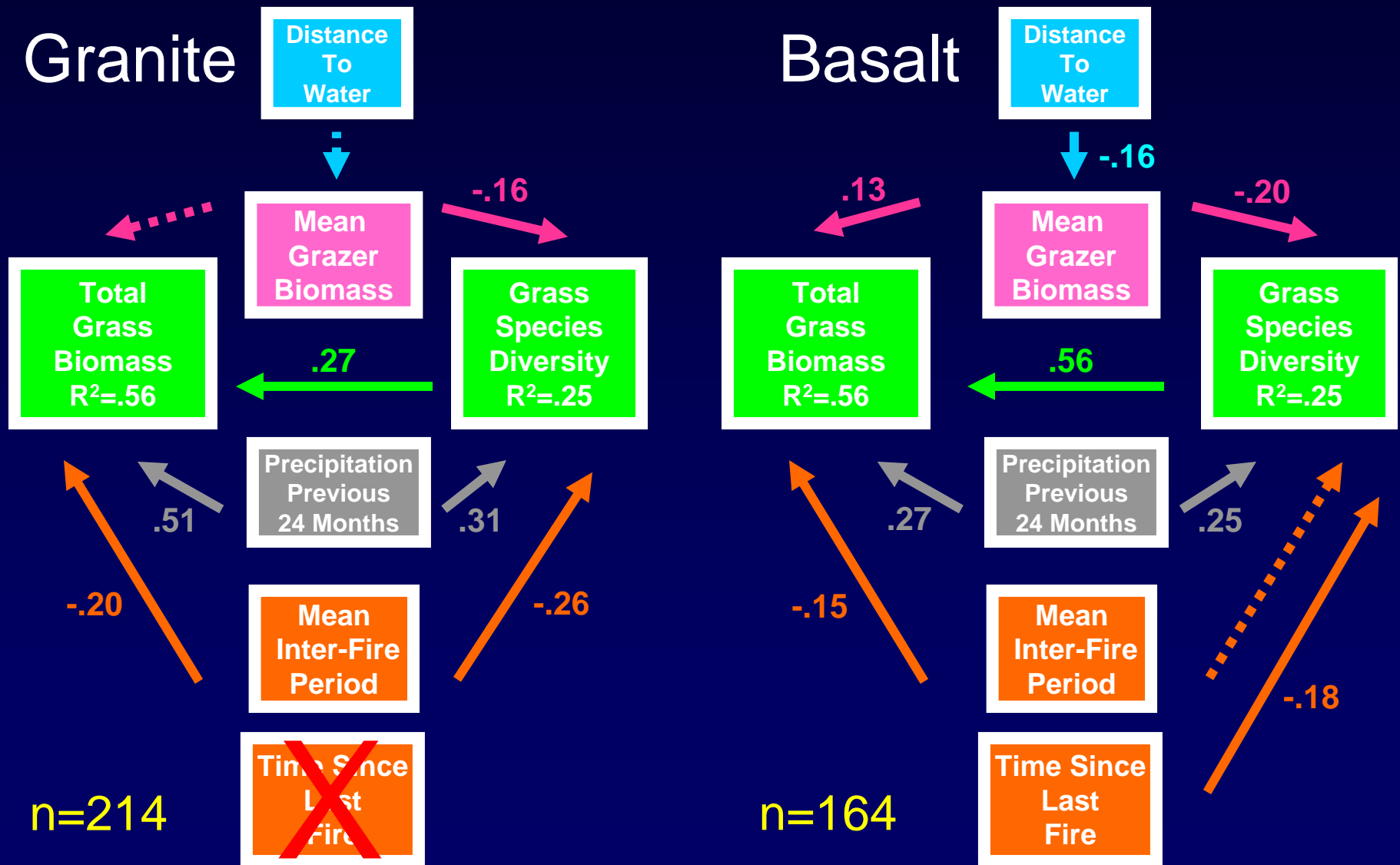




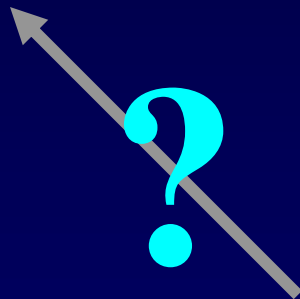
Modeling Approach

1. Evaluate Model Containing Fire, Herbivore, and Precipitation Effects
 - A. Unconstrained (Basaltic Not Same as Granitic)
 - B. Constrained (Basaltic Same as Granitic)
2. Consider Direct and Indirect Effects
 - A. Direct Effect on Total Grass Biomass
 - B. Indirect Effect on Total Grass Biomass Mediated by Some Aspect of Species Diversity
3. Evaluate Model for
 - A. Average Rainfall Year
 - B. Drier than Average Year
4. Consider Short-term Grazing Effects and Long-term Grazing Regime

