

Fire as a spatial process affects the stability in savannas

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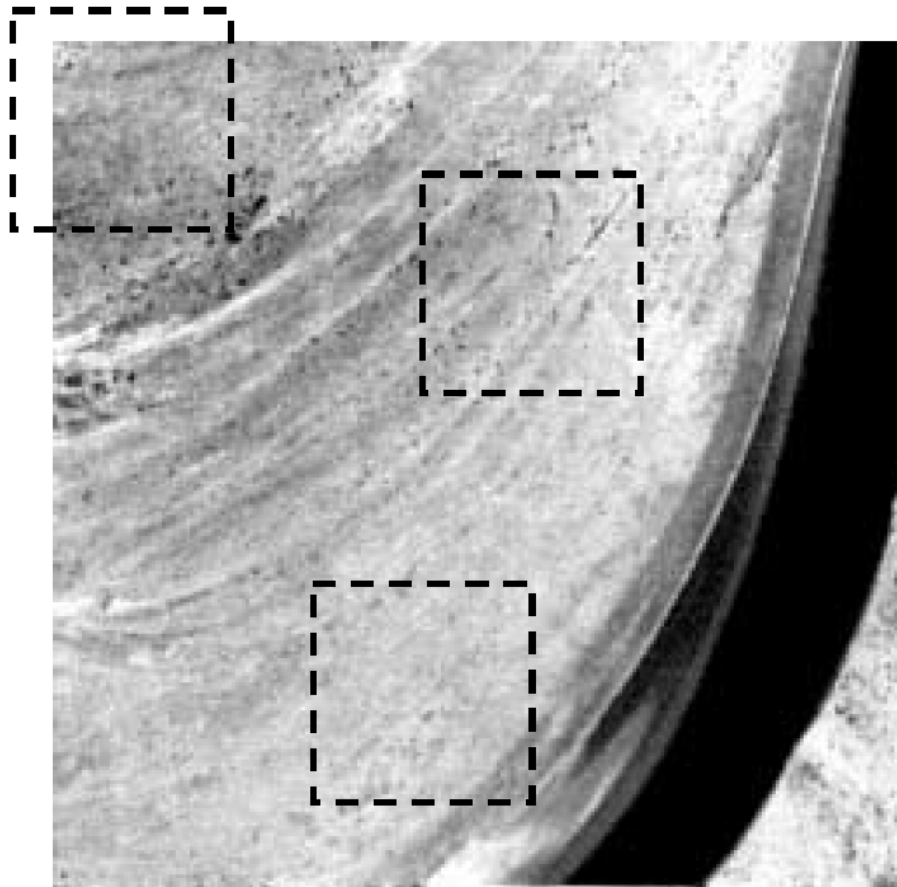
1903



