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Higginbottom, T, Collar, N, Symeonakis, Ilias and Marsden, S (2017) All forests are not equal: Quantifying the biodiversity value of remnant mountain forests in Java, Indonesia. In: 37th International Symposium on Remote Sensing of Environment, 08 May 2017 - 12 May 2017, Tshwane, South Africa.

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Additional Information: Abstract of a poster presented at ISRSE-37.

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The 37th International Symposium on Remote Sensing of Environment

Earth Observation for Development and Adaptation to a Changing World

Tshwane, South Africa, 8 - 12 May 2017

All forests are not equal: Quantifying the biodiversity value of remnant mountain forests in Java, Indonesia.

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Tropical forests are recognised as the most biodiverse ecosystems on the planet and a range of policies are in place or being considered for their protection. Although the last decade has seen major progress in the mapping of forest characteristics, such as cover and biomass, quantifying the biodiversity value of forest habitats remains an elusive goal. With human and climate-related pressures expected to increase over the coming decades, mapping the biodiversity value of forests is more critical than ever for ensuring conservation efforts are deployed as effectively as possible. Mapping the value of forest for biodiversity is a complicated endeavour, as it requires the quantification of various interlinking parameters. Unfortunately, no single Earth-observation sensor can provide an appropriate inventory of these parameters. However, recent advancements in open-data policies allow for multi-sensor approaches. On the one hand, optical sensors, such as Landsat, offer a means for 2-dimensional land cover mapping, but provide no context on the 3-dimensional properties of habitats. Conversely, radar data, in particular Synthetic Aperture Radar at L-band wavelengths, can relatively accurately capture the 3-dimensional properties of vegetation, allowing for biomass and height quantification.

We implement a multi-sensor approach for quantifying the biodiversity value of highland forests in west Java, Indonesia. We combine a Landsat-derived land cover map, ALOS-PALSAR-based biomass estimates and habitat fragmentation metrics as complementary measures of forest health and biodiversity value. Our results indicate that large area of remnant forest has relatively little biodiversity value, due to low biomass and high fragmentation, attributable to selective logging and the encroachment from smallholder agriculture. Protected areas, especially the Mount Halimun Salak National Park, contain the most productive forests, due to the protection of older, high-value trees. Further protection is provided by steep mountainous areas that are difficult to access and unsuitable for exploitation. These areas have intact forests with little fragmentation, but are not suitable for supporting high biomass due to the steep slopes. These results are of value to biodiversity conservation efforts in Java, and will be made freely available through the dryad digital repository (<http://datadryad.org/>).