

Holly Gibbs, Stanford University

Holly Gibbs is a David H. Smith Conservation Research Fellow in the Program on Food Security and Environment at Stanford University. She is a land use and carbon cycle scientist with more than 10 years experience mapping human impacts on the environment. Dr. Gibbs develops statistical and GIS models to quantify and predict shifting drivers, patterns and consequences of tropical deforestation and agricultural expansion. In particular, she is investigating the economic and policy levers needed to help guide agricultural expansion away from tropical forest and savanna ecosystems. Dr. Gibbs is also developing improved methods to map carbon stocks across managed and natural ecosystems. Much of this research aims to reconcile forest conservation, climate change and food security through improved policy and economic incentives.

She earned her Ph.D. from the University of Wisconsin-Madison in the Center for Sustainability and the Global Environment (SAGE) where a DOE Global Change Environmental Fellowship supported her studies. Her dissertation research quantified shifting pathways of tropical land use and their implications for carbon emissions. Throughout her Ph.D. she worked closely with policy makers, business leaders and environmental groups in support of the UNFCCC initiative to Reduce Emissions from Deforestation and Degradation (REDD). Prior to moving to Madison, Dr. Gibbs worked as a Post-Masters Research Associate in Oak Ridge National Laboratory's Environmental Sciences Division where she led remote-sensing and GIS research for global carbon cycle and bioenergy projects. She received a B.S. of Distinction in Natural Resources and M.S. in Environmental Science from The Ohio State University

Holly K. Gibbs

David H. Smith Conservation Research Fellow
Stanford University
The Woods Institute for the Environment
Program on Food Security and the Environment
473 Via Ortega
Stanford, CA 94305

Phone: (513) 720-2784
E-mail: hgibbs@stanford.edu

EDUCATION

Post-Doctoral Research Fellow, Stanford University, October 2008 – present

Focus: U.S. biofuels policies and implications for carbon balance and conservation

Advisors: Rosamond Naylor, Woods Institute, and Chris Field, Dept. of Global Ecology

Ph.D. Environment and Resources, University of Wisconsin-Madison, October 2008

Dissertation: Shifting pathways of tropical land use and their implications for carbon

emissions. Advisor: Jonathan Foley, Center for Sustainability and the Global Environment

M.S. Natural Resources, The Ohio State University, March 2001

Thesis: Human-induced changes in global vegetation and climatic parameters

Specialization: Remote sensing, geographic information systems, and spatial modeling

B.S. Natural Resources (Degree of Distinction), Ohio State University, March 1999, *cum laude*

Thesis: Obstacle avoidance by hand-raised, captive-born, and wild-caught big brown bats

Specialization: Environmental science, wildlife biology and natural resources

HONORS AND AWARDS

- Science Magazine's "Environment News of the Year" 2009
- National Academies of Science Kavli Frontiers of Science Fellow 2008
- David H. Smith Conservation Post-Doctoral Research Fellowship 2008-2010
- Papers selected as "Best of 2007" and "of 2008" by Env Res. Letters 2007 & 2008
- Selected as International Young Scholar by IGBP – START program 2006
- Department of Energy's Graduate Environmental Research Fellowship 2005-2008
- Outstanding Student Paper Award, American Geophysical Union 2004
- Natural Resources Competitive Graduate Student Research Grant 2000
- Student Alumni Society's Outstanding Student Leadership Award 1999
- Awarded "Outreach Project of The Year" by The Ohio State University for "Increasing Diversity in the Environmental Field" series 1999
- The Ohio State University's Honors Summer Research Fellowship 1998
- The Pressey Honors Endowment 1998
- Research Award from the U.S. Fish and Wildlife Service 1998
- Highest rank in the School of Natural Resources' Proposal Competition 1997

PROFESSIONAL EXPERIENCE

David H. Smith Conservation Research Fellow, Stanford University, October 2008 - present
Leading research on the impacts of U.S. climate and biofuels policies on tropical forest conservation, climate change, and food security.

Energy, Carbon and Land Use Consultant, Various, January 2006 - present
Organizations include EKO Asset Management Partners, Carbon Conservation, Winrock International, Conservation International, Starling Resources, and the Tropical Forest Group. Assess and map forest carbon, bioenergy potentials and other ecosystem services.

Doctoral Research Fellow, University of Wisconsin-Madison, August 2003 - September 2008
Developed statistical models to reconcile and hybridize estimates of tropical deforestation during the 1980s and 1990