

# Preliminary behavioral ecology study of crowned sifaka in gallery forests in Madagascar

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## INTRODUCTION

- Madagascar is known for its biodiversity which represents the 15% of the existant species. The 20% of primates in the world are only found in this big Island.
- 99% of lemurs are endemic in the island.
- The biodiversity is coupled with high anthropogenic threats due to habitat loss and hunting.
- The habitat loss is more important in the dry forest in the western of the island.
- In 2018, 95% of the 112 living species are threatened of extinction (IUCN).
- The understanding of natural history is important for a conservation.
- It has been reported that the dry deciduous and gallery forest in the western and southern of the island are neglected for research and conservation.
- That is why we studied the behavioral ecology of *Propithecus coronatus*, a critically endangered species, occurring mostly in dry and gallery forest

## OBJECTIVES

**Main objective:** provide the first information in behavioral ecology of crowned sifaka in gallery forests in Madagascar.

**Specific objective:** study of activity budget, dietary flexibility, habitat used and home range.

## METHODS

### Study site

- Mandrava gallery forest (Madiromirafy-Maevatanana, mid-west)
- Size: 200 ha
- 16°52'08.5" S
- 46°45'46.7" E
- 36 birds species
- 15 reptiles species
- 10 fish species
- 3 lemurs species

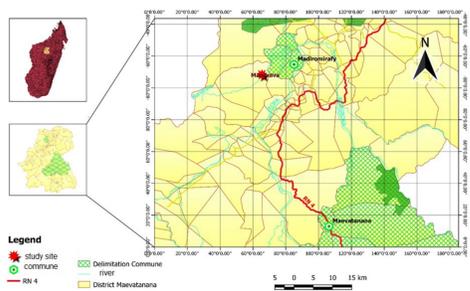


Figure 1: map showing the study site : Mandrava gallery forest

### Data collecting

- Data were collected between December 2017 and March 2018.
- Two groups of crowned sifaka was followed from 8am to 4pm every day.
- Instantaneous scan group (every 5 mn) to record daily activity of the group
- Instantaneous focal animal sampling (3mn) to record feeding and dietary behaviour
- GPS data recorded every 15 mn : for home range mapping/habitat use
- Voucher specimen: to identify plant species
- Height recording ( estimation ) : using score interval (sol,1= 1-5m; 2=5-10m;3=10-15m; 4=15-20;5> 20)
- Diameter of support used: using score interval (little branch=0-5cm; middle branch=5-10cm; big branch=10-15cm)
- Data was analysed with SPSS and Excel

## RESULTS

### Activity budget

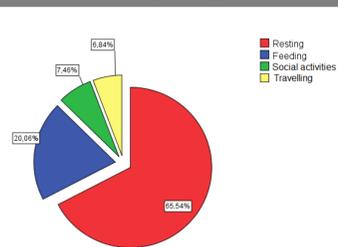


Figure 2: Activity budget of *Propithecus coronatus* at Mandrava gallery forest

- Activity budget dominated by resting time (65,54%)
- Feeding activity occupies 20% of their time
- Social interactions, mostly dominated by affiliative behavior occurs at 7.46% of their active time.

### Plant species consumed

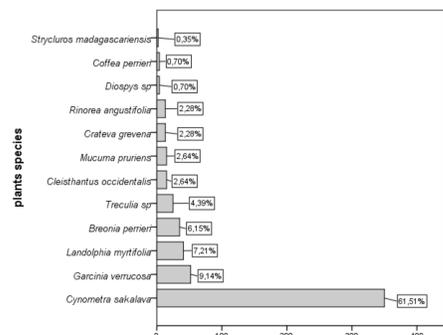


Figure 3: Plant species source of food of *Propithecus coronatus* at Mandrava gallery forest. In total 20 species of plant composed the food of the species but only 12 is visible on the graph.

Then, the diet is dominated by one plant species, *Cynometra sakalava*, at 61% of their feeding time.

### Height of tree used

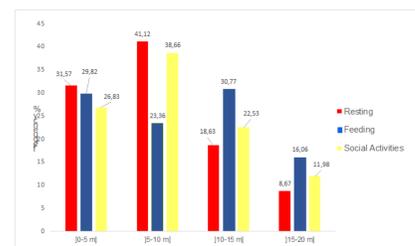


Figure 4: Height of trees used by *Propithecus coronatus* at Mandrava gallery forest

There is a significant difference of the utilization of the tree height for the two daily activities: For resting activity (Kruskall Wallis: 41,084 ddf=3 ; p-value=0,000), the height between zero until 10 m is the mostly used. For social activities (Kruskall Wallis : 11,241 ; ddf=3 ; p-value= 0,010), the species often uses the height between 5 and 10 m. For the feeding activity there is no significant difference of the use of the tree height (Kruskall Wallis : 6,586 ; ddf= 3 ; p-value= 0,86)

### Dietary

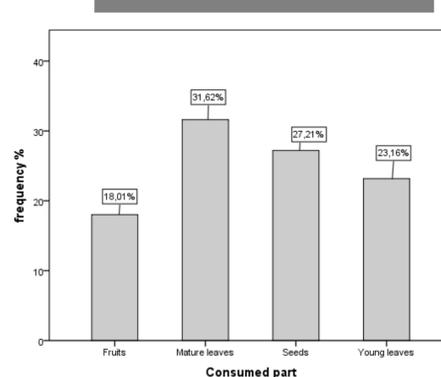


Figure 5: dietary of *Propithecus coronatus* at Mandrava gallery forest

Dietary is composed by leaves : mature leaves 31,62% and young leaves 23,16%; seeds and fruits are also part of this dietary (45% ).

