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WHEN NATURE WORKS PECULIARLY: FRAGMENTATION EFFECTS ON LOCAL TEMPERATURE IN THE BRAZILIAN ATLANTIC RAINFOREST

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Habitat fragmentation is one of the major contributors to global biodiversity loss. This process may make many landscapes drier and hotter worldwide, notably those in tropical regions, due to increases the amount of habitat edges. The aim of this study was to quantify the impact of habitat fragmentation on local temperature in the Brazilian Atlantic Forest. Our hypothesis is that habitat fragmentation affects the local temperature by intensifying edge effects in landscapes. To test this hypothesis, we obtained satellite data on forest cover (year 2000) and five climatic variables: mean daytime temperature, mean nighttime temperature, mean daily temperature, evapotranspiration and albedo. We compared pairs of landscapes with similar amount of habitat (varying from 10 to 30%) and altitude (difference < 50 m), but with different levels of fragmentation (number of patches), using a "moving window" approach. We calculated the difference in each climatic variable between each pair of landscapes, and used path analysis to explore the relationships between local temperature and the number of patches, albedo and evapotranspiration. The total effect of habitat fragmentation on daytime and daily temperatures was negative: on average, an increase in 100 patches would decrease daytime and mean temperature in 0.23°C. On the other hand, the same increase in the number of patches would increase nighttime temperature in 0.07°C. Fragmentation increased evapotranspiration during the day, probably by increasing the total area of contact between the forest and the matrix. This increase in evapotranspiration increases latent heat loss, leading to local cooling. The slight nighttime warming probably reflects the observed reduction in albedo, which by its turn increases heat absorption. Our results reveal an unexpected influence of habitat fragmentation on local temperature, bringing new implications and challenges to conservation biology.

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