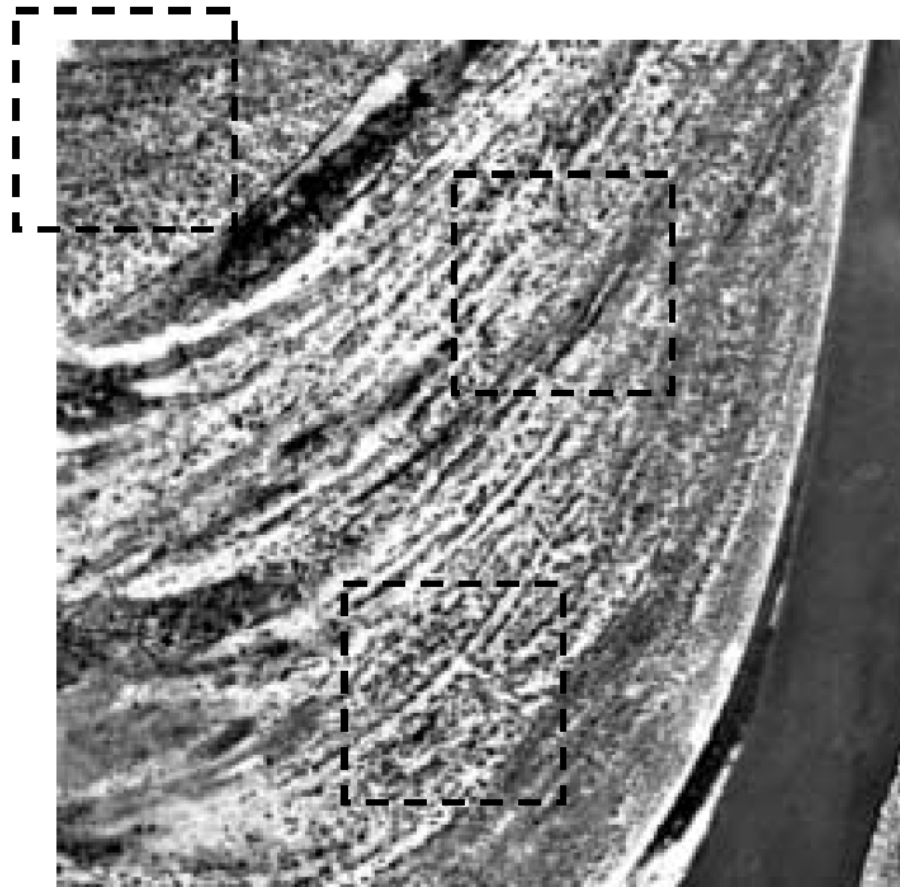
1997



Sharp & Whittaker 2003



1948

