Battle for sunlight shapes forest structure in the tropics

Even though environmental differences exist in tropical rainforests, the distribution of tree size class is remarkably consistent among them. In a new study using data from a rainforest in Panama, researchers determined that competition for sunlight is the underlying cause of this common structure in rainforests around the globe despite differences in plant species and geography. The finding can be used in climate simulations to predict how rainforests absorb excess carbon dioxide from the atmosphere.

Rainforest trees in Peru ***(Image courtesy: mongabay.com)***

In case of rainforest structure, it all begins with a gap in the canopy, created after a death or fall of a tree. The gap enables sunlight to reach the forest floor and fuel the rapid growth of small trees. The newly available sunlight enables the understory trees to grow quickly until a few outstrip the others and block the light from reaching their shorter counterparts. Over time, the trees' crowns grow to fill the gap until the point where not all of the trees can fit in the sunlit patch. Some will be left behind in the shade of their competitors.

"This process of moving from fast growth in the sun to slow growth in the shade sets up this characteristic size structure that is common across tropical rainforests, despite the differences in their environments," said Caroline Farrior, the first author of the research work and currently a postdoctoral fellow at the National Institute for Mathematical and Biological Synthesis.

It is well known that tropical rainforests store about twice as much carbon as other forests. "About half of that is due to huge trees, but the other half is all that stuff in the middle. It is not possible to build an accurate climate model without getting that right", indicated Pacala, the co-author and Professor in Ecology and Evolutionary Biology.

"With this new understanding of tropical forests, we can go on to build better models, we can make more accurate estimates of the carbon storage that's currently in tropical forests, and we can go on to more accurately predict the pace of climate change in the future," concluded Ms. Farrior.

The investigation was largely supported by the National Science Foundation (USA) and carried out by a group of researchers at Princeton University, the National Institute for Mathematical and Biological Synthesis, the Smithsonian Tropical Research Institute and collaborating institutions. The findings are published in the journal *Science*.

Source:

http://www.sciencedaily.com/releases/2016/01/160107185003.htm