

A.P.E. Project **(Assess. Protect. Evaluate.)**

Mitigating the Impacts of Power Lines on Primates in Costa Rica

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Introduction

Economic growth and tourism development in Costa Rica have created pressure to rapidly increase the construction and development of linear infrastructure, such as roads and power lines, across the country. The pressure to increase infrastructure nationwide has resulted in the uptake of cost-effective materials such as uninsulated aluminum electrical lines. These lines, while cheaper, pose a serious threat of electrocution to many species of arboreal wildlife, including endangered primates like spider, squirrel and howler monkeys. Costa Rica's national interest in protecting wildlife and habitat, as well as a strong NGO presence, has helped address power line wildlife conflict through citizen science data collection and community-led efforts to insulate power lines. The use of uninsulated aluminum electrical lines is widespread globally, and lessons from Costa Rica may help other countries implement proper mitigation measures to prevent the electrocution of wildlife.



Figure 1. Location of Costa Rica

Costa Rican primate electrocutions are most likely to occur where power lines cross roads because arboreal animals use the power lines frequently to cross dangerous barriers that roads present. If not immediately killed by the electrocution, animals tend to fall, injured, to the ground and may be killed by vehicle collision. Insulating lines over roads should be a priority and adding artificial arboreal structures adjacent to, instead of, or over power lines may provide the best on-site interventions¹. In some areas, trimming tree branches to prevent access to power lines is also necessary, when insulating the wires is not feasible.

Mitigation

Insulating power lines is also beneficial to both power companies and communities, as insulated wires can carry more current, are less apt to cause power outages and may be cost-efficient over time². While these locally concentrated efforts have shown successes, they need to be scaled up nationally and could provide evidence to influence policies governing the design and implementation of linear infrastructure development.

Francis³ (2020) conducted a risk analysis of primate electrocutions in Costa Rica to better understand threats to monkeys being electrocuted. They used GIS to identify areas of high and low risks across the country, looking at factors that endanger monkeys, such as land cover, agricultural conversion and human population density at sites of electrocutions. This study relied upon the local organization, Kids Saving the Rainforest (KSTR) to then assess the accuracy of their analysis through observations in Puntarenas Province. The models they developed were found to be accurate in weighted risk analyses, and concluded that electrocution events are riskiest to monkeys when they cross power lines over roads, where they are far from protected areas (where power lines are restricted and forests are intact) and at lower elevations, where food sources are reliable.

While burying power lines seems like an ideal solution, forest disturbance and maintaining clearance over buried lines can degrade forests and have large habitat impacts as well as be expensive to install and costly or impossible to repair and maintain.

Artificial arboreal structures can provide safe crossings, yet good research is necessary to place structures where primates will use them without disturbing group dynamics or endangering species using the structures. Baseline and long-term monitoring should be in place to understand behaviors, use patterns and preferences of crossing structures over time. As researchers and wildlife groups design arboreal crossings over power lines, roads and rails, there is much to learn about how different animals use them. Single rope, ladder, covered or open structures are preferred by different species. And where telephone and power lines are accessible even in the presence of artificial crossing structures, they remain a danger as telephone lines are often anchored to power poles and animals are exposed to bare wires and transformers as they ascend or descend⁴.

Rope bridges have been installed in many areas by local groups concerned for the welfare of animals being electrocuted or killed by vehicles attempting to cross roads. It is important to understand the occurrence, spatial distribution, design, material components and habitats surrounding wildlife electrocutions to provide useful crossing structures and insulate wires that wildlife regularly use. Wildlife rehabilitation groups are working together with conservationists, biologists and communities to insulate sections of power lines that are prioritized by common electrocutions. Various NGO's focus on different species, so sloths, for instance, or monkeys, may be the focus of wildlife rescue. This is effective and localized as it is costly to insulate bare wires across large areas.

Laidlaw⁴ conducted a study in Manuel Antonio, Costa Rica to explore the use and efficacy of ten different crossing structures in 2016. Camera traps were used to identify species and behaviors of crossing a paved side road, near a main road. Eleven species were observed to use the bridges during 1,540 crossing events. This was not significantly different than the use of a telephone wire crossing in the same area and this team concluded that crossing structures are frequently used and can be successful in reducing electrocutions but only when dangerous wires are insulated and / or wildlife is prevented from using wires and cables that are not insulated.

Linshield⁵ conducted a study in Manuel Antonio National Park, Costa Rica to look at arboreal crossing structure types as well as primate behavior – body size, locomotor behavior and their degree of terrestrial and arboreal preferences. Smaller bodied squirrel monkeys (*Saimair oerstedii*) used single rope crossings more frequently than mantled howler monkeys (*Alouatta palliate*) which illustrates the need in this area, for more than one style of crossing structure. To export these lessons to other areas where multiple species require safe crossings, it is important to understand species compositions, behaviors and interactions to better understand how a structure or structures should be constructed. Telephone cables may be ideal crossing structures for some wildlife, but the anchoring poles and all wires should be insulated and safe.

Conclusion

The success of artificial arboreal crossing structures in Costa Rica has implications for their potential use in other areas, including habitats where gibbons, orangutans and other brachiating primates and arboreal animals

are found. By installing artificial arboreal crossing structures along power lines in areas where primates need to cross habitats disturbed by linear infrastructure, it is possible to reduce the risks posed by forest gaps, rails, roads and power lines where the loss of apes can unnecessarily threaten the survival of local populations. Further, long term monitoring is necessary for vulnerable populations where genetic isolation or drift may occur if crossing structures are limiting some individuals from crossing or impediments exist for adequate gene flow.

References

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