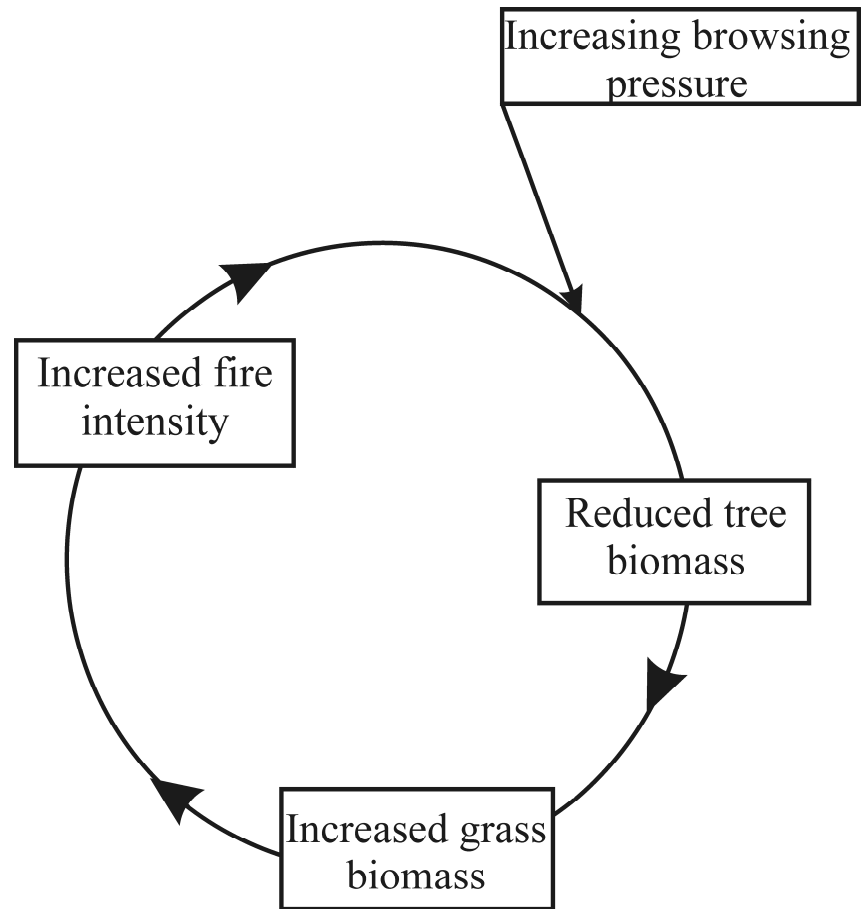
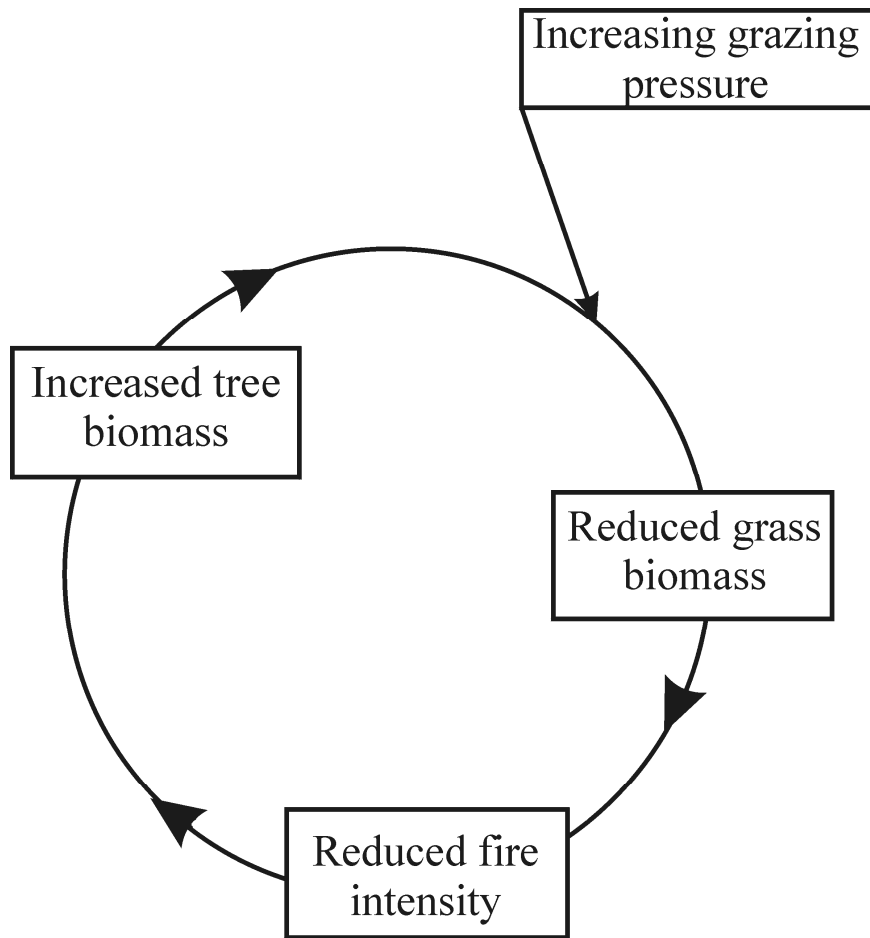


