

## *Curriculum Vitae*

**Ruth S. DeFries**

Ecology, Evolution, and Environmental Biology  
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### **Current Appointment**

Denning Professor of Sustainable Development, Columbia University

### **Research Interests**

Consequences of anthropogenic land use change on ecological processes;  
Characterization of land cover and anthropogenic land use change with remote sensing;  
Interactions between human activities, the land surface, and ecosystem services that regulate the Earth's habitability.

### **Education**

Ph.D. (1980)  
Department of Geography and Environmental Engineering  
Johns Hopkins University, Baltimore, MD

B.A., *summa cum laude* (1976)  
Washington University, St. Louis, MO (major in earth science)

### **Fellowships and Honors**

MacArthur Fellowship, 2007  
Member, National Academy of Sciences (elected 2006)  
Fellow, American Academy of Sciences (elected 2010)  
Fellow, American Geophysical Union (2009)  
Fellow, American Association for the Advancement of Science (elected 2008)  
Fellow, Aldo Leopold Leadership Program of the Ecological Society of America (2001)  
Fulbright Award for Research in India (2007)  
Phi Beta Kappa

### **Previous Appointments**

Associate Professor and Professor (Aug 1999 - 2008)  
University of Maryland, College Park  
Joint appointment in Department of Geography (50%) and Earth System Science Interdisciplinary Center (50%)

Associate Research Scientist (Aug 1991 - Aug 1999; 1991-97 60%; 97-99 80%)  
Department of Geography, University of Maryland, College Park

Visiting scientist (June - Aug 1998)  
Carnegie Institution of Washington, Department of Plant Biology, Palo Alto, CA

Senior Project Officer (June 1983 - Aug 1991)  
National Research Council, Washington, D.C.

Research Associate (Feb 1981 - March 1983)  
Environmental Science and Engineering Group  
Indian Institute of Technology, Bombay, India

Hydrologist (Oct 1979 - Oct 1980)  
United States Geological Survey, Baltimore, MD

