## Physics theory explains patterns of deforestation in the tropics

Correlations: Forest fragments decrease habitat quality for wildlife. | Photo Credit: <u>T VIJAYA</u> <u>KUMAR</u>

Predicting rising numbers is usually good news in ecology, but not if they are forest fragments. Current rates of deforestation could cause a 33-fold increase in forest fragments over the next 50 years, shows a study published in *Nature*.

Deforestation, fuelled by factors including habitat conversion and timber production, causes fragmentation. As large forests are cut into pieces, biodiversity suffers and carbon is also lost. To study patterns of tropical forest fragmentation, scientists at the Helmholtz Centre for Environmental Research (Germany) used remotely-sensed images to map more than 130 million forest fragments across 427 million hectares in the Americas, Asia, Africa and Australia.

They found that fragment sizes in three continents followed similar frequency distributions. The number of forest fragments smaller than 10,000 hectares, for instance, is similar in Central and South America (11.2 %), Africa (9.9 %) and south-east Asia (9.2 %).

"This is surprising because land use noticeably differs from continent to continent," said mathematician and lead author Franziska Taubert in a press release. While habitat conversion is what plagues the Amazon, it is logging of commercially-important forest trees in south-east Asia.

So how was local deforestation causing similar fragmentation patterns on a global scale? The scientists found the explanation in percolation theory, which explains how individual particles of an object cluster, transforming the object itself once it reaches a critical point. The theory has been used to explain phenomena as diverse as the trickling of water through soil and the structures of crystals to the pattern of how a forest fire spreads.

According to this theory, in a certain phase of deforestation, the forest landscape exhibits structures that can be found repeatedly. The scientists found that forest fragmentation is currently close to a critical point beyond which fragment number will strongly increase.

Using scenarios that assume different deforestation and reforestation rates, the scientists modelled how many forest fragments can be expected by 2050. For example, if deforestation continues in the Central and South American tropics or south-east Asia at the current rate, the number of fragments will increase 33-fold and their mean size will decrease from 17 hectares to 0.25 hectares. Fragmentation can only be stopped by slowing down deforestation and reforesting more areas.

More and smaller fragments will have repercussions for countries that fall in these zones, including India. More fragments mean more edges, which are highly prone to disturbance and decrease habitat quality for wildlife.

"Carbon stocks tend to reduce in fragments due to several reasons including loss of large trees and edge effects which often favour tree species with lower wood densities," said scientist Jayashree Ratnam of Bengaluru's National Centre for Biological Sciences, who is currently studying regional carbon cycles across India.

Receive the best of The Hindu delivered to your inbox everyday!

Please enter a valid email address.

Fossilised bird dung from almost 1500 years ago was used for the study.

END

Downloaded from crackIAS.com

© Zuccess App by crackIAS.com