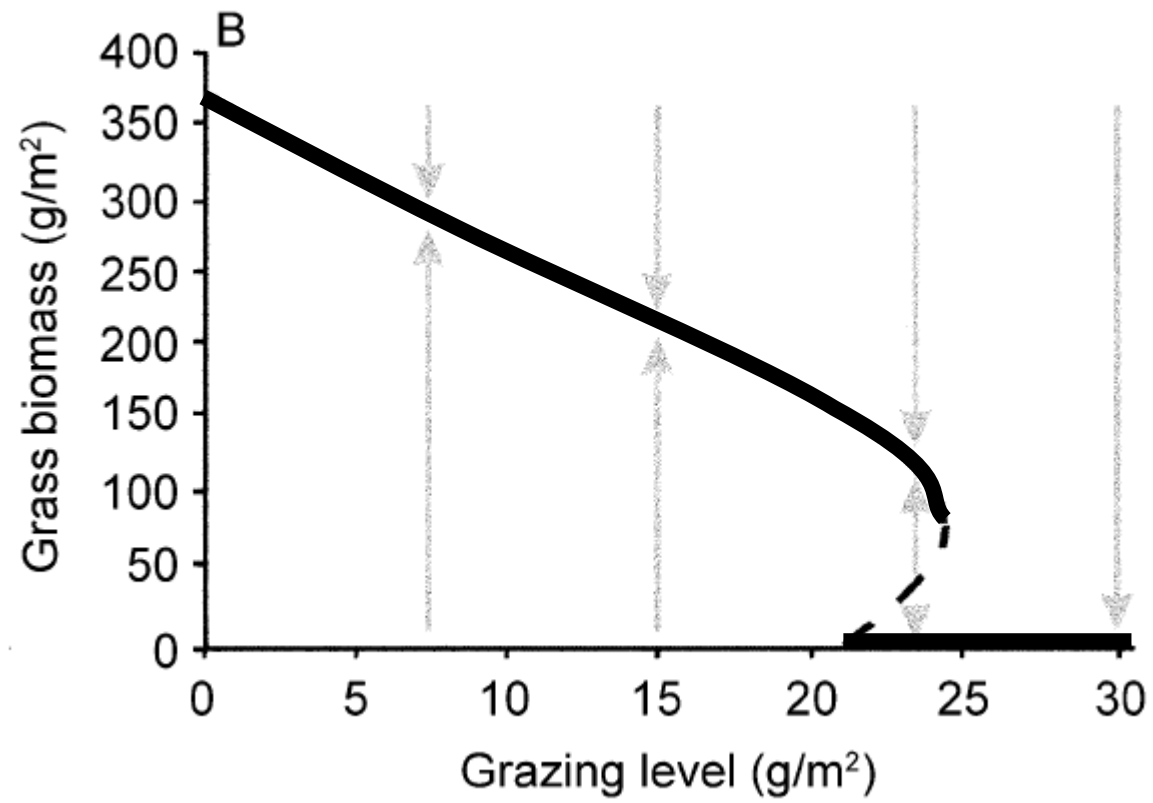
1993

Sharp & Whittaker 2003





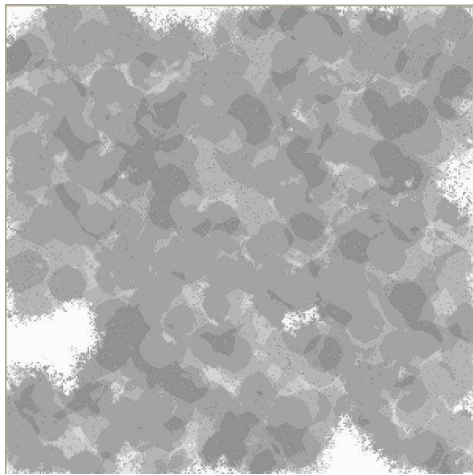




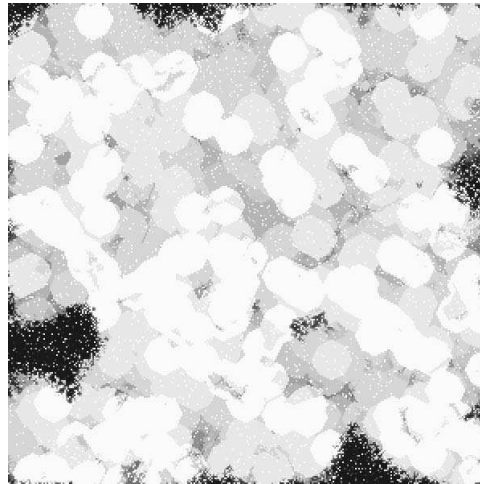
Van Langevelde et al. 2003



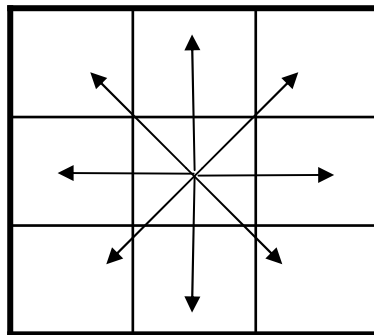
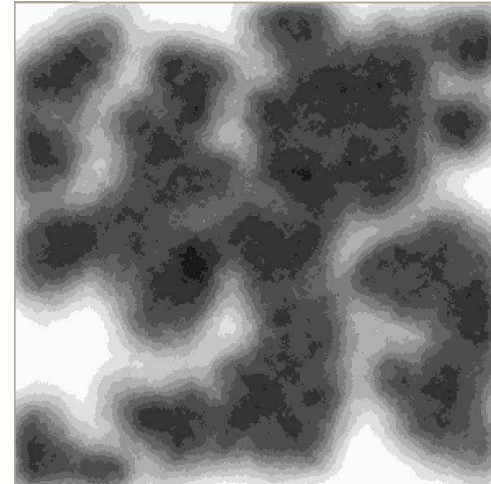
Grass