### Type of branch used

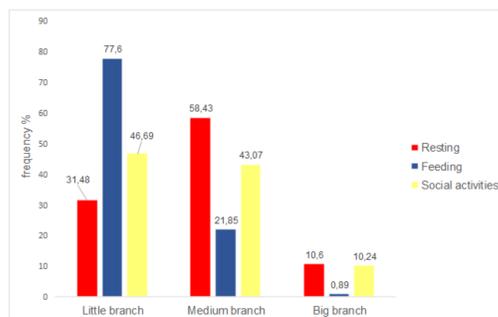


Figure 6: type of support used by *Propithecus coronatus* at Mandrava gallery forest

There is a significant difference of the diameter of support used by *Propithecus coronatus* for the three daily activities: Resting (Kruskall-Wallis : 41,321; ddf=2 ; p-value=0,000 ) : the support with a diameter between 5 and 10 cm is the mostly used. Feeding activity (Kruskall wallis 61, 572, ddf= 2 ; p-value=0,000): the little branch with diameter below 5cm is the mostly frequented. Social activities: Kruskal-Wallis : 18,228 ; ddf=2 ; p-value=0,000 ) : the little and the medium branches are the mostly used by the species

### Home range

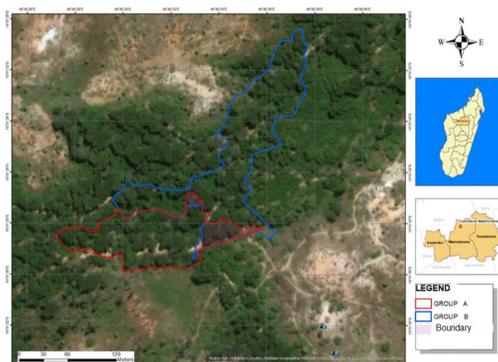


Figure 7: Home range of the two groups of *Propithecus coronatus* at Mandrava gallery forest

This figure displays the home range of two groups of crowned sifaka followed during the study. An overlap of 443,78 m<sup>2</sup> between their home range has been observed .

The home range size of the group A is 1,08 ha and 1,78 ha for the group B

## DISCUSSION

- The daily activity is dominated by the resting time (65,54%). Rakotondrabe(2012) in his study at Amboaloando about crowned sifaka found that the species spent 59,60% on resting, and 50% resting time at Antrema (Pichon&al,2010).

This trend can be explained by:

- a dietary (folivorous) : species needs more time to digest fiber contained in leaves (Korstjens et al., 2010)
- a behavior associated with energy conservation because leaves do not procure a lot of energy then a low metabolism basal is benefic for the species

- Thermoregulatory system in order to minimize the energy expenditure and water loss to cope with hot temperature in western region (Ekert& Kappeler 2014)

- Folivorous species: dietary composed by 31,62 mature leaves and 23,16% of young leaves. However, sifaka ate fruits and seeds (45%). Rakotondrabe (2012) found that crowned sifaka at Amboaloando consumed leaves (62,96%). Also, Randrianaly (2015) found that crowned sifaka consumed fruits (65,25%). This trend can be explained by fructification on rainy season (Wright,2006), they take advantage on it because fruits are highly energetic (Milton,1979).

- The food is composed by 20 species of plant. Compared with another crowned sifaka in other site this is less (Pichon& al., 2010: 60 plant species cover crowned sifaka food at Antrema), it may be due to quality of habitat and floristic richness.

- The species occupies lower height due to food distribution, and vigilance in such open canopy.
- The species used small home range. Muller(1997) in his study on *Propithecus verreauxi* found that they have a small home range between 1,2 and 1,5 ha. The home range size is linked to the group size, dietary (folivorous species do not travel a lot), habitat availability.

## CONCLUSION & FUTURE DIRECTION

- The crowned sifaka inhabiting the Mandrava gallery forests has typical behaviour of all the others sifaka species: folivorous, a lot of resting times
- The results shows the flexibility of the behavioral ecology of crowned sifaka : dietary changed according to food availability, use of lower level, small home range.
- This study provides informations on the species and will help the ongoing Sifaka Conservation program for the remaining the crowned sifaka across the western Madagascar.

## ACKNOWLEDGMENTS

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