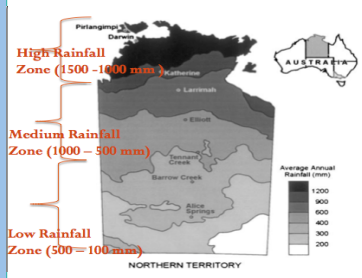
A Story of Fire, Earth and Water in the Northern Territory Savannas

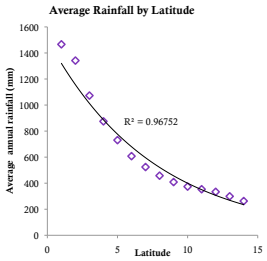
Barbara Bernal[1], Andrew C. Edwards[2] and Lindsay B. Hutley[3]

[1]Research Institute for the Environment and Livelihoods, Charles Darwin University. [2]Centre for Bushfire Research, Charles Darwin University. [3]Research Institute for the Environment and Livelihoods

Introduction

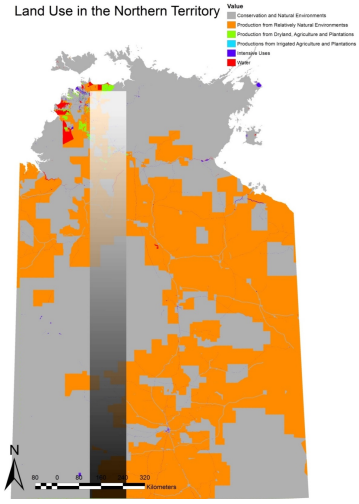
Primary productivity refers to the rate at which energy is converted to vegetative biomass, it responds to a variety of factors such as rainfall and disturbance regimes (1,2). The Northern Australian Tropical Transect (NATT) graduates from 400 mm up to 2,000 mm mean annual rainfall along a south to north gradient, this rainfall gradient affects vegetation structure, floristic composition and productivity (3). Due to the dry-wet season cycle, fire is the regular disturbance, with around 40% of the landscape burning every year; the frequency and severity of fire events can influence primary productivity and impact the carbon cycle (4). The aim of this study was to examine the relationship between antecedent fire regimes and rainfall variability in the primary production of the three different rainfall zones along the NATT, and to characterize the post-fire recovery rate of savanna vegetation in terms of primary production.





Study Site and Data

The selection of sites for this project was based on overlaying a grid of cells along the NATT, representing a variety of savanna-woodland vegetation along the 'conservation and natural environment' land use type. Spatial data on fPAR (Fraction of Photosynthetically Active Radiation), fire and rainfall was obtained for the study sites to compare these three variables for the time series of 2009 to 2014.

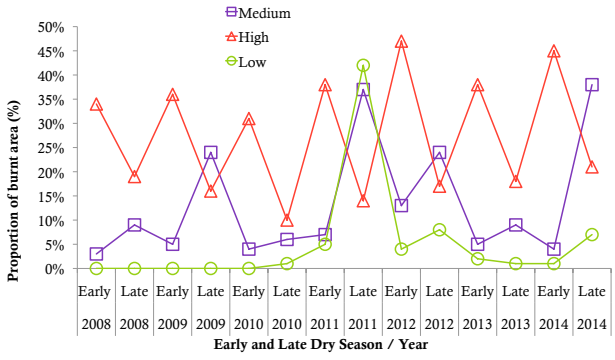


References:

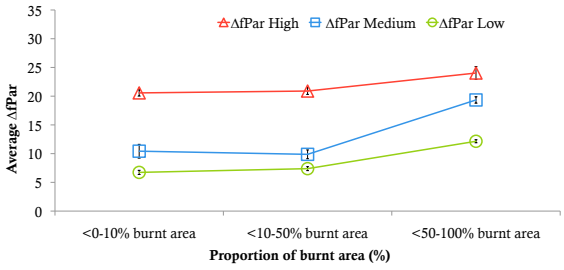
1- Beringer, J., et al. *Global Change Biology,* **2005**, 21**,** 62-81.
2- Kanniah, K., et al. *Progress in Physical Geography*. **2010,** 34(4), 454-490.
3- Beringer, J., et al. 2003. *International Journal of Wildland Fire,* **2003** 12**,** 333-340.
4- Cook, D. & Heerdegen, G. *International Journal of Climatology,* 2001, 21**,** 1723-1732

Inter-annual Rainfall Variability

Inter-annual Fire Variability



Average ΔFPAR and Proportion of Burnt Area



$\Delta fPAR_i$ = April $fPAR_i$ – October $fPAR_{i-1}$

Main Findings

The rainfall time series shows the abnormal increase of rainfall in the wet season of 2010- 2011, with increased fire activity for the Medium and Low rainfall zones. The semi-arid savannas of the NT show a high sensitivity to rainfall variability, while the High rainfall zone has a more stable response in primary production. High proportion of burnt area shows higher response in ΔFPAR values for the semi-arid zones.