Trees

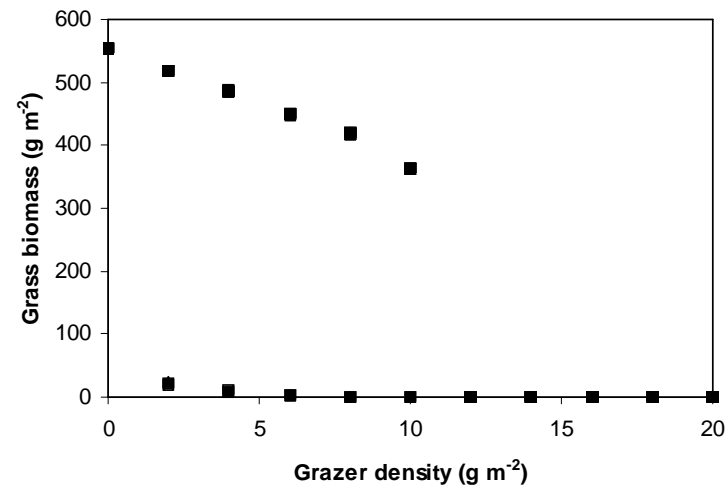


Fires

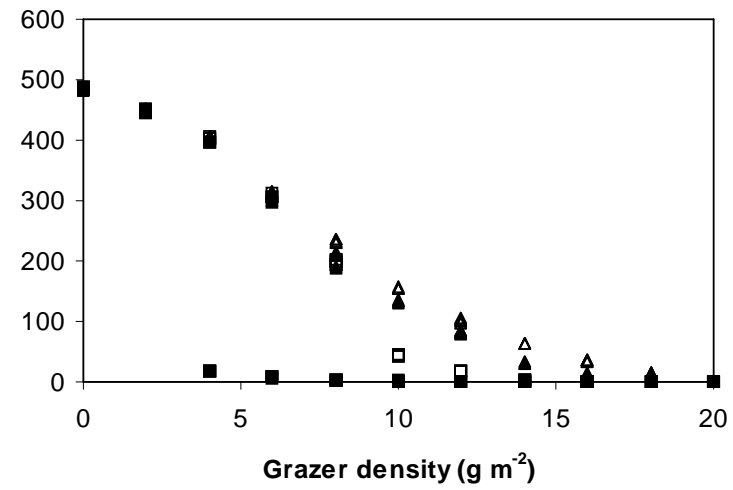


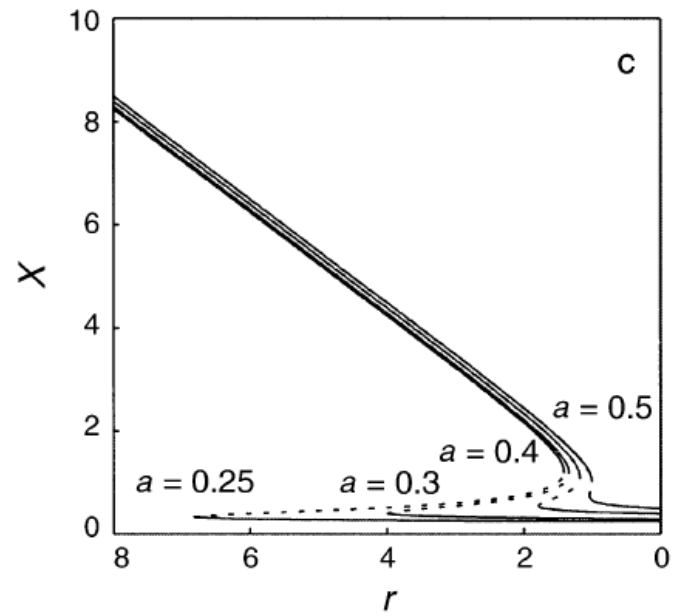
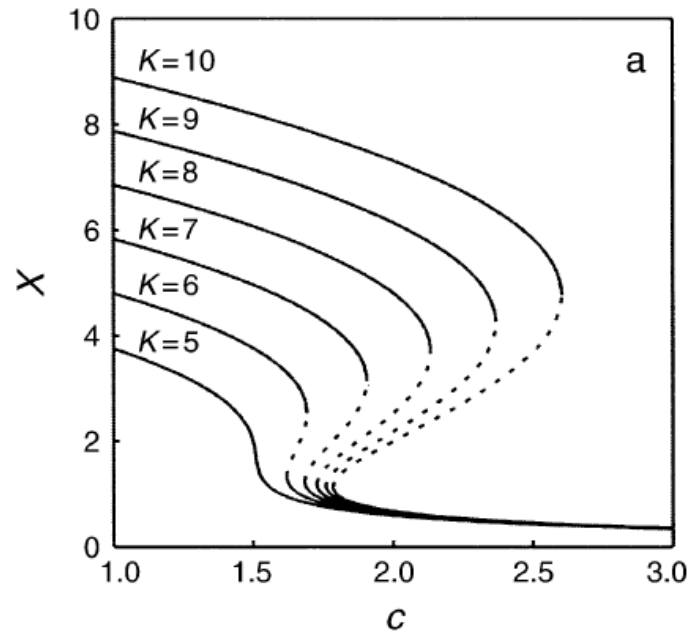
(Berjak and Hearne 2002)

