Assessing Forest Degradation in Guyana with GeoEye, Quickbird and Landsat

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Abstract

Forest degradation is defined as a change in forest quality and condition (e.g. reduction in biomass), while deforestation is a change in forest area. This pilot study evaluated several image processing approaches to map degradation and estimate carbon removals from logging. From the Joint Concept Note on REDD+ cooperation between Guyana and Norway carbon loss as indirect effect of new infrastructure is addressed as follows: "The establishment of new infrastructure in forest areas often contributes to forest carbon loss outside the areas directly affected by construction. Unless a larger or smaller area or greenhouse gas emission impact can be documented through remote sensing or field observations, the area within a distance extending 500 meters from the new infrastructure (incl. mining sites, roads, pipelines, reservoirs) shall be accounted with a 50% annual carbon loss through forest degradation." Our premise is that if we can detect logging at various levels of intensity equivalent to less than 50% removal, then we can apply this approach to examine degradation surrounding new infrastructure. For this preliminary degradation analysis, we examined two Landsat 5 TM images and two high-resolution scenes from GeoEye/Quickbird from central Guyana. Field data on logging concession (maximum allowable cut) and logging impacts of forest gaps were used to test a suite of image processing approaches. Our goal was to examine areas known to be recently logged (i.e. degraded) and quantify the signal in the remote sensing data from this activity. From this analysis, we present results comparing pre-logging imagery to imagery acquired approximately post-logging.

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