Examining spatially explicit networks of individual plant interactions with a frugivorous lemur mutualist (*Eulemur rubriventer*)

Jadelys Tonos[1], Onja Razafindratsima and Amy Dunham

INTRODUCTION

- Plant-animal interactions structure terrestrial communities and play an important role in shaping the biodiversity of tropical ecosystems
- The study of these interactions at the individual level has begun to reveal ecologically relevant variation which may be missed in species level studies[1]
- By examining networks of frugivore-plant interactions I hope to contribute to our understanding of the mechanisms shaping individual plant-animal interaction patterns

METHODS

1. Direct observation of 2 lemur groups

2. Built network of visited plants linked by lemur movements and calculated network metrics:

Strength
Sum of all node links

Frequency
Total number of visits observed for each plant

Within-module connectivity
Proportion of a node's links which occur within its module[2]

Between-module connectivity
Proportion of a node's links which occur outside its module[2]

3. Measured individual, neighborhood and spatial plant traits

Individual

Height
Estimated height of each plant visited

Fruit crop
- Categorical estimate of fruit crop size
- Measured within 7 days of visit
- Averaged across all visits

Spatial

Delta_pc
1. Estimated distance between plants
2. Created a spatial network with connections determined by distance based probability[3]
3. Calculated global connectivity
4. Used node removal to estimate the change in global connectivity

