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Introduction

An understanding of natural forest dynamics (under no human disturbance) is essential to conservation, as most conservation decisions such as conservation management, nature-friendly land use practices, and nature restoration, can not be sensibly done without such a standard.

High Forest

Wood Pasture

There are two competing theories about how primeval forests looked like :

1. A widely accepted view — High Forest — is that closed-canopy mixed-deciduous forests dominate the landscape with regeneration in canopy gaps.

2. A new hypothesis — Wood Pasture — is that herbivores do not only create larger openness in the canopy by browsing, but also drive the whole forest regeneration through a cycling process: open land - shrubs - closed canopy - break-up

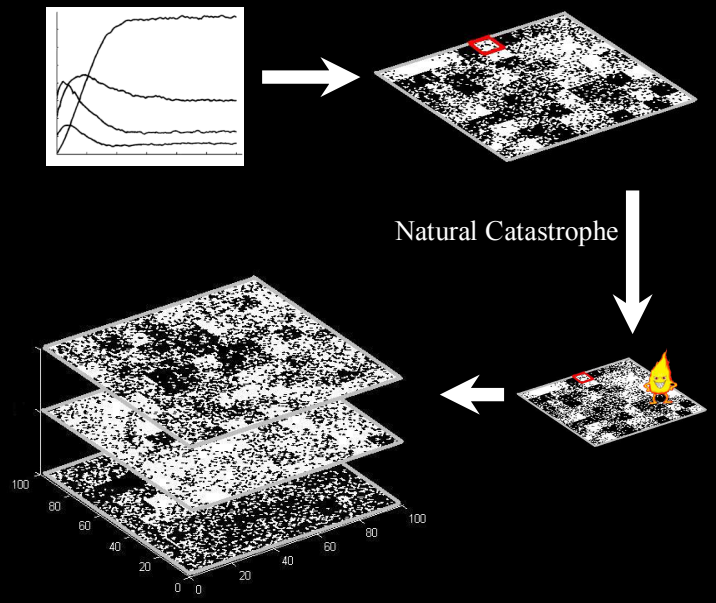
Method

A revised Lotka-Volterra equation is used to calculate populations of four compositing 'species' in each patch: mature trees (canopy), junior trees (understory), shrubs (understory) and ground flora (ground).

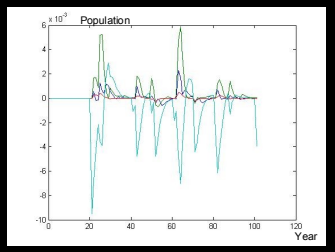
$$dN / dt = r_i N_i * (1 - \sum_{i=1,j=1}^{4} \frac{\alpha_{ij} N_j}{k_i}) + \sum_{i \neq j} \beta_{ij} N_j - \gamma_i N_i$$

Where r is natural growth; k is carrying; α is competition pressure and density pressure; β is the reproduction rate of Mature Trees and the rate of Junior Trees move into Mature Trees every year; γ is browsing pressure.

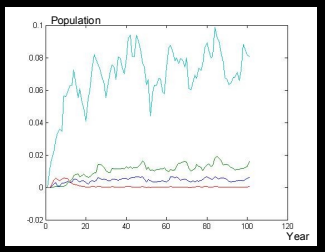
10*10 patches are located in two types of landscapes: A homogeneous land where herbivores are free to move anywhere, and thus create synchronized break-up and openness in all patches every 200 years; A disparate land where each patch has its own break-up year.



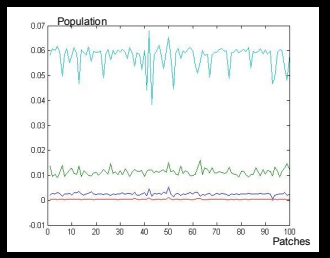
Results



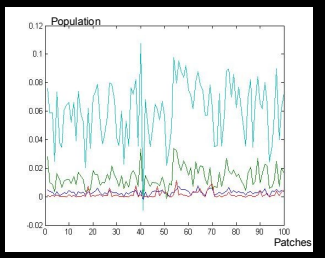
(a)



(b)



(c)



(d)

(a) & (c): variance difference between homogeneous wood pasture land and high forest land; (a) spatial scale; (c) temporal scale;
(b) & (d): variance difference between disparate wood pasture land and high forest land; (b) spatial scale; (d) temporal scale.

Conclusions & Discussions

These two hypothesises showed

1. different temporal pattern on homogeneous land, but similar spatial pattern.
2. different temporal and spatial pattern on disparate land.
3. Canopies differ most under two different dynamics.
4. More detailed analyse of the differences and their causing factor is needed.