Investigating the Flora and Fauna of Manu National Park, Peru

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Aim

To deepen knowledge of key ecological processes and interactions to aid conservation challenges at Cocha Cashu biological station.

Introduction

- Despite ecological research being conducted at Cocha Cashu Biological Station since the 1970's, information on key ecological processes is still lacking. It is rare that such processes can be studied in a virtually untouched ecosystem such as Cocha Cashu.
- Research into invertebrates is especially limited here (Gentry 1990).
- Identification of individual jaguars has never been attempted at the station.
- The palm family (*Arecaceae*) is a keystone group of neotropical forests but palm distribution in floodplain forests has not been well studied.
- Strangler fig trees are hugely important within the forest ecosystem not only providing animals with an important food resource but also creating the perfect conditions for invertebrates and other animals to reside within.

Objectives

- Investigate factors affecting the probability of habitat use amongst jaguars and their prey species.
- Compare rates and types of insect herbivory in different successional stages of the forest.
- Investigate the drivers of *Arecaceae* distribution in different successional stages of the forest.
- Investigate factors affecting the distribution of stranger figs.

Methods
Study site

- Cocha Cashu Biological Station is a 10km² site with 50km² of trail systems located in Manu National park, Peru (figure 1 and 2).

- The region is a high diversity UNESCO world heritage site with little anthropogenic impacts, making it a unique site for the study of intact ecosystems.

- The station is situated in a lowland riparian zone, the forest is heterogeneous with varying successional stages of plant communities.

Figure 1. Cocha Cashu Biological Station, Manu National Park, Peru.
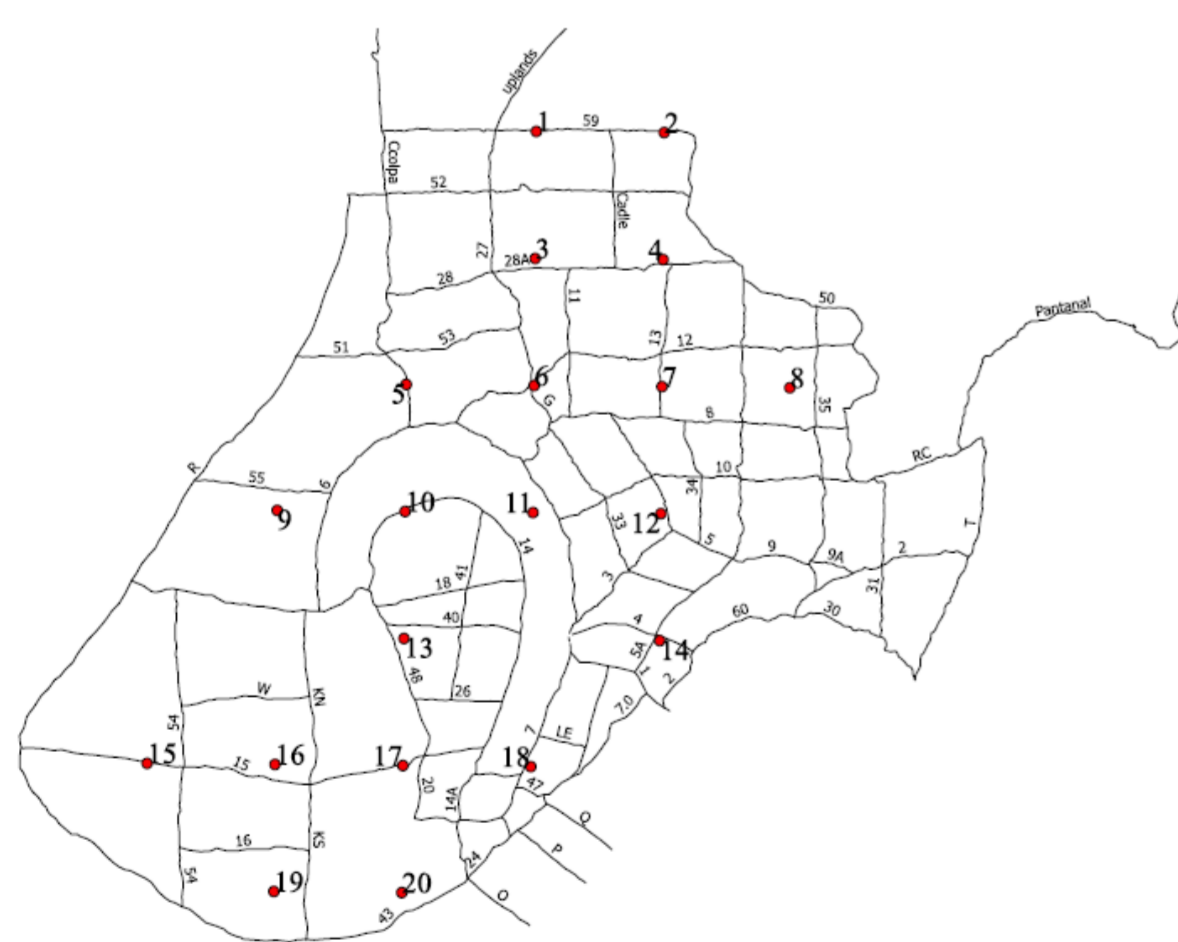
Field Surveys