### Journal Articles

- Yackulic, C., M. Fagan, M. Jain, A. Jina, Y. Lim, M. Marlier, R. Muscarella, P. Adame, R. DeFries, and M. Uriarte. in press. Biophysical and socioeconomic factors associated with forest transitions at multiple spatial and temporal scales. *Ecology and Society*.
- Bowman, D., J. Balch, P. Artaxo, W. J. Bond, M. Cochran, C. D'Antonio, R. DeFries, F. Johnstaon, J. Keeley, M. Krawchuk, C. Kull, M. C. Mack, M. Moritz, S. Pyne, C. Roos, A. Scott, N. Sodhi, and T. Swetnam. in press. The human dimension of fire regimes on Earth. *Journal of Biogeography*.
- Karanth, K., R. DeFries, A. Srivathsa, and V. Sankaraman. in press. Wildlife tourists in India's emerging economy: Potential for a conservation constituency? *Oryx*.
- Fernandes, C., W. Baethgen, S. Bernardes, R. DeFries, D. DeWit, L. Goddard, W. Lavado, D. E. Lee, C. Padoch, M. Pinedo-Vasquez, and M. Uriarte. 2011. North Tropical Atlantic influence on western Amazon fire season variability. *Geophysical Research Letters* **38**.
- Hansen, A., C. Davis, N. Piekielek, J. Gross, D. Theobald, S. Goetz, F. Melton, and R. DeFries. 2011. Delineating the ecosystems containing protected areas for monitoring and management. *BioScience* **61**:363-373.
- Karanth, K. and DeFries, R. 2011. Nature-based tourism in Indian protected areas: New challenges for park management. *Conservation Letters* **4**:137-149.
- Morton, D., R. DeFries, J. Nagol, C. Souza, E. Kasischke, G. C. Hurtt, and R. Dubayah. 2011. Mapping canopy damage from understory fires in Amazon forests using annual time series of Landsat and MODIS data. *Remote Sensing of Environment* **115**:1706-1720.
- DeFries, R. and C. Rosenzweig, 2010. Toward a whole-landscape approach for sustainable land use in the tropics. *Proceedings of the National Academy of Sciences* **107**(46): 19627-19632.
- Freedman, A. H., Buermann, W., Mitchard, E.T.A., DeFries, R.S., and T.B. Smith, 2010. Human impacts flatten rainforest-savanna gradient and reduce adaptive diversity. *PLoS One* **5**(9): e13088.
- Giglio, L., Randerson, J.T., Van der Werf, G., Kasibhatla, P., Collatz, G.J., Morton, D., and R. DeFries, 2010. Assessing variability and long-term trends in burned area by merging multiple satellite fire products. *Biogeosciences Discussion* **7**: 1171-1186.
- Karanth, K. and DeFries, R., 2010. Conservation and management in human-dominated landscapes: Case studies from India. *Biological Conservation* **143**(12): 2865-2869.
- Sachs, J., Remans, R., Smukler, S., Winowiecki, L., Andelman, S., Cassman, K., Castle, D., DeFries, R., Denning, G., Fanzo, J., Jackson, L., and R. Leemans, R., 2010. Monitoring the world's agriculture. *Nature* doi:10.1038/466558a.
- van der Werf, G., J. T. Randerson, L. Giglio, G. J. Collatz, M. Mu, P. Kasibhatla, D. Morton, R. DeFries, Y. Jin, and T. van Leeuwen. 2010. Global fire emissions and contribution of deforestation, savanna, forest, agricultural, and peat fires (1997-2009). *Atmospheric Chemistry and Physics Discussions* **10**:16153-16230.
- Vina, A., M.-N. Tuanmu, et al., 2010. Range-wide analysis of wildlife habitat: Implications for conservation. *Biological Conservation* **143**: 1960-1969.
- Zeigler, S., W. F. Fagan, et al., 2010. Identifying important forest patches for the long-term persistence of the endangered golden-headed lion tamarin (*Leontopithecus chrysomelas*). *Tropical Conservation Science* **3**(1): 63-77.
- DeFries, R., Rudel, T.K., Uriarte, M., and Hansen, M., 2010. Deforestation driven by urban population growth and agricultural trade in the twenty-first century. *Nature Geoscience*, **3**, 178-181.
- DeFries, R., Karanth, K., and Pareeth, S., 2010. Interactions between protected areas and their surroundings in human-dominated tropical landscapes. *Biological Conservation*, **143**, 2870-2880.
- DeFries, R., and D. Pandey. 2010. Urbanization, the energy ladder and forest transitions in India's emerging economy: Trade-offs and synergies for ecosystem services and human well-being. *Land Use Policy*. **27**: 130-138.
- Baker, J., G. Richards, Grainger, A., Gonzalez, P., Brown, S., DeFries, R., Held, A., Kellndorfer, J., Ndunda, P., Ojima, D., Skrovest, P., Souza, C. Jr., Stolle, F., 2010. Achieving forest carbon information with higher certainty: A five-part plan. *Environmental Science and Policy* **13**(3): 249-260.

