Seed Dispersal and Red Howlers in Forest Fragments

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Seed Dispersal and Red Howlers in Forest Fragments

In September 2004, Marcela Santamaria Gómez of the Wildlife Research Group, Department of Anatomy, University of Cambridge, UK, defended her doctoral thesis, supervised by David J. Chivers and titled, "The effect of home range reduction on the ecology of red howler monkeys in Central Amazonia." It was supported by the Biological Dynamics of Forest Fragments Project (Smithsonian Institution and Instituto Nacional de Pesquisas da Amazônia), the Fundação O Boticário para a Proteção da Natureza, Apiros, British Federation for University Women (BFUW), Instituto de Pesquisa Ambiental da Amazônia (IPAM), the University of Cambridge, Selwyn College, the Department of Anatomy, the American Society of Primatologists, and Idea Wild. The following is a summary of the thesis.

The loss of effective seed dispersers in forest remnants has been stated to disrupt dispersal services that alter the dynamics of tropical forests. Howler monkeys are efficient seed dispersers that prove to be exceptionally tolerant to habitat fragmentation by surviving in very small forest fragments. In this context, the effect of home range reduction caused by habitat fragmentation on the feeding ecology of red howler monkeys (*Alouatta seniculus*) and on their subsequent role as primary seed dispersers in Central Amazonia is examined.

The study was carried out at the Biological Dynamics of Forest Fragments Project (BDFFP) near Manaus, Brazil. Two howler groups living in fragments of 2.5 ha and 12 ha (Groups 1 and 2, respectively) were habituated during a four-month period. Systematic data on the diet, activity budgets, and use of space were collected for each group on a monthly basis between January 2002 and January 2003. Comparisons on seed dispersal were also made from faecal analysis between the two fragments (Co 2.5 ha and Co 12 ha) and continuous forest (Km41).

At the three study sites, a strong seasonality in plant-part production was recorded within the howlers' home ranges, dividing the year into three seasons: fruiting (January–May), leafing (June–September) and flowering (October–December), but low fruit availability was found within the small fragment. Both groups were frugi-folivorous, with drastic seasonal variations based on plant-part availability. Group 1 responded to low fruit supply by eating more flowers and by repeatedly crossing a secondary-vegetation gap (50 m) to obtain fruit from an adjacent continuous forest. Forest fragmentation drastically reduced the howlers' home range from about 20 ha in Km41 to 7.2 ha and 2.5 ha in the fragments (63% and 88% reduction, respectively).

Home range was composed of 60% edge habitat for Group 1 and only 26% for Group 2. A more drastic reduction in the home range of Group 1 resulted in a net decline in food plants, which affected decisions of time allocation in this group: howlers living in the small fragment rested more and fed less throughout the study. Group 1 seemed to live in a more demanding environment and was presumably at its limits of flexibility, whereas Group 2 was well adjusted to a less disturbed habitat.

Although the reduction of the howlers' home range decreased the number of seeds and plant species dispersed, howlers were effective seed dispersers for most of the species they consumed at the three study sites. In fragments, up to 77% of small to large seeds of fruits exploited by Groups 1 and 2 were dispersed by endozoochory; passing through the howlers' digestive systems—lasting about 20 hours—had a positive or neutral effect on germination success. Despite the fact that Group 1 deposited seeds at shorter distances from fruit sources than Group 2, up to 93% of seeds were moved away from the parental crown by both groups.

Although howlers are generally regarded as less effective dispersers because they produce large faecal clumps with seed aggregation, this is not always the case. Five main aspects of deposition patterns emerged from this study, which indicated that the view of categorizing a species as a good or bad disperser is misguided.

1) Howlers defaecated mainly in synchrony (*c.* 80%), but also separately (20%).
2) In both defaecation types, howlers dispersed seeds in latrines and random sites in the forest, but more often in the former (up to 66%).
3) Seed deposition was spatially clumped; this patchiness was associated not only with sleeping areas, but also with latrines located outside them.
4) In latrines, howlers deposited more seeds of more species than in random sites, but at both fragments seed densities were similar between defaecation sites.
5) The fate of seeds delivered in howlers' multispecies seed depositions varied greatly according to seed species at all sites and to seed density at Km41. Nonetheless, after nearly one year 51% of the seedlings had survived in Km41, 50% in Co 12 ha, and 23% in Co 2.5 ha.

In conclusion, howlers living in small and medium fragments are contributing to the maintenance of regeneration processes through seed dispersal; consequently, the species is a key element to consider in management and restoration programmes of fragmented landscapes.

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Reference

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