

Tropical Forest Dynamics and its Impacts

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Change



Not just document change, understand, and predict it

Outline

(1) Forest change

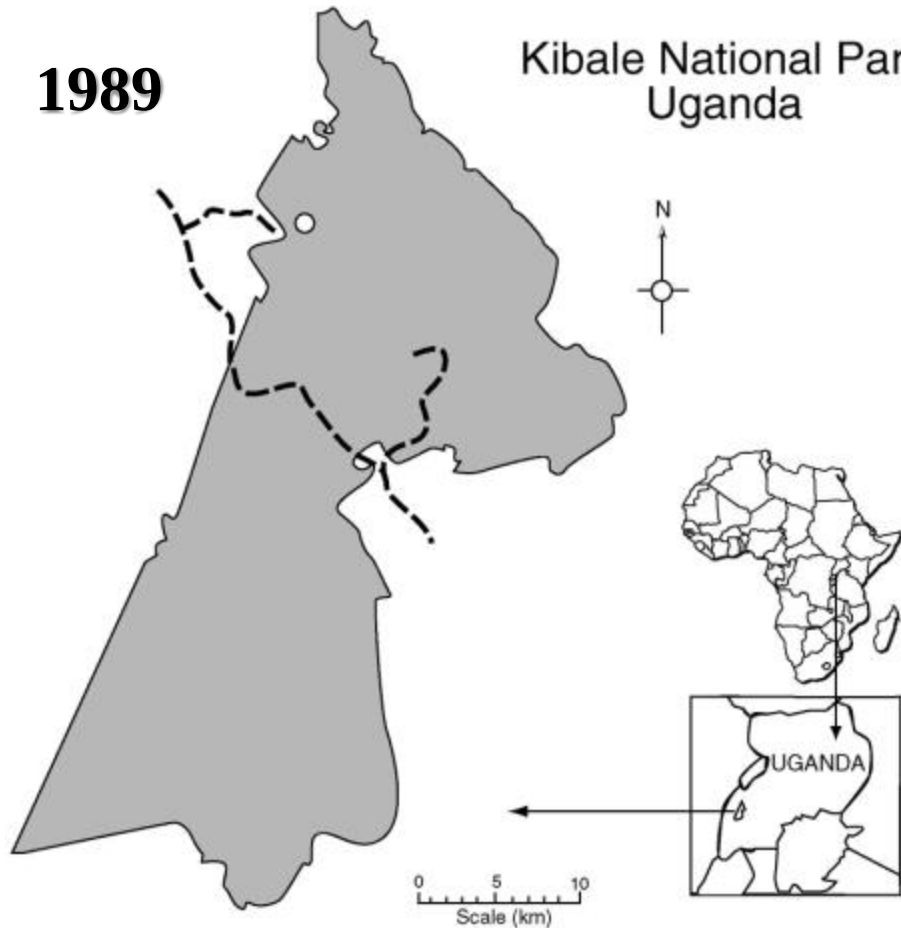
(2) Climate change & plant chemistry

(3) Overall impact on primate populations

(4) Conclusions

1989

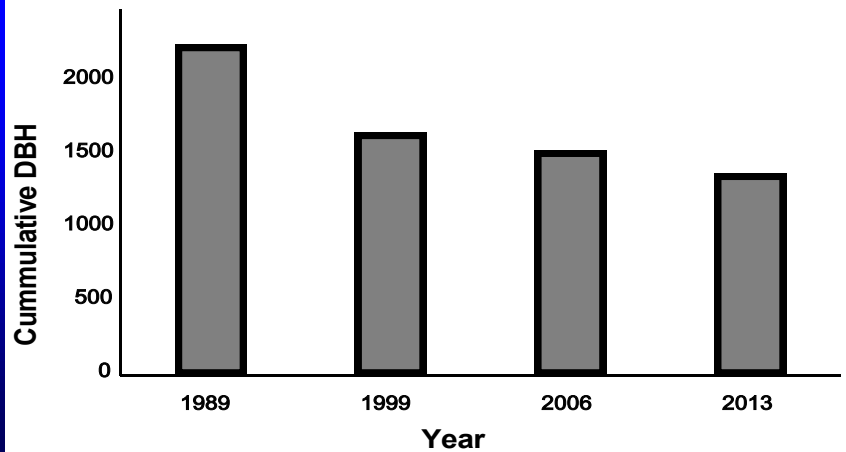
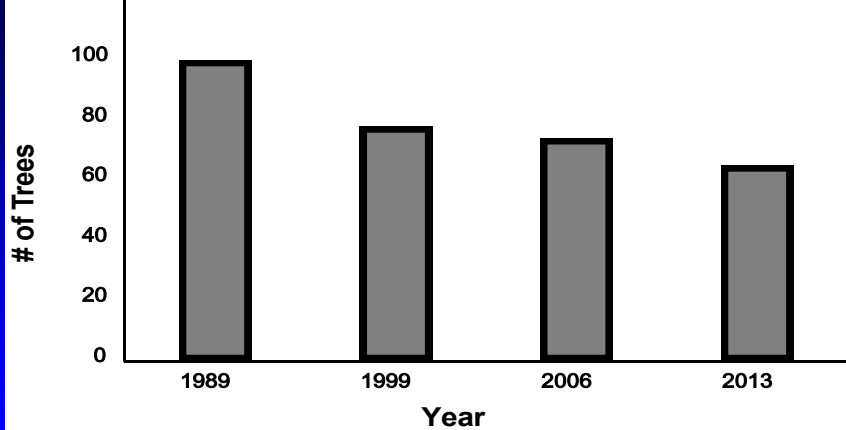
Kibale National Park Uganda