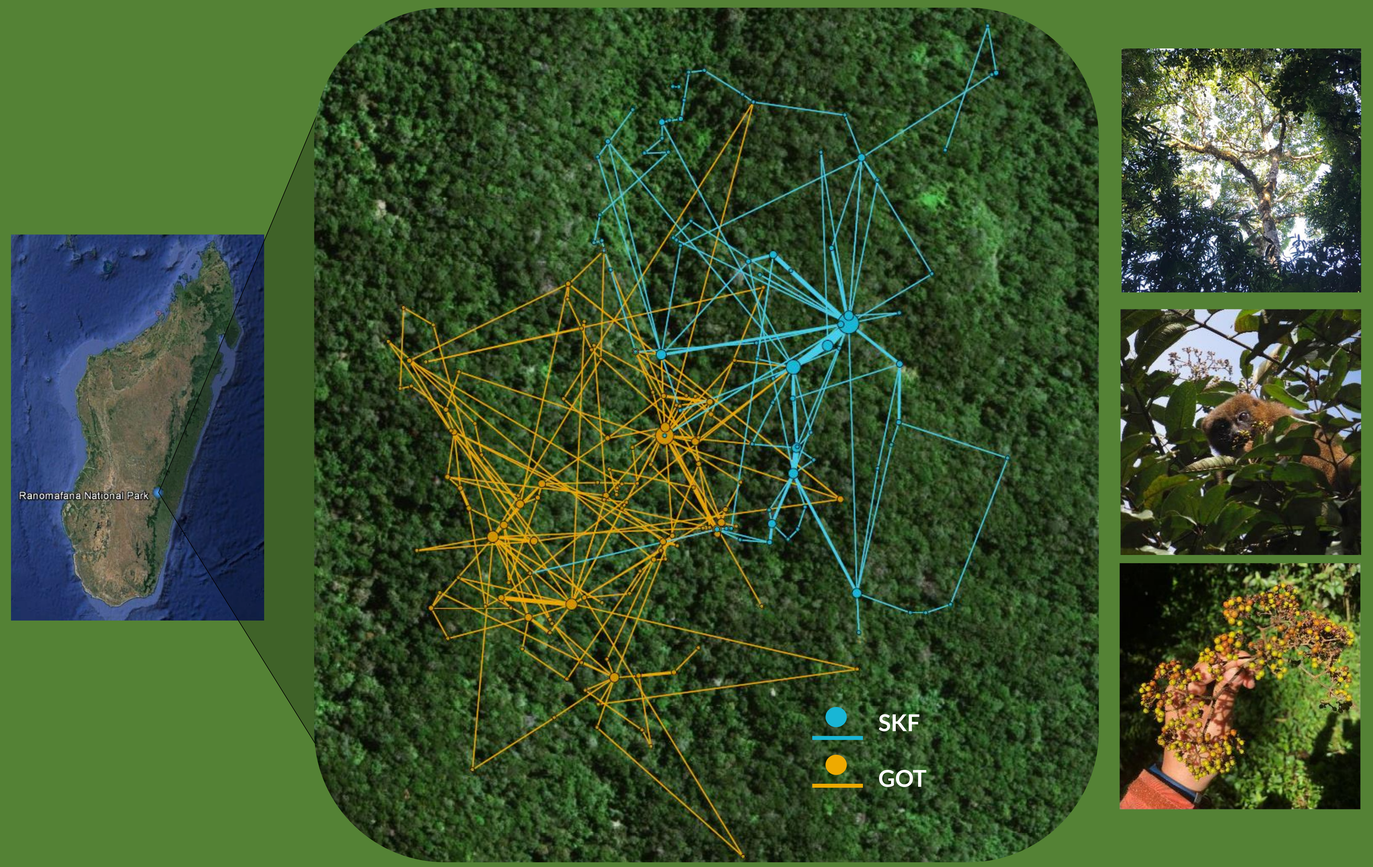
Neighborhood

Abundance & Richness
- Fruiting abundance and richness of plants within 10m diameter
- Measured within seven days of visit
- Averaged across all visits

4. Used generalized linear models with AIC based model selection and averaging to examine how plant traits relate to network metrics[4]

Patterns of interaction between frugivorous lemurs and fruiting plants are influenced by

Individual plant traits & plant spatial patterns



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Citations:
1.(Bolnick et al., 2011)
2.(Guimera & Amaral, 2005)
3. (Saura & Torné 2009)
4.(Johnson & Omland, 2004)
5.(Rodríguez-Pérez et al.,, 2014)
6.(Morales & Vázquez, 2008)
7.(Dupont et al., 2014)
8.(Guerra et al., 2017)

Figure 1. Left: Juvenile female from the GOT group. Right: Adult and sub-adult males of the SKF group

RESULTS

- Across all response variables only fruit crop, height and delta_pc had any significant influence.
- For within module degree there was no significant effect from any response variable.
- Results varied between groups. Group specific and combined analysis results displayed.

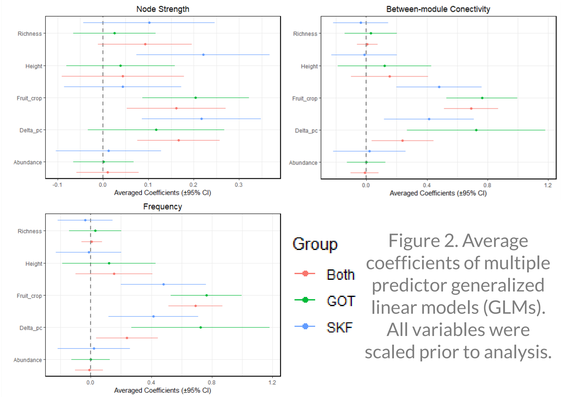

Figure 2. Average coefficients of multiple predictor generalized linear models (GLMs). All variables were scaled prior to analysis.

CONCLUSIONS

- Individual and spatial plant traits play a primary role in shaping interaction networks between lemurs and fruiting plants. These results confirm what has been observed and modeled in bird frugivory patterns and pollinator-plant interactions[5,6,7]
- Though fruiting neighborhood properties have been shown to affect frugivore visitation and fruit removal this study found no support of its influence on interaction patterns in a individual and spatially explicit network[8]
- Slight differences in the networks generated by each lemur group further suggest that the mechanisms influencing interaction patterns may depend on spatial fruiting context

DIRECTIONS

- Examine the influence of interaction patterns on seed dispersal
- Use individua based modeling to examine the influence of fruiting spatial context on interaction patterns and on the relevance of individual, spatial and neighborhood characteristics.

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