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- van der Werf, G., Morton, D., DeFries, R., Olivier, J., Kasibhatla, P., Jackson, R.B., Collatz, G.J., and Randerson, J.T., 2009. CO2 emissions from forest loss. *Nature Geoscience*. 2, 1-2.
- Rudel, T. K., DeFries, R., Asner, G. and W. Laurance. 2009. Changing drivers of deforestation and new opportunities for conservation. *Conservation Biology*. 23: 1396-1405.
- Asner, G., Rudel, T., Aide, T.M, DeFries, R. and R. Emerson. 2009. A contemporary assessment of global humid tropical forest change. *Conservation Biology*. 23: 1386-1395.
- Bowman, D., Balch, J., Artaxo, P., Bond, W.J., Carlson, J., Cochrane, M.A., D'Antonia, C., DeFries, R., Doyle, J., Harrison, S., Johnston, F., Keeley, J., Krawchuk, M., Kull, C., Marston, J.B., Moritz, M., Prentice, I.C., Roos, C., Scott, A., Swetman, T.W., van der Werf, G., and Pyne, S. 2009. Fire in the earth system. *Science* (324): 481-484.
- DeFries, R., F. Rovero, P. C. Wright, J. Ahumada, S. J. Andelman, K. Brandon, J. Dempewolf, A. Hansen, J. Hewson, and J. Liu. 2009. From plot to landscape scale: Linking tropical biodiversity measurements across spatial scales. *Frontiers in Ecology and the Environment*. doi:10.1890/080104.
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- Carpenter, S., Mooney, H., Agard, J., Capistrano, D., DeFries, R., Diaz, S., Dietz, T., Duraipappah, A., Oteng-Yeboah, A., Pererira, H., Perrings, C., Reid, W., Sarukhan, J., Scholes, R., Whyte, A. 2009. Science for managing ecosystem services: Beyond the Millennium Ecosystem Assessment. *Proceedings of the National Academy of Science* (106): 1305-1312.
- van der Werf, G. R., J. Dempewolf, S. N. Trigg, J. T. Randerson, P. S. Kasibhatla, L. Giglio, D. Murdiyarsa, W. Peters, D. Morton, G. J. Collatz, and R. DeFries. 2008. Climate regulation of fire emissions and deforestation in equatorial Asia. *Proceedings of the National Academy of Sciences*. 105(51): 20350-20355.
- van der Werf, G. R., D. C. Morton, R. S. DeFries, L. Giglio, J. T. Randerson, G. J. Collatz and P. S. Kasibhatla. 2008. Estimates of fire emissions from an active deforestation region in the southern Amazon based on satellite data and biogeochemical modeling. *Biogeosciences Discussion*. 5: 3533-3573.
- DeFries, R., D. Morton, G. van der Werf, L. Giglio, G. J. Collatz, J. T. Randerson, J. T. Houghton, P. Kasibhatla, and Y. Shimabukuro. 2008. Fire-related carbon emissions from land use transitions in Southern Amazonia. *Geophysical Research Letters*. 35(L22705): doi:10.1029/2008GL035689.
- DeFries, R. 2008. Terrestrial vegetation in the coupled human-earth system: Contributions of remote sensing. *Annual Review of Environment and Resources* 33:369-390.
- Morton, D., R. DeFries, J. T. Randerson, L. Giglio, W. Schroeder, and G. van der Werf. 2008. Agricultural intensification increases deforestation fire activity in Amazonia. *Global Change Biology* 14:2262-2276.
- Hansen, M. C., S. V. Stehman, P. V. Potapov, T. Loveland, J. R. G. Townshend, R. DeFries, K. W. Pittman, B. Arunarwati, F. Stolle, M. K. Steininger, M. Carroll and C. DiMiceli 2008. Humid tropical forest clearing from 2000 to 2005 quantified using multi-temporal and multi-resolution remotely sensed data. *Proceedings of the National Academy of Sciences* 105(27): 9439-9444.
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- DeFries, R., F. Achard, F. Brown, M. Herold, D. Murdiyarsa, B. Schlamadinger and C. M. Souza. 2007. Earth observations for estimating greenhouse gas emissions from deforestation in developing countries. *Environmental Science and Policy*. 10: 385-394.
- DeFries, R., A. J. Hansen, B. L. Turner II, R. Reid and J. Liu. 2007. Land use change around protected areas: Management opportunities to balance human needs and ecological function. *Ecological Applications*. 17: 1031-1038.
- Hansen, A. J. and R. DeFries. 2007. Ecological mechanisms linking nature reserves to surrounding lands. *Ecological Applications*. 17: 974-988.
- Dempewolf, J., R. DeFries, S. N. Trigg and S. Eby. 2007. MODIS derived burned area mapping of Serengeti-Mara region. *IEEE Geoscience and Remote Sensing Letters*. 4: 312-316.
- Foley, J., G. P. Asner, M. A. Costa, M. Coe, R. DeFries, H. Gibbs, E. Howard, S. Olson, J. Patz, N. Ramankutty and P. Snyder. 2007. Amazonia revealed: Unexpected forest degradation and the loss of ecosystem goods and services in the Amazon basin. *Frontiers in Ecology and the Environment*. 5 (1): 25-32.

