

Monitoring lianas from space: Using Sentinel-2 imagery to observe liana removal in logged tropical forests

ABSTRACT

Liana removal – the cutting of over-abundant woody climbing plants (lianas) – has the potential to substantially increase tree growth and biomass accumulation across millions of hectares of degraded tropical forest. Satellite imagery could provide data capable of observing the effect of liana removal on the forest canopy, enabling the large-scale monitoring and validation of liana removal, which remains a key hurdle to its widespread implementation. Using a 320-ha liana removal experiment in Sabah, Malaysian Borneo, we tested whether a time series of Sentinel-2 images could observe the canopy signature of liana removal. Calculating a range of metrics derived from the Normalized Burn Ratio – a vegetation index based on spectral reflectance that differentiates leaf from non-leaf – we quantified satellite-derived canopy disturbance and fragmentation across a range of liana removal intensities and examined how canopy disturbance changed in the 12-months following removal treatments. We find that liana removal significantly increases canopy disturbance and fragmentation metrics one month after removal, with partial removal having a smaller effect than complete removal. The impact of liana removal on the canopy metrics declined over time, with measures of canopy disturbance and fragmentation largely indistinguishable from control forest within 12-months of treatment. Our findings evidence that freely available satellite imagery can be used to efficiently monitor large-scale liana removal applied at a range of intensities and suggest that partial liana removal could significantly reduce canopy disturbance of this restoration method.