Non-Spatial

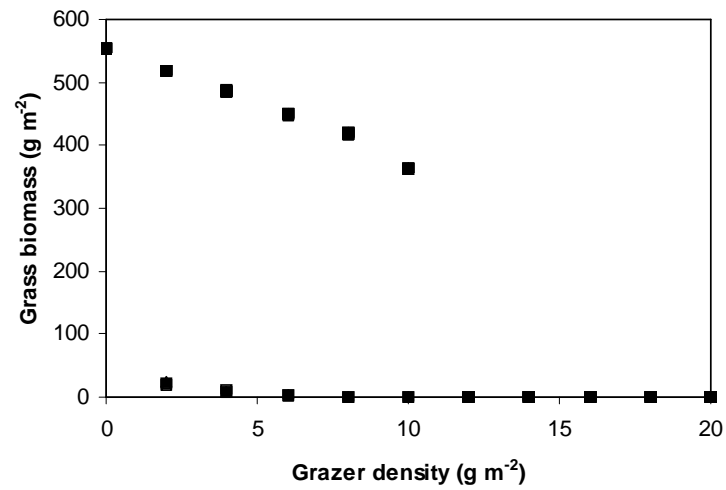


Spatial

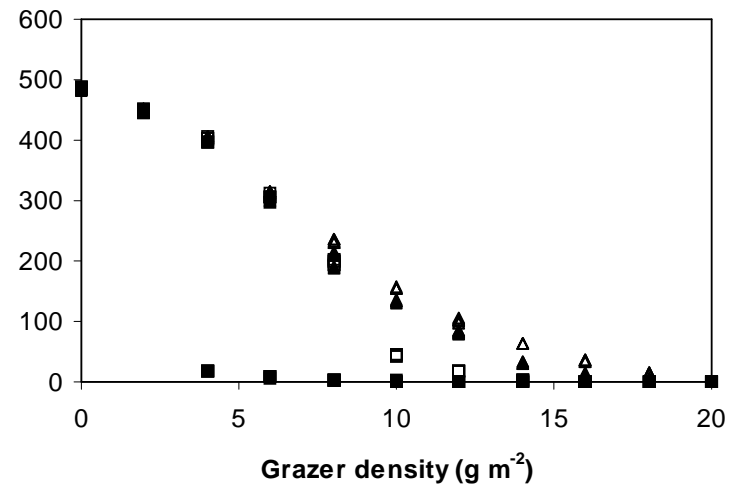




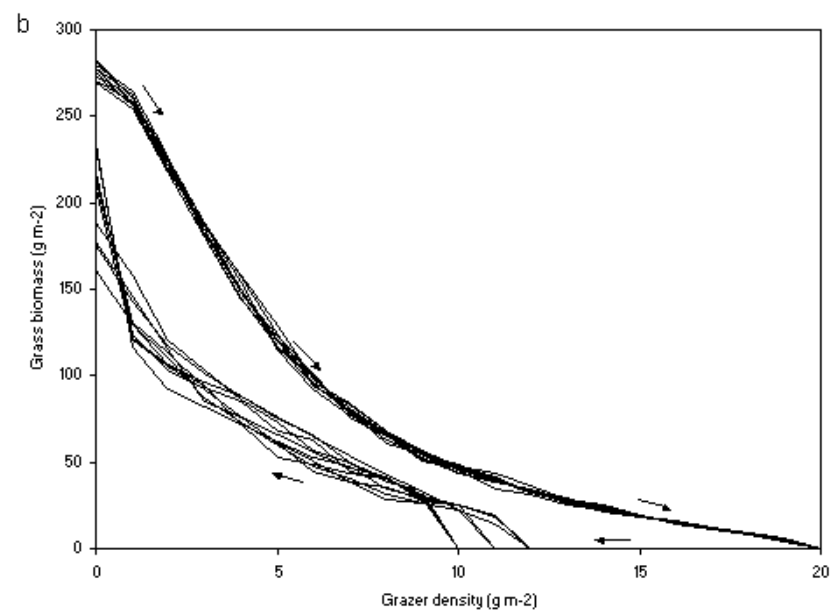
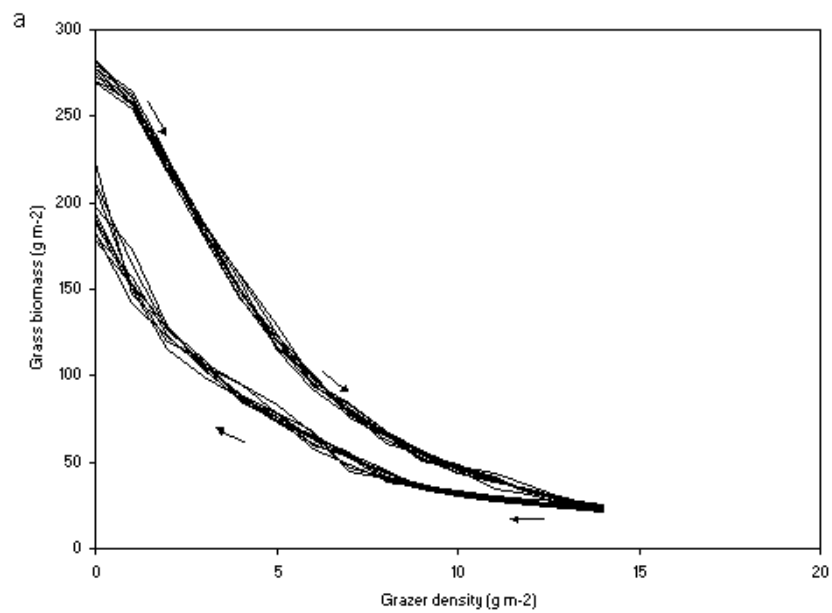
Non-Spatial



