THE IMPACT OF FOREST FRAGMENTATION ON POPULATIONS OF NEW WORLD PRIMATES

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Keywords: Primates, Platyrrhini, New World monkeys, anthropogenic habitat fragmentation, populations, ecology, behavior, genetic variability, conservation, management.

Contents

Summary

The New World monkeys (*infraorder Platyrrhini*) are a diverse group of primates distributed throughout the Neotropics, from northern Argentina to southern Mexico. An ecological characteristic of the group is a high degree of specialization for an arboreal way of life, which makes these animals especially vulnerable to the effects of anthropogenic habitat fragmentation, despite their considerable behavioral flexibility. Deforestation rates began increasing considerably after the European discovery of the New World, and reached critical levels in the twentieth century, in particular on the "old frontiers" of Central America and the Brazilian Atlantic Forest. Colonization of the Amazon/Orinoco basins has been much slower, by contrast, and primate populations in many areas are relatively well-protected by their geographical isolation. Accordingly, whereas a majority of species endemic to old frontier ecosystems are endangered with extinction, only a small number of species of the more diverse Amazonian fauna are threatened. Two principal variables – size and degree of isolation – determine the effects of a fragment on the local primate fauna, although others, including the fragment's history, shape and proximity to continuous forest may also be important. Principal effects include the modification of ecological and demographic processes, loss of genetic variability and increased vulnerability to stochastic events, which generally result in either reduced abundance or local extinction. In general, larger-bodied platyrrhines tend to be less tolerant of the effects of habitat fragmentation, although the

abundance of a few ecologically-flexible species may often increase in fragments. A primary focus of conservation programs is the re-establishment of connectivity among fragments, which may involve habitat regeneration or active management of populations, although the collaboration of local human populations is also important. Ultimately, the long-term effects of fragmentation on platyrrhine populations are still poorly understood, and successful conservation will depend on both adequate management strategies, and effective monitoring and research.

1. Introduction

The loss of natural habitat to human activities – predominantly agriculture – is the primary threat to terrestrial organisms throughout the World. While some species are able to adapt to novel, anthropogenic environments, they tend to represent a relatively small proportion of the total biological diversity found in a given region. This is especially the case in the Tropics, where species richness is typically many times greater than that of equivalent ecosystems in the temperate zone, and the proportion of tolerant species is smaller still.

Anthropogenic habitat loss is rarely a straightforward process, in which a region's natural ecosystem is converted in its entirety into a man-made landscape. In addition to the complexities of colonization and land ownership, most sedentary cultures recognize the importance of natural habitats such as forests, which provide a variety of resources – lumber, firewood, game, fruit, honey, and medicinal plants – that are either unavailable, or relatively costly to produce on agricultural land. Other areas, such as steep hilltops or swamps, may also be overlooked because of their relatively poor quality or inaccessibility.

In the New World, extensive anthropogenic habitat loss was a relatively rare phenomenon until the arrival of European colonists at the end of the fifteenth century. While these pioneers brought with them the "European model" of settlement, there was surprisingly little impact on the environment, overall, during the first four hundred years of occupation. The twentieth century brought drastic change, however, including new patterns of immigration, technological advances and industrialization. As the demand for land grew, so the means to clear it increased in efficiency. Armed with chain saws, bulldozers and trucks, modern-day colonists have been able to advance ever deeper into forests once considered impenetrable, resulting in an almost exponential increase in deforestation rates during the course of the twentieth century.

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Biographical Sketch

Stephen F. Ferrari is a biological anthropologist (Ph.D, University of London) who has dedicated the last twenty years to the study of Brazilian primates and the ecosystems they inhabit. His principal research interests include behavioral ecology, taxonomic and genetic diversity, and conservation biology. Starting in the southern Atlantic Forest, with the endangered marmoset *Callithrix flaviceps*, he has now conducted field research on a large number of platyrrhine species, primarily in the southern Amazon basin, and the northern Atlantic Forest. His discoveries include two new species of marmoset from southwestern Amazonia, although his primary focus is now the conservation of the critically endangered titi monkey *Callicebus coimbrai*, endemic to a small area of northeastern Brazil, where it has suffered critical levels of habitat fragmentation. Ex-president of the Brazilian Primatology Society, Ferrari is currently an adjunct professor at the Federal University of Sergipe, member of the graduate faculty at the Federal University of Paraíba, senior scientist at the Brazilian National Research Council, consultant to the National Center for the Protection of Brazilian Primates, and member of the IUCN Primate Specialist Group and Pitheciine Action Group.