Changes in Forest Composition 1989-2013



Markhamia lutea





Celtis durandii

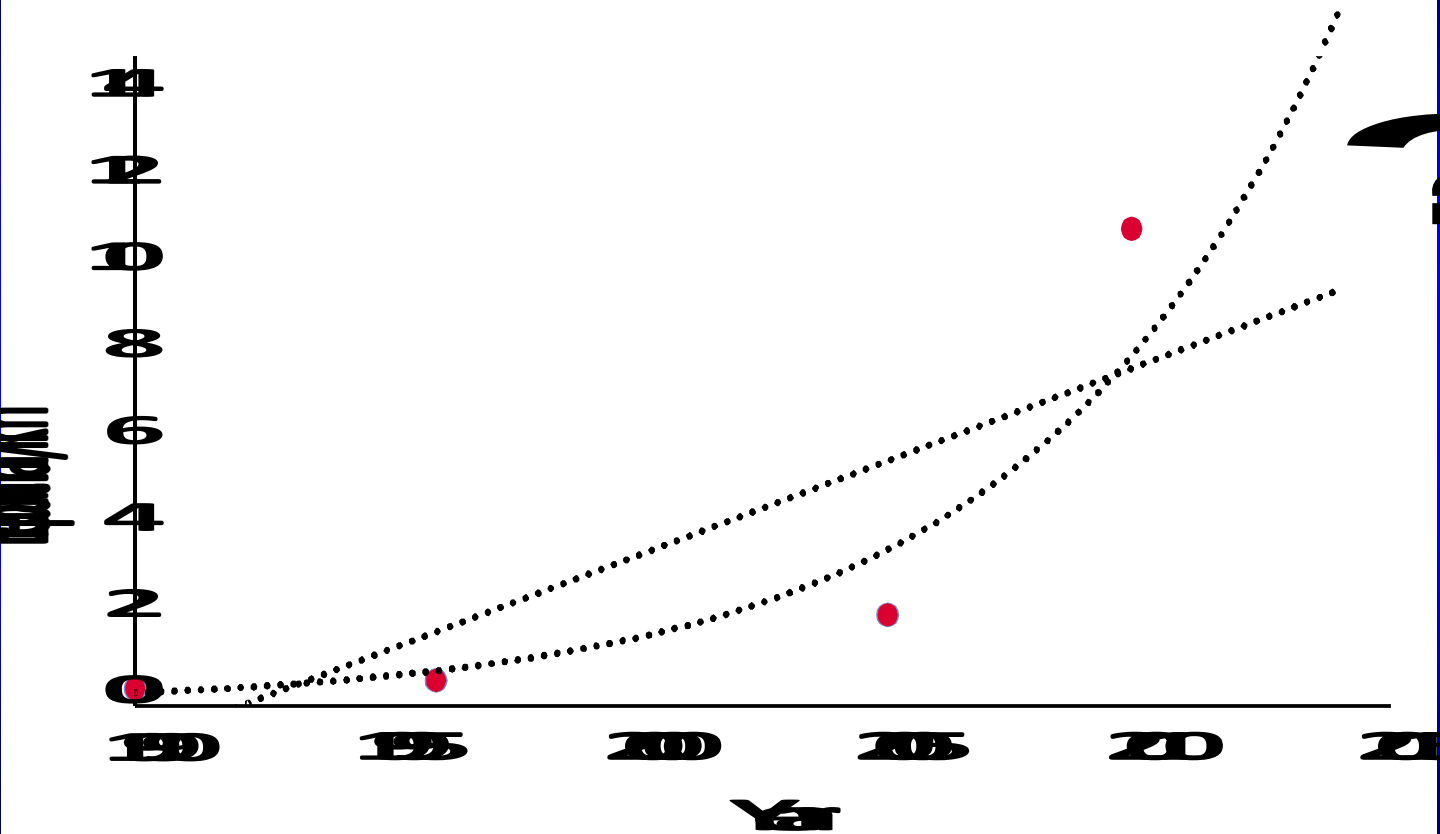




Elephant Density is Increasing



Hepatitis C Incidence





- **Elephant induced changes?**

- 1) **Abundance of elephant preferred tree food species did not change**
- 2) **Counter to prediction trees capable of resprouting did not increase**
- 3) **Did not alter the composition of old-growth forest**
- 4) **Arresting forest succession in disturbed areas**

