

**LETTER**

# Tree diversity and carbon storage cobenefits in tropical human-dominated landscapes

Anand M. Osuri<sup>1,2</sup>  | Siddarth Machado<sup>3,4</sup>  | Jayashree Ratnam<sup>4</sup>  |  
 Mahesh Sankaran<sup>4,5</sup>  | N. Ayyappan<sup>6</sup> | S. Muthuramkumar<sup>7</sup>  | N. Parthasarathy<sup>8</sup>  |  
 Raphaël Pélissier<sup>6,9</sup>  | B. R. Ramesh<sup>6</sup> | Ruth DeFries<sup>10</sup>  | Shahid Naeem<sup>10</sup> 

<sup>1</sup>The Earth Institute, Columbia University, New York, New York

<sup>2</sup>The Nature Conservancy, Arlington, Virginia

<sup>3</sup>School of Forest Resources and Conservation, University of Florida, Gainesville, Florida

<sup>4</sup>National Centre for Biological Sciences, Tata Institute of Fundamental Research, Bangalore, Karnataka, India

<sup>5</sup>School of Biology, University of Leeds, Leeds, UK

<sup>6</sup>Department of Ecology, French Institute of Pondicherry, Puducherry, India

<sup>7</sup>Department of Botany, V. H. N. S. N. College (Autonomous), Virudhunagar, Tamil Nadu, India

<sup>8</sup>Department of Ecology and Environmental Sciences, Pondicherry University, Puducherry, India

<sup>9</sup>AMAP Lab, IRD, CIRAD, CNRS, INRA, University of Montpellier, Montpellier, France

<sup>10</sup>Department of Ecology, Evolution, and Environmental Biology, Columbia University, New York, New York

**Correspondence**

Anand M. Osuri, Nature Conservation Foundation, 1311, "Amritha," 12<sup>th</sup> Main, Vijayanagar 1st Stage, Mysore 570017, India.  
 Email: moanand@gmail.com

**Funding information**

Science and Engineering Research Board, Grant/Award Numbers: PDF/2016/000104, SERB/SR/SO/PS/78/2012; Nature Conservancy; Earth Institute, Columbia University

**Abstract**

A lack of spatial congruence between carbon storage and biodiversity in intact forests suggests limited cobenefits of carbon-focused policies for conserving tropical biodiversity. However, whether the same applies in tropical human-dominated landscapes (HDLs) is unclear. In India's Western Ghats Biodiversity Hotspot, we found that while HDL forests harbor lower tree diversity and aboveground carbon stocks than relatively intact forests, positive diversity–carbon correlations are more prevalent in HDLs. This is because anthropogenic drivers of species loss in HDLs consistently reduce carbon storing biomass volume (lower basal area), and biomass per unit volume (fewer hardwood trees). We further show, using a meta-analysis spanning multiple regions, that these patterns apply to tropical HDLs more generally. Thus, while complementary strategies are needed for securing the irreplaceable biodiversity and carbon values of intact forests, ubiquitous tropical HDLs might hold greater potential for synergizing biodiversity conservation and climate change mitigation.

**KEYWORDS**

basal area, biodiversity conservation, carbon storage, climate change, forest degradation, meta-analysis, tree density, tropical forests, Western Ghats, wood density

This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2019 The Authors. *Conservation Letters* published by Wiley Periodicals, Inc.