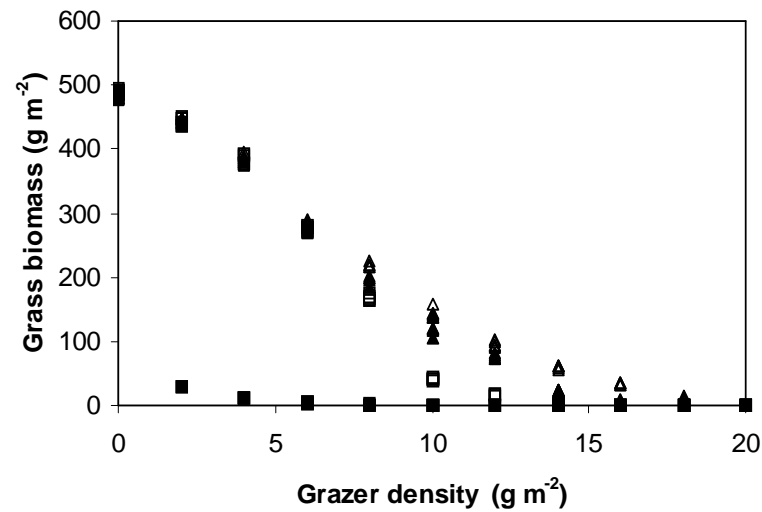
Spatial



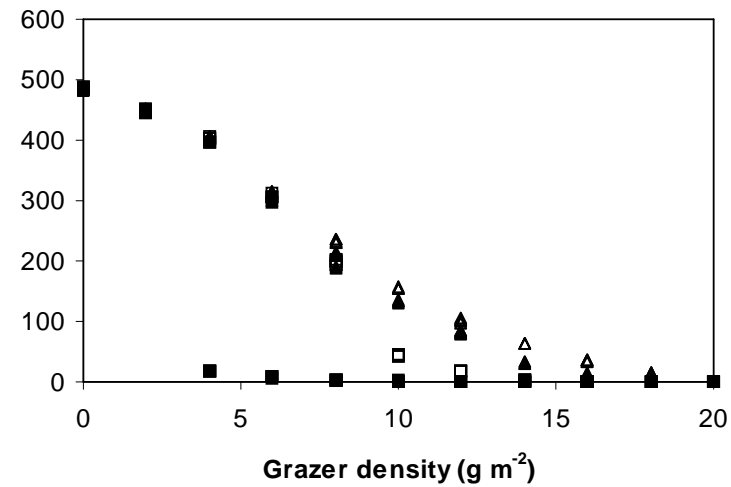
Hysteresis?



