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Habitat Quality and Fragmentation and the Distribution and Abundance of the Tana River Red Colobus Monkey, Procolobus Rufomitratus, in Eastern Kenya

Habitat fragmentation constitutes the most significant threat to survival of primates in the world and therefore there is an urgent need for effective conservation measures that protect primates living in fragmented habitats. Few studies have investigated what habitat factors determine the probability that primates will occur in habitat fragments or effectiveness of specific conservation measures established to protect them.

I analysed forest habitat and colobus population attributes to determine factors that influenced occurrence and abundance of the critically endangered Tana River red colobus in forest fragments in Kenya. The probability of colobus inhabiting forests was positively related to amount of habitat edge and tree species composition. Most of the variance in the density of colobus monkeys was explained by: basal area of food trees, basal area per food tree, density of food trees, and basal area per tree for all trees. Therefore effective primate conservation in fragmented habitats may require strategies that consider different factors that influence both the occurrence of a species and its abundance.

To determine whether the Tana River Primate National Reserve is effective in conserving the Tana River red colobus, and by extension other species, I determined whether colobus population attributes or forest habitat attributes differed between inside and outside the reserve. I found no difference in colobus density or mean group size between forests inside and outside the reserve. Forests outside the reserve had significantly higher total basal area of trees, mean basal area per tree, and total basal area of stumps left by trees cut for human use. I also compared colobus group attributes from 1999-2001 to those from a study at the time of reserve establishment (1978) and 10 years after establishment (1988). The mean group size declined by nearly 50% since reserve establishment, and it occurred in all age classes. These results suggest that forests inside TRPNR are not more suitable habitat for colobus monkeys than those outside the reserve, as would be expected if the reserve were effectively protecting the habitat and colobus population.

Recommendations For Conservation Actions And Further Research

The main threat to survival of endemic primates and other species in the Tana River forests is habitat destruction through forest clearing for farmland, which reduces forest area, and extraction of products, which changes forest structure. This research found that forest cutting and product extraction have escalated in the Tana forests since 1994 to the extent that up to 20% of the forest cover within the reserve may have been removed or severely degraded. This finding, the fact that the colobus population continued to decline within the reserve, just like outside, and that there are no apparent differences in habitat and colobus population attributes inside and outside the reserve causes serious concern and calls for intensified management efforts to make this reserve meet its conservation objectives of protecting the primates and their habitat.

The primates and other forest species will likely continue to experience many negative impacts due to loss of habitat over the coming years, possibly crowding, declining birth rates, increasing disease rates, and intensified conflicts with humans, among other potential problems which could lead to further population decline. Therefore there is an urgent need for continuing basic research to carefully record and monitor these potential population and habitat changes and to make this data available to facilitate quick and focused remedial management actions to secure the

remaining populations. Knowledge of important habitat attributes determining occupancy of forest patches and abundance of colobus from this research can be applied directly to enhance conservation within the reserve and in forests outside.. With careful planning, colobus groups found in severely degraded forests could be relocated to patches that are still in good condition as determined by abundance of food trees. Important food trees comprise only 13 species and these should be planted preferentially to restore and enrich degraded forests, and local people should be encouraged to cut tree species that are not important primate food trees for their timber needs.

The finding that forests outside the reserve contained larger colobus groups and higher density of animals may imply that forests outside the reserve are in better condition than those inside, or habitat degradation in forests outside has caused temporary elevation of monkey densities in these forests. Further research is needed to determine which of these two possibilities is true because currently these forests are without any formal protection, yet in view of the small population size of this endangered primate, populations outside should constitute an important and integral component of any population management measures. Also important is an analysis that examines how forest habitat over time has influenced colobus population size and pattern of occupancy of forest patches in order to be able to predict future population consequences from further habitat loss.