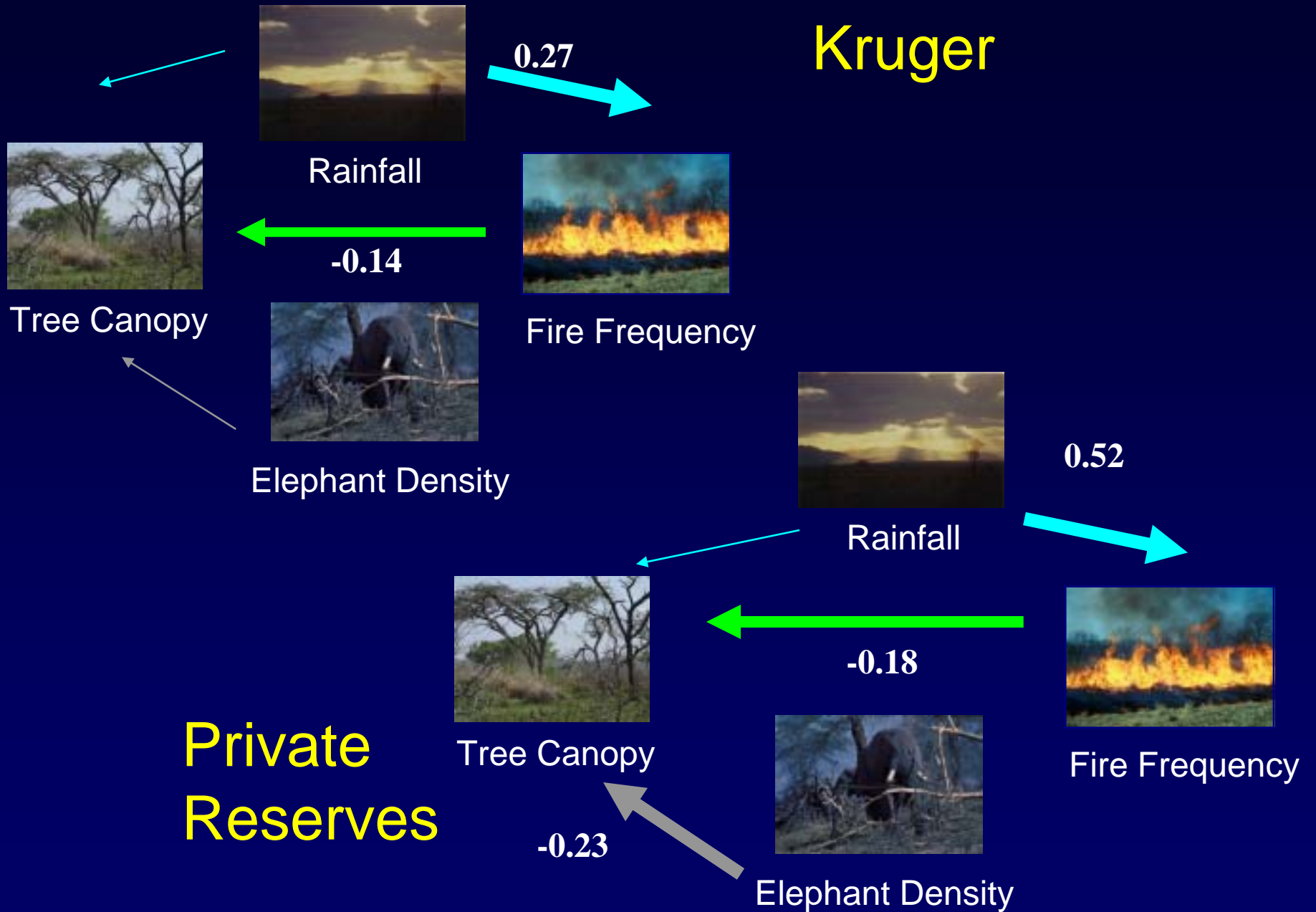
Long-term Grazing Regime



Ecosystem Structure & Ecosystem Function



Kruger



Implications for Management

- **Analytical framework for understanding complex ecological relationships & evaluating assumptions underlying management decisions**
- **TPCs for granitic and basaltic soils may differ**
- **More frequent fires promote grass species diversity**
- **Effects of herbivory on both plant diversity and biomass are weak**