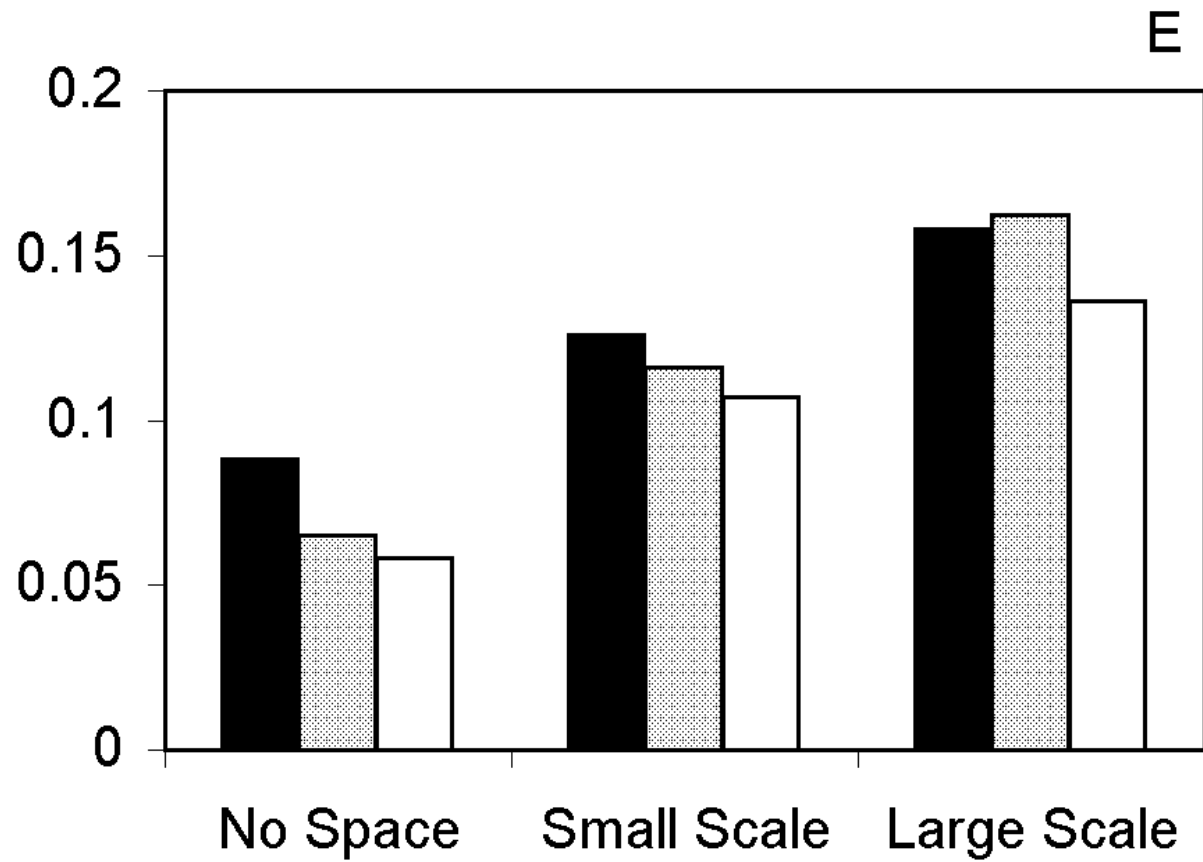
Large scale



Small Scale



Conditions for alternative stable states?



■ Grazer density = 5 g m⁻²
▒ Grazer density = 10 g m⁻²
□ Grazer density = 15 g m⁻²

Concluding remarks

- Fire as a spatial process reduces occurrence bush encroachment shift
- Even without Encroachment shift, hysteresis is still possible
- Scale of burning has effect on the abiotic conditions where hysteresis can occur
- The BIG question: Are encroached savannas really that stable as suggested by models?

Thank You

Cited literature

- Berjak, S. G. and J. W. Hearne (2002). An improved cellular automaton model for simulating fire in a spatially heterogeneous Savanna system. Ecological Modelling. **148**: 133-151.
- Sharp, B. and R. Whittaker (2003). The irreversible cattle-driven transformation of a seasonably flooded Australian savanna. Journal of Biogeography **30**: 783-802.
- Van Langevelde, F., C. A. D. M. Van de Vijver, et al. (2003). Effects of fire and herbivory on the stability of savanna ecosystems. Ecology **84**: 337-350.
- Van Nes, E. H. and M. Scheffer (2005). "Implications of spatial heterogeneity for catastrophic regime shifts in ecosystems." Ecology **86**(7): 1797-1807.