Camera Trapping

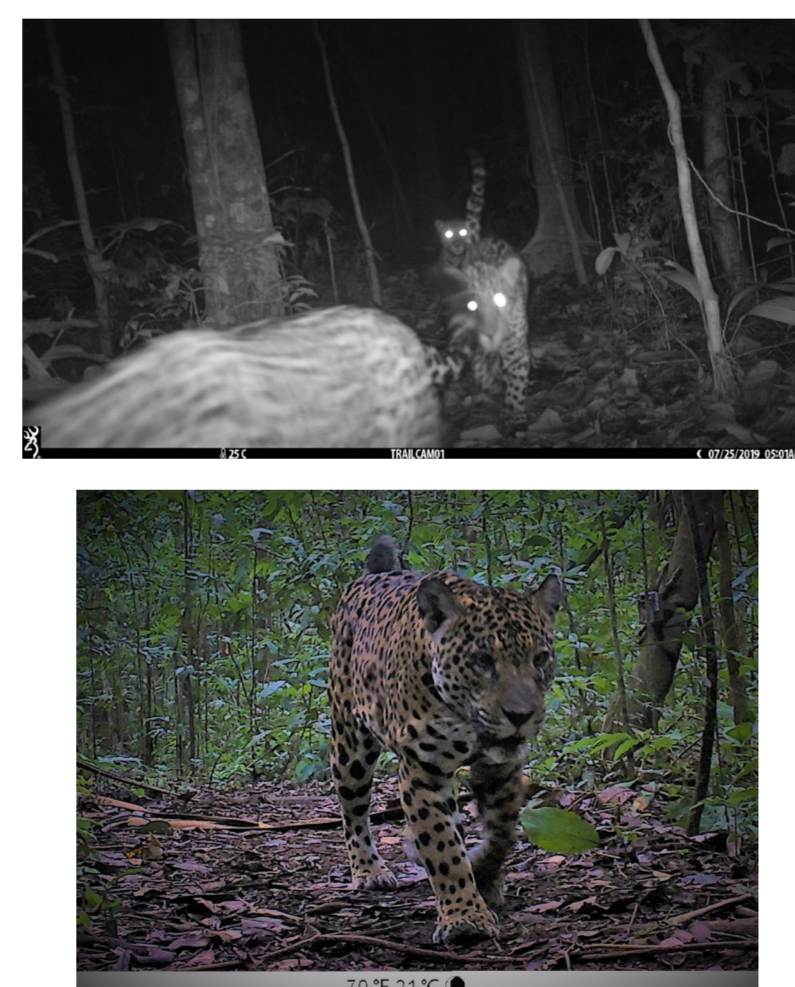Figure 2. Camera trap set up across Cocha Cashu trail system.

Figure 3. A: 3 jaguars captured on trail 5A on 25/07/2019 at 5am B: Jaguar captured on trail 27 on the 27/07/2019 at 1pm.