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- Ramankutty, N., H. Gibbs, F. Achard, R. DeFries, J. Foley and R. A. Houghton. 2006. Challenges to estimating carbon emissions from tropical deforestation. *Global Change Biology* 12: 1-16.
- Schimel, D., I. Y. Fung and R. DeFries. 2006. Space-based ecological observations: The NASA decadal survey. *Frontiers in Ecology and the Environment* 4(4): 171.
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- Morton, D., R. DeFries, Y. Shimabukuro, L. Anderson, F. Espirito-Santo, M. Hansen, and M. Carroll, 2005: Rapid assessment of annual deforestation in the Brazilian Amazon using MODIS data. *Earth Interactions*, 9(8): 1-22.
- DeFries, R., Hansen, A.J., Newton, A.C. and Hansen, M.C., 2005. Increasing isolation of protected areas in tropical forests over the past twenty years. *Ecological Applications*, 15(1): 19-26.
- Randerson, J.T., G.R. vanderWerf, G.J. Collatz, L. Giglio, C.J. Still, P. Kasibhatla, J.B. Miller, J.W.C. White, R. DeFries, and E.S. Kasischke, 2005: Fire emissions from C3 and C4 vegetation and their influence on interannual variability of atmospheric CO<sub>2</sub> and d13CO<sub>2</sub>. *Global Biogeochemical Cycles*, 19 (GB2019).
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- Hansen, M. and DeFries, R., 2004, Detecting long term forest change using continuous fields of tree cover maps from 8km AVHRR data for the years 1982-1999. *Ecosystems*. DOI 10.1007/s10021-004-0243-3.
- DeFries, R. and Bounoua, L. 2004. Consequences of land use change for ecosystem services: A future unlike the past. *Geojournal*, 61: 345-351.
- DeFries, R., Foley, J. and Asner, G.P., 2004. Land Use Choices: Balancing Human Needs and Ecosystem Function. *Frontiers in Ecology and the Environment*, 2(5): 249-257.
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- Bounoua, L., DeFries, R.S., Imhoff, M.L. and Steininger, M.K., 2003. Land use and local climate: A case study near Santa Cruz, Bolivia. *Meteorology and Atmospheric Physics*, DOI 10.1007/a00703-003-0616-8.
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- Chan, J.C.-W., Huang, C. and DeFries, R., 2001, Enhanced algorithm performance for land cover classification using bootstrap aggregating (bagging). *IEEE Transactions on Geoscience and Remote Sensing*, 39 (3):693-695.
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### **Books and Edited Volumes**

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- Karanth, K. and DeFries, R. (eds.). 2010. Conservation and Management in Human-Dominated Landscapes: Case Studies from India. *Journal of Biological Conservation* 143 (12).
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### **Advisory Committees/Working Groups (selected, last 5 years)**

- Lead author, Intergovernmental Panel on Climate Change, Fifth Assessment, 2010 – present
- Board of Trustees, Environmental Defense Fund, 2010-present
- Chair, Ecosystems, Land Use, and Biodiversity Panel of Decadal Survey for the Earth Sciences, National Research Council, 2005-2007
- Vice-chair, National Research Council, Committee on Earth Studies, Space Sciences Board, 2008-present.
- Member, America's Climate Choices: Science Panel, National Research Council, 2008-2010
- Member, Terrestrial Carbon Group, 2007-2011
- Executive Editor, *Environment* magazine, 2006-2011
- Editorial Board, *Proceedings of the National Academy of Sciences*, 2007-present
- Editorial Board, *Regional Environmental Change*, journal published by Springer-Verlag, 2003 – 2011.
- Member, Global Observations of Forest Cover, Forest/Land Cover Implementation Team, 2001-present

### **Ph.D. Students**

- D. Morton, "Savannization of a Tropical Forest Frontier: Carbon Consequences of Climate and Anthropogenic Fire from a Height-Structured Ecosystem Model" (awarded 2008)
- J. Dempewolf, "Fire Dynamics and Woody Cover Changes in the Serengeti-Mara Ecosystem 2000 to 2005: A Remote Sensing Approach" (awarded 2007)
- M. Songer, "Dynamics of Non-Timber Forest Product Extraction in a Protected Tropical Dry Forest Area in Southeast Asia" (awarded 2006)
- L. Anderson (co-advisor), "Analyzing the Impact of Participatory-Developed Conservation Policies in the Negril Environmental Protection Area, Western Jamaica" (awarded 2007)
- K. Wurster, "Using MISR to Assess the Impact of Charcoal Production on Forest Regeneration Rates in Southeastern Senegal" (awarded 2010)
- S. Zeigler, "Incorporating Landscape in Population Viability Analysis: Improving Generic Modeling Platforms for Endangered Species Conservation" (awarded 2010)
- M. Macedo, "Tropical Deforestation and the Land-Water Interface" (advanced to candidacy)
- V. Gutierrez, "Integrating Land Transformation Process into Fire and Carbon Modeling in Amazonia" (advanced to candidacy)
- M. Fagan, "Growing up Fragmented: Improving Estimates of Carbon Sequestration from Tropical Reforestation" (advanced to candidacy)
- M. Marlier (co-advise with K. Griffin), "Contributions of Biomass Burning to Air Quality Degradation" (advanced to candidacy)
- M. Agarwala, "Mapping Forest Degradation in Tropical Deciduous Forests"
- M. Cattau, "Tropical Peat swamp Forest Loss in Indonesia: Linking Landscape Connectivity, Seed Dispersal, and Carbon Storage"
- M. Jain (co-advise with S. Naeem), "Resilience of Agriculture to Climate Variability in Northwest India"