- **Elephant induced changes?**

- Arrested Succession:**

- increase in basal area in logged areas is almost zero.
 - regeneration in a restored area is being slowed

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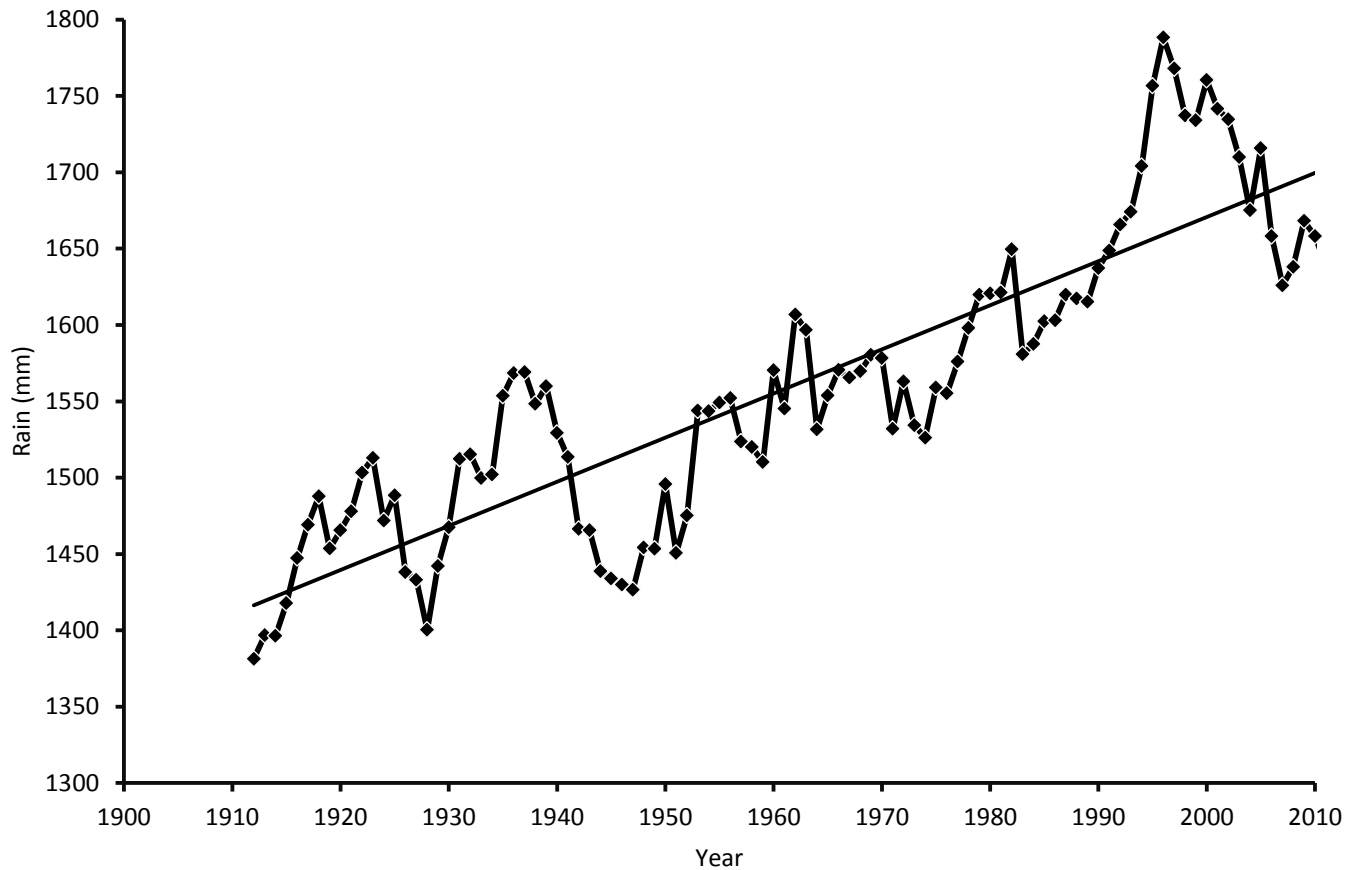
- **Global Climate**

- The earth's climate has warmed by approximately 0.6°C in the past 100 years.
- Some estimates suggest that the climate could warm by up to 5.8°C this century.