- 20 camera traps were set as a grid spaced 500m apart (figure 2 and 3). Habitat attributes such as distance from the lake were measured using google earth. Canopy density was mapped in 20m x 20m plots at each camera trap station (figure 3 and 4).

Strangler Fig Tree Distribution

- Over two hundred strangler figs were plotted along the trail system of Cocha Cashu. Factors such as height, circumference, canopy density and root strength were recorded for 30 trees. Canopy cover was again mapped using 20 x 20m plots (figure 3 and 4).
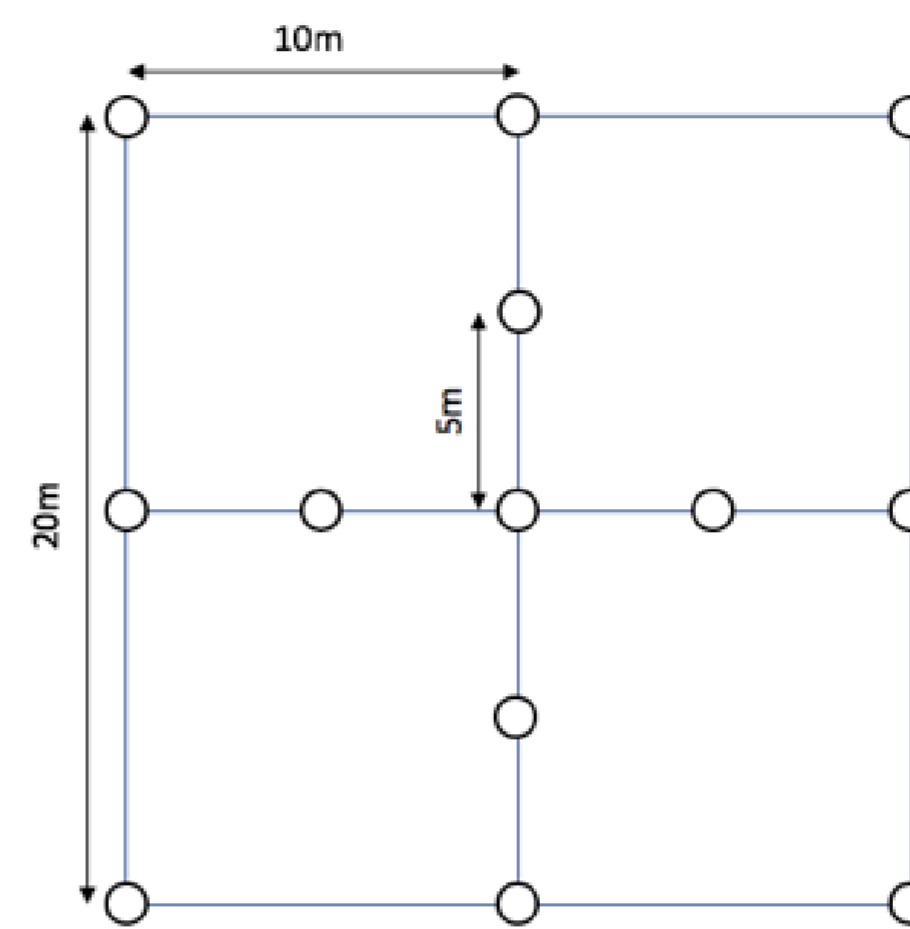

Figure 3. 20m x 20m canopy density plot. 3 pictures at different exposures are taken at each point.

Figure 4. Canopy images are taken at 3 exposures and analysed to calculate canopy density.

Insect Herbivory

- 60 leaves were collected from six 25x10m plots in different successional stages of the forest. Each leaf was categorized by type of insect herbivory present e.g. hole feeding. Leaf area index (LAI) and overall herbivory damage (%) were taken using the BioLeaf mobile app (figure 5).

Figure 5. Analysis of insect herbivory damage using the BioLeaf mobile app. The red areas indicate that this leaf has herbivory damage of 11.78% and a Leaf Area Index (LAI) of 2.22.

