

Appendix B: Quantification of habitat variables ‘forest degradation’ and ‘canopy openness’

In order to quantify forest degradation in the surroundings of mammal and dung beetle sampling sites, we performed a supervised classification with the maximum likelihood method based on satellite imagery. We used the blue, green, red, and near infrared bands of two Sentinel-2 images, mosaicked in a sole one, acquired on the 25 January 2016, with a 10 meters pixel size. Reference data (9640 reference points) were defined from a combined visual interpretation of the Sentinel-2 image and Google Earth data for better spatial resolution. Four classes were identified: (i) dense forest matrix (comprising dense forest stands and swamp forests), (ii) degraded forests (comprising forest visually impacted by both logging and slash-and-burn agriculture) and crops, (iii) bare soil (roads and villages) and (iv) water surface (rivers). We later used a majority filter with a sliding square window of 3 x 3 pixels to smooth the resulting raster. The classification performance was assessed based on the Kappa statistic derived from the confusion matrix. We defined buffer zones around biodiversity sampling points to compute a metric of forest degradation based on the classification raster. Around each camera trap, we considered a 700 meters buffer zone to potentially influence the detection of mammals, considering the recommended distance of 1.4 kilometers between two cameras for mammal inventories in tropical regions (international protocol of TEAM Network, 2011). Around each dung beetle trap, we considered a 75 meters buffer zone, considering that the traps could influence these insects up to 50-100 meters (Larsen and Forsyth, 2005). We computed the proportion of pixels classified as degraded forest in those circular windows around each biodiversity sampling site.

To estimate canopy openness above dung beetle pitfall traps, we took five hemispherical photographs per trap, at 1.5 meters of height and at sunrise: one photo directly above the trap and four photos at 10 meters from the trap in the direction of the four cardinal points. Vegetation below 3 meters of height was cleared beforehand. The percentage of canopy openness is the percentage of open sky seen from beneath a forest canopy and was calculated with GLA software (Frazer et al., 1999). The percentage of canopy openness associated to each trap was the mean of the five values obtained for each trap.

References

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