Kibale's Climate

- **300 mm more rainfall/year than at the start of the century**
 - **less frequent droughts**
 - **earlier onset of the rainy season**
 - **4.4 °C increase in average maximum monthly temperature**



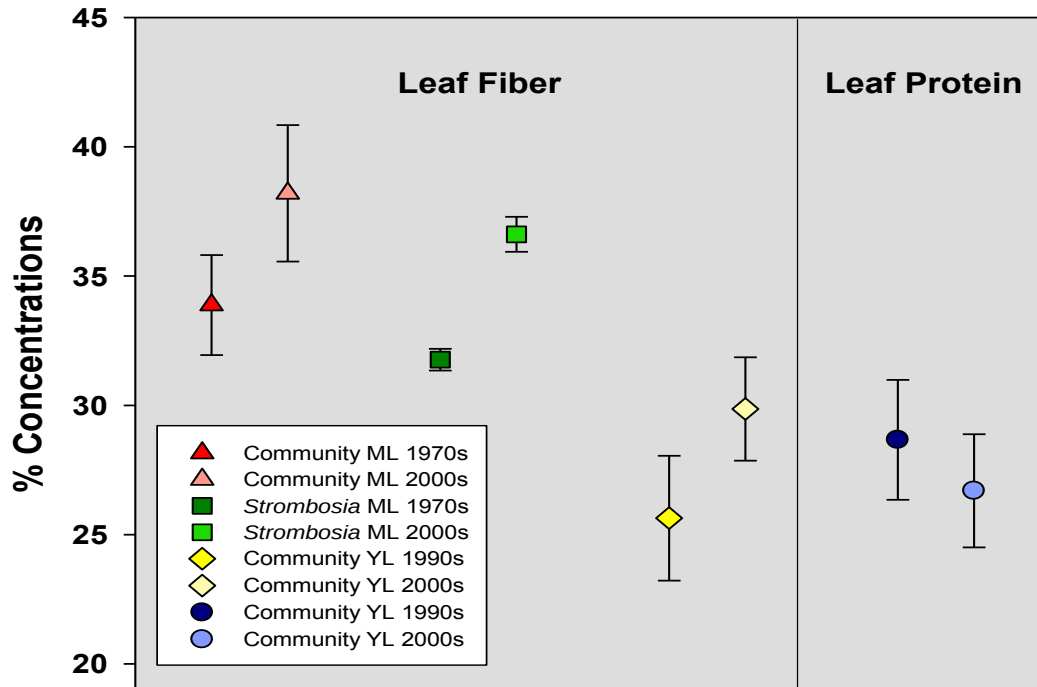
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Predicted Responses of Leaf Nutrients to Climate Change

Diet Component	Increased Temperature	Increased Rainfall	Increased CO ₂
Protein			
Fiber			
Tannins			

Leaf quality has declined in the directions predicted by climate change



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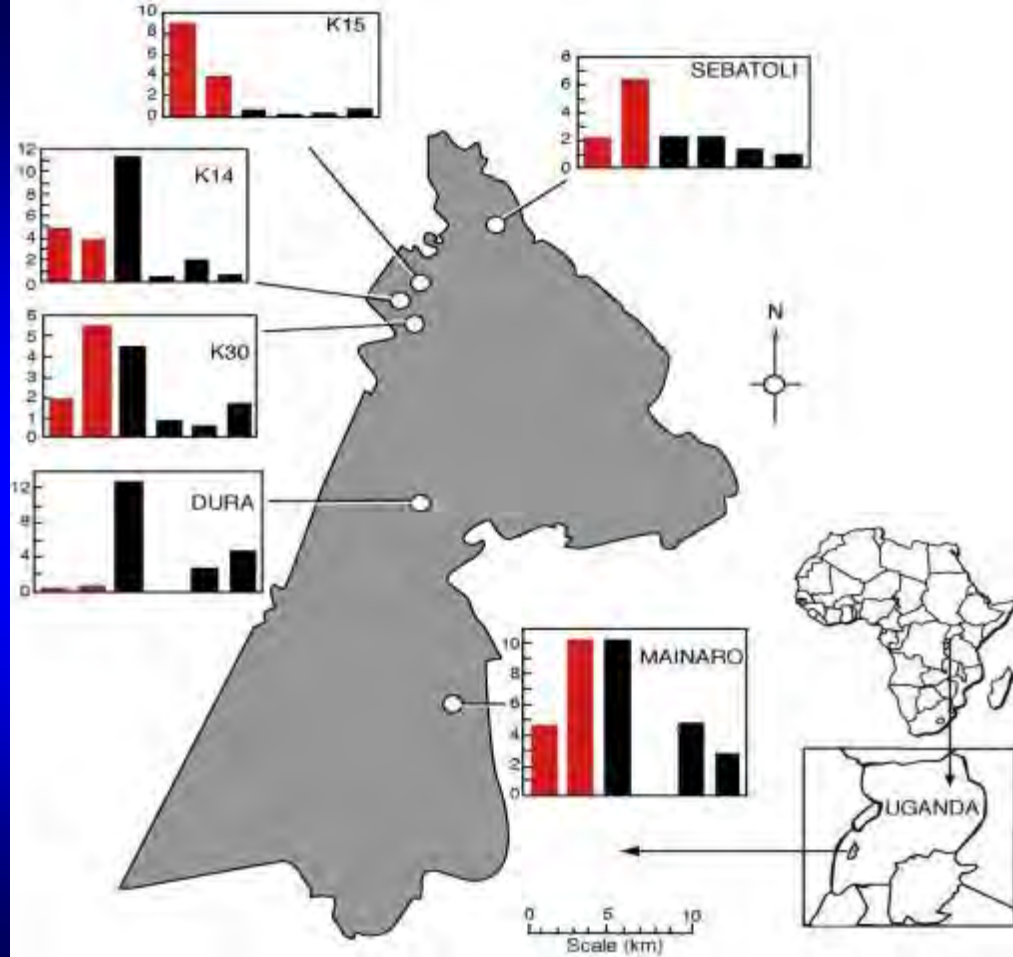
(4) Conclusions

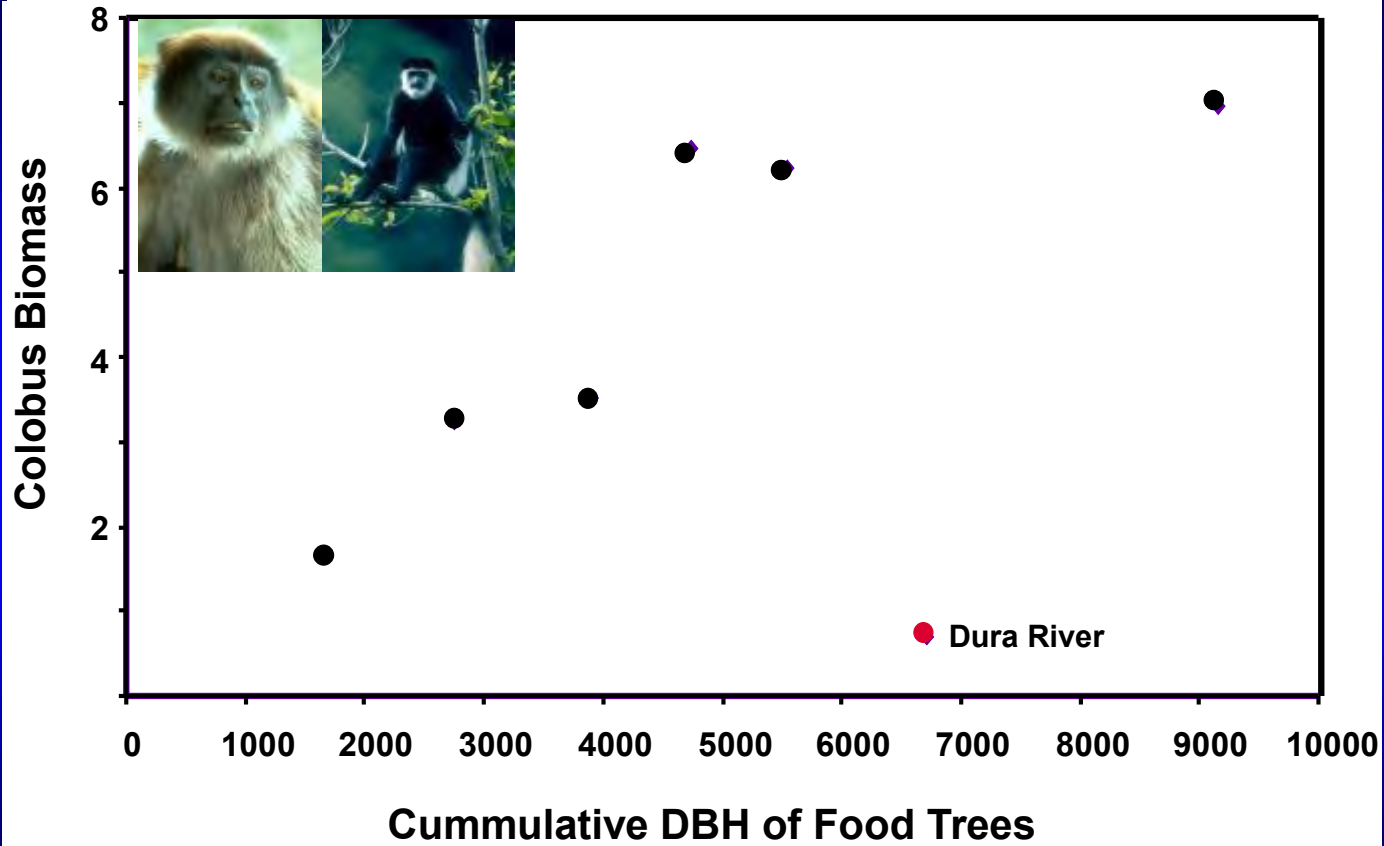
Red Colobus



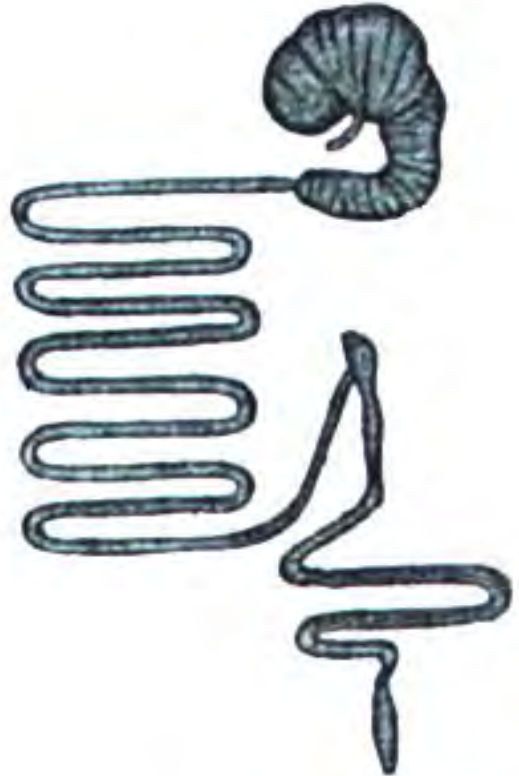
Black-and-white Colobus

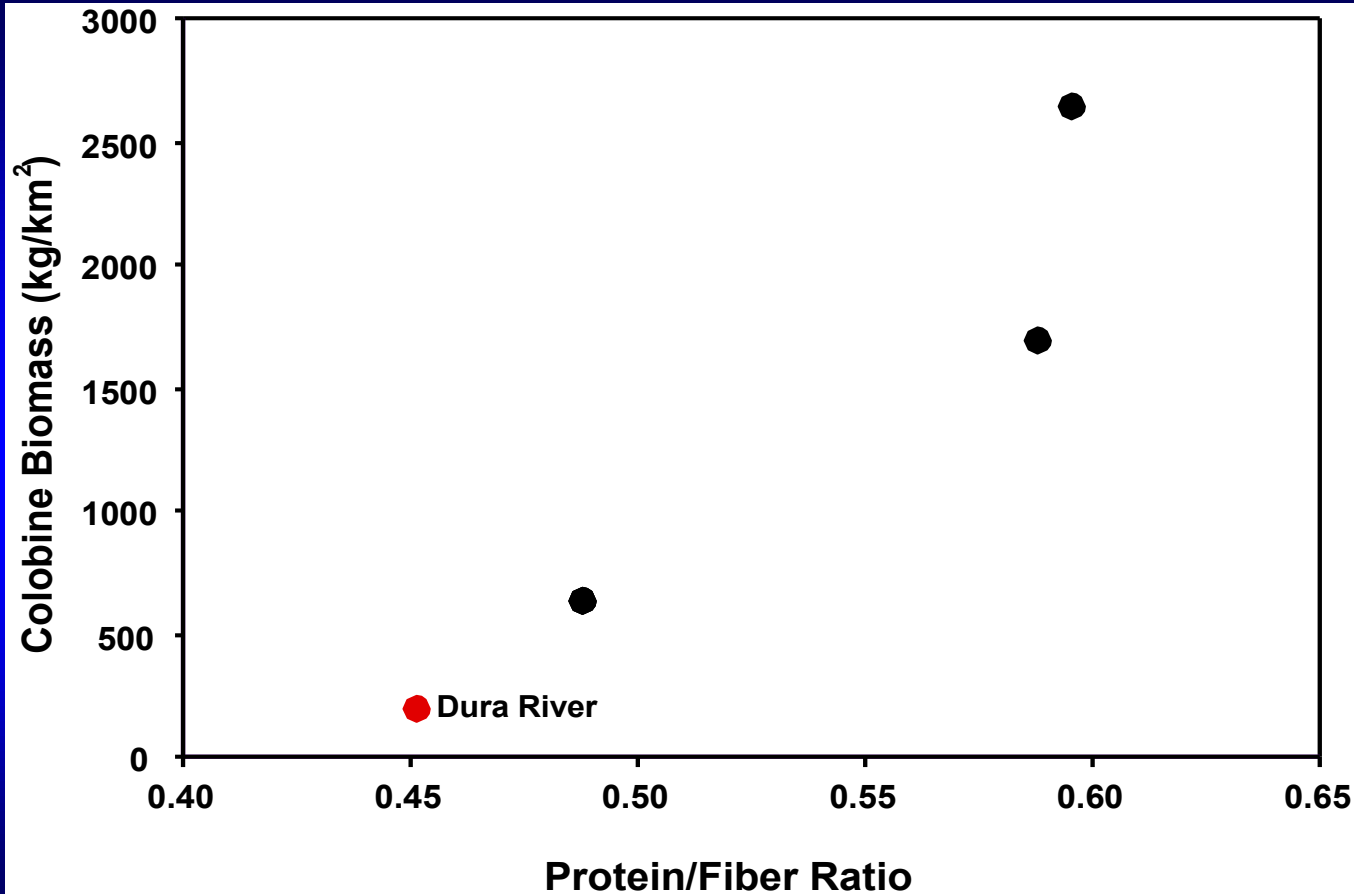


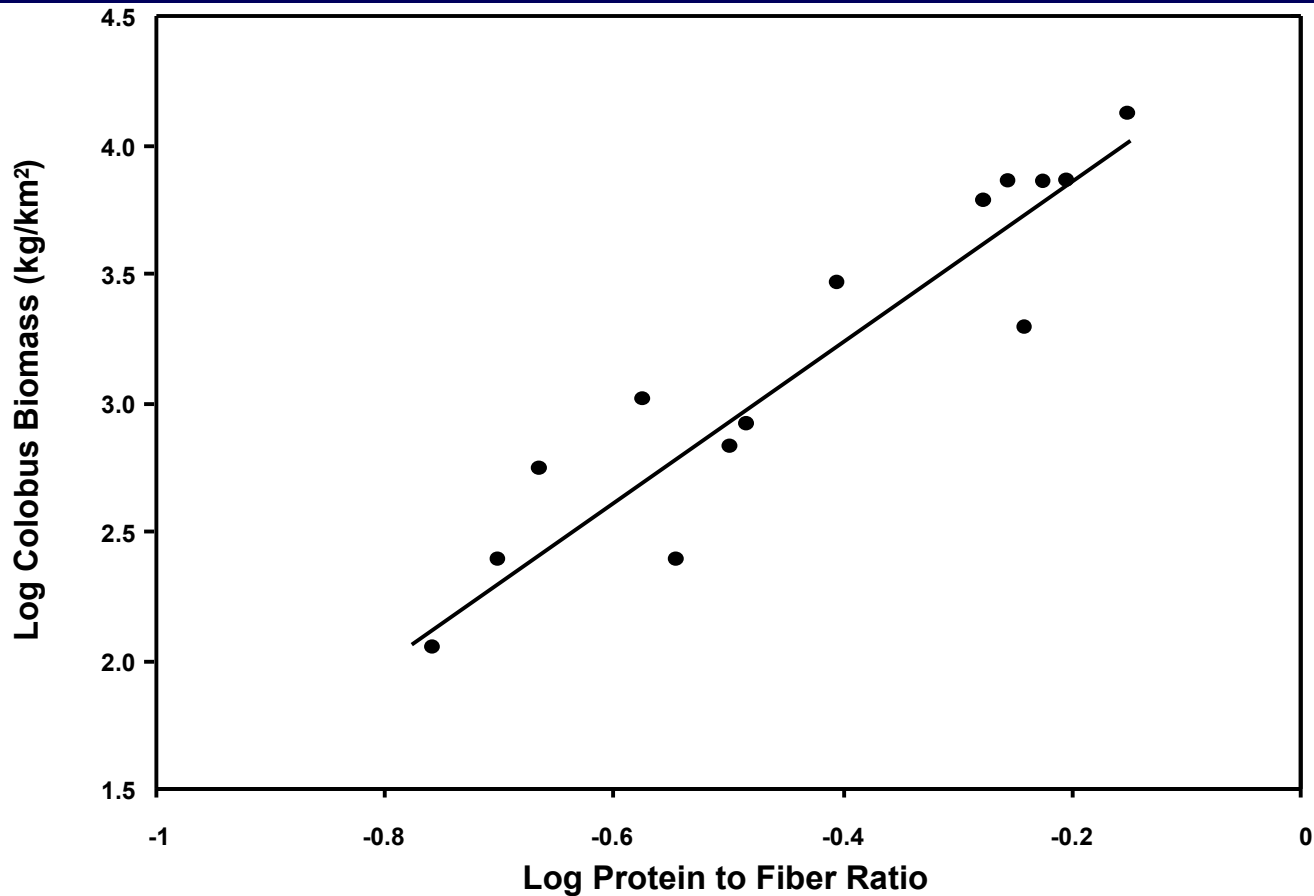




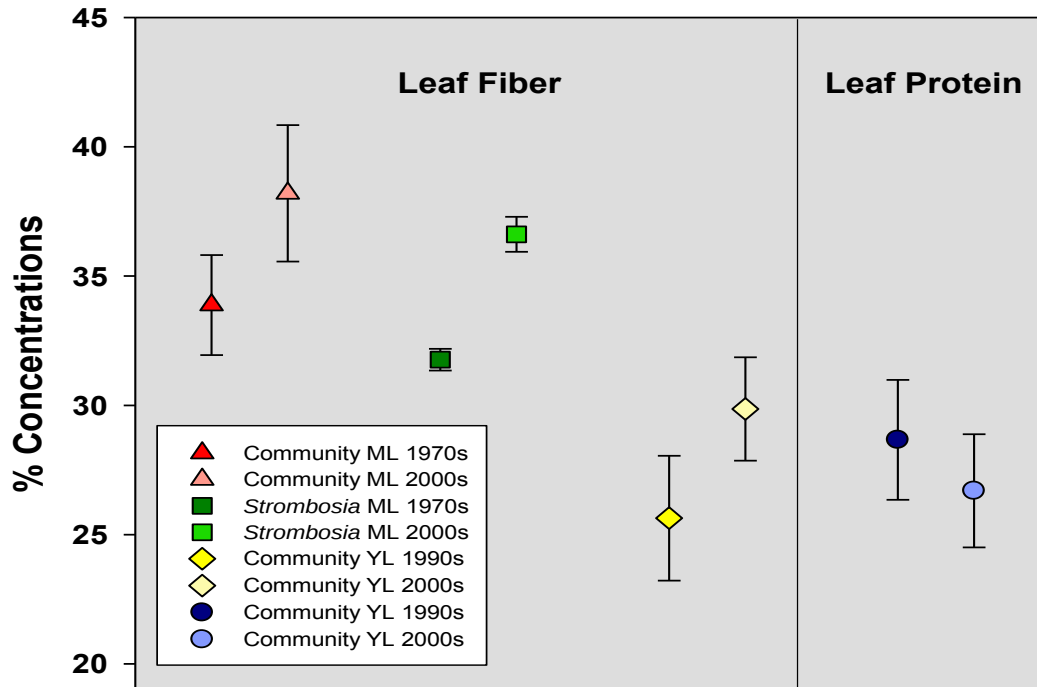
Protein/Fiber Model





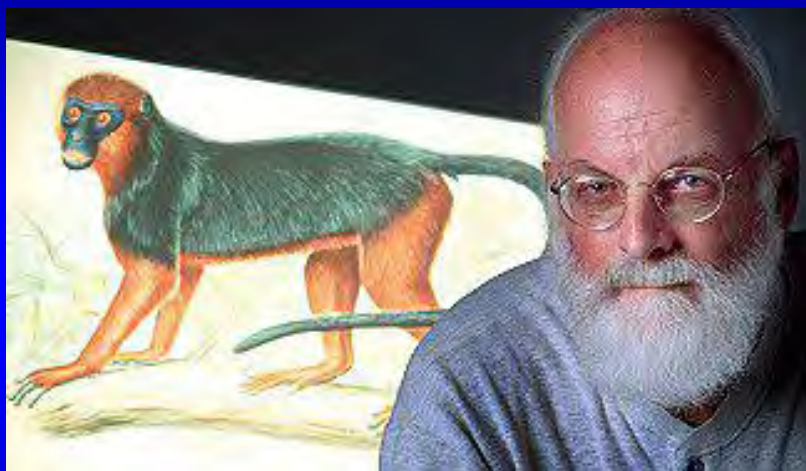


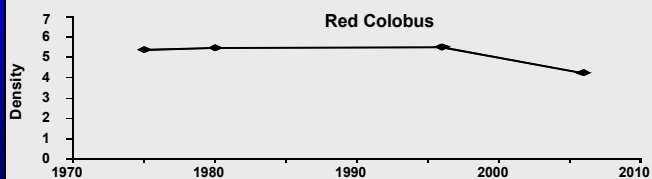
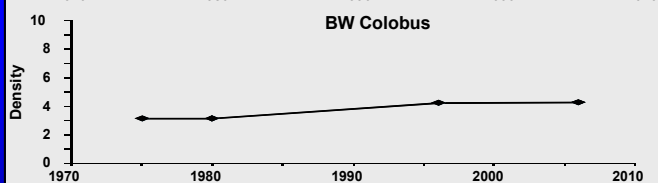
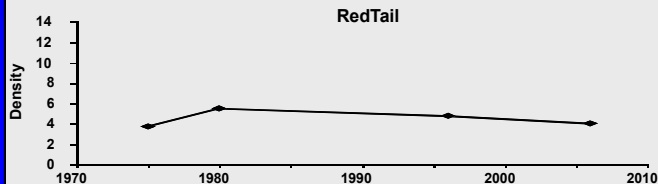
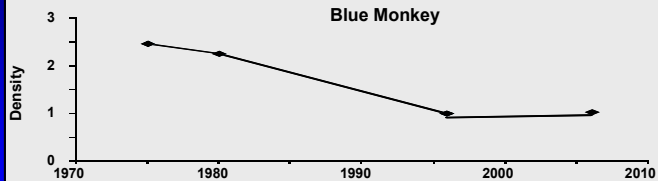
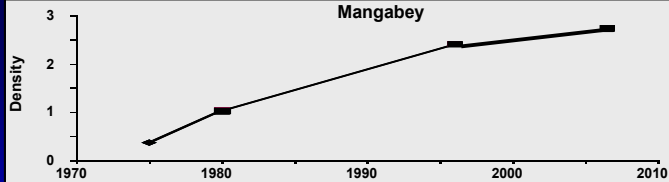
Remember: Leaf quality changed



Predict:

**Folivorous Primate Populations
Should Decline.**





Predict:

**Folivorous Primate Populations
Should Decline.**

BUT THEY ARE STABLE - WHY

Changes in Forest Composition 1989-2013



Changes in Forest Composition

- 2013 shows more food trees**
- 2013 shows more quality trees**

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Where are we?

Red colobus example:

- 1) Poorer nutrition
- 2) Increased disease
- 3) Food trees increasing
- 4) Population stable