Palm Tree Distribution

- All members of the *Arecaceae* family and forest trees above 10cm in diameter were recorded in 10 by 100m quadrats in 3 different successional stages of the forest. The positioning and height of 543 trees were recorded, along with canopy cover at each of the quadrats (figure 6).
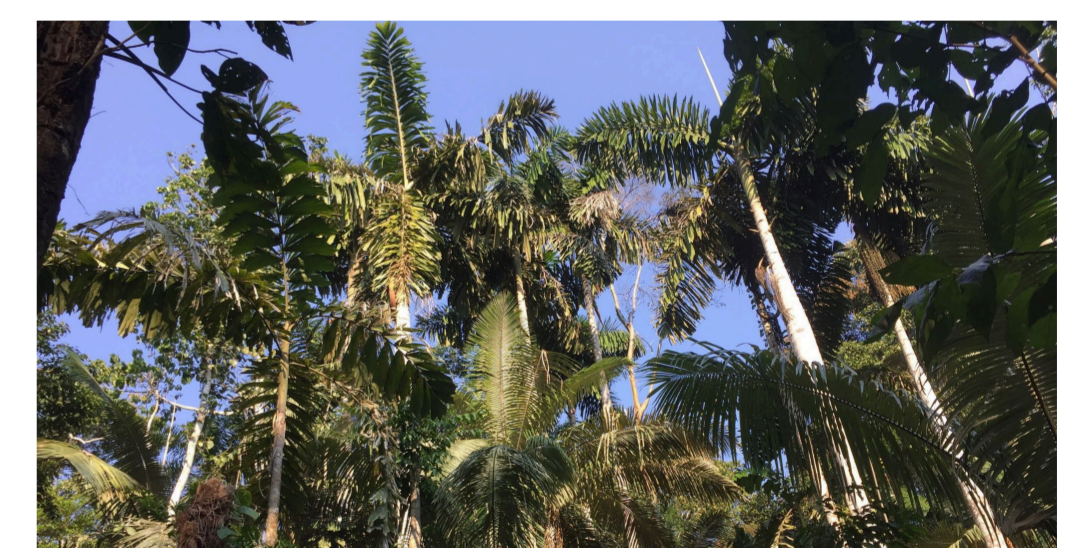

Figure 6. Looking at the canopy of a clumped distribution of *Iriartea deltoidea* and *Astrocaryum murumuru* palms.

What next?

- Camera trap data are sorted into separate species, some of these are 'bycatch' (figure 7). Camera trap data will be used to apply for funding to set up permanent camera trap stations for a long-term monitoring scheme.

- Insect herbivory rates and types in each habitat will be compared. Date will be used to further research into insect communities and herbivory effects on regulating plant populations.

- Point pattern analysis will be used to assess the distribution of strangler figs in more detail.

- Second order point pattern analysis will help to generate hypotheses about the drivers of the distribution of *Arecaceae* members.
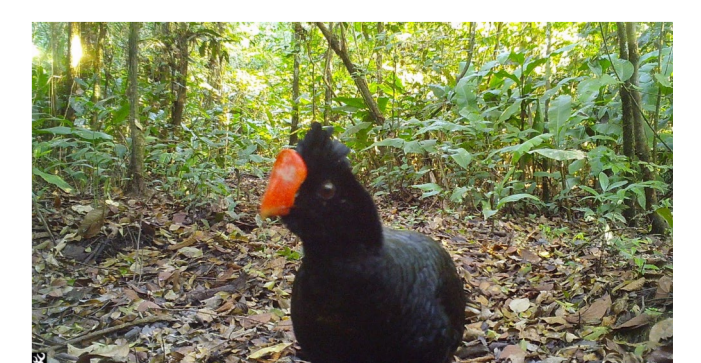

Figure 7. Bycatch - a Razor- billed Curassow mimics the call of the jaguar.

Acknowledgements and References

Newcastle University Expeditions Committee, the Royal Geographic Society, and the Gilchrist Educational Trust for funding.
Supervisors and advisors: Marion Pfeifer, Darren Evans, Ankush Prashar, Laura Braunholtz, Gordon Port and all the staff at Cocha Cashu Biological station
AH. Gentry (1990) Four Neotropical Rainforests. Yale University Press
BioLeaf: A professional mobile application to measure foliar damage caused by insect herbivory. Computers and Electronics in Agriculture 129 (2016) 44-55