

Biodiversity protected areas in Indonesia ineffective in preventing deforestation

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Establishing protected areas in forests is one way to keep deforestation at bay and safeguard biodiversity. However, a study led by researchers from the National University of Singapore (NUS) has revealed that such a measure is ineffective in the case of biodiversity-focused protected areas in Indonesia.

The research, led by Assistant Professor Roman Carrasco of the Department of Biological Sciences at the NUS Faculty of Science and Assistant Professor Alex Cook of NUS' Saw Swee Hock School of Public Health, found that the monitoring and prevention of road construction within protected areas and stepping up control measures in illegal logging hotspots would be more effective for conservation than reliance on protected areas alone.

The findings were first published online in the journal *Global Environmental Change* on 13 March 2015.

Need to address the rate of deforestation

Global rates of [tropical deforestation](#) have increased over the last two decades, particularly in Southeast Asia, which lost approximately 32 million hectares of forests between 1990 and 2010. During this period, Indonesia accounted for approximately 61 per cent of forest loss in Southeast Asia.

"Extensive deforestation in Indonesia is a cause for global concern as it contributes substantially to land-based global carbon emissions and potentially high rates of biodiversity loss," explained Asst Prof Carrasco.

For Indonesia, as the analysis of deforestation and protected area effectiveness has been limited by data availability and geographical scope, the nation-wide analysis conducted in the study is useful to better understand the factors affecting the rate of deforestation and the measures needed to tackle it.

Distribution of deforestation and effectiveness of protected areas

The research, conducted by Mr Cyrille Brun, a Masters student at the NUS Faculty of Science under the supervision of Asst Prof Carrasco and Asst Prof Cook, looked at the five main islands of Indonesia, namely Sumatra, Java, Kalimantan, Sulawesi and Papua. By using remote sensing maps of land use change from 2000 to 2010 to construct spatial Bayesian models, they analysed deforestation patterns in Indonesia as well as the effectiveness of protected areas. The team used the International Union for Conservation of Nature (IUCN) classification of protected areas in order to evaluate the influence of potential factors on deforestation and project future deforestation.

The models showed that deforestation between 2010 and 2020 is likely to occur in close proximity to the areas that have been deforested before 2010, identifying the south and west part of Kalimantan, the north-west Sumatra and West Papua as areas that will be subject to the greatest rates of deforestation.

It was found that protected areas that were strictly set aside to protect biodiversity and where human visitation was strictly controlled were

shown to be ineffective at slowing down deforestation while the other categories of protected areas achieved mixed results. In addition, deforestation was found to be lower as the transport cost to the market increases, and for higher elevation. At the same time, high agricultural rent led to higher deforestation.

The probability of being deforested was found to be lower within forest concessions or industrial timber plantations than in other locations outside concessions. "While it has been shown that [deforestation](#) rates are lower in protected areas than in certain non-protected areas in Indonesia, mounting demands for timber and agricultural products along with weak enforcement are changing this situation, resulting in illegal logging and agricultural encroachment within Indonesia's protected areas," said Asst Prof Cook.

Implications for conservation

The study suggests that monitoring and prevention of road construction within protected areas, the creation of new logging concessions or the further implementation of forest plantations, stronger enforcement of the protected areas and alternative livelihoods to small-scale farmers could be more effective for conservation than reliance on [protected areas](#) alone.

The findings could prove to be a useful tool to support land-use planning in Indonesia for future conservation purposes.

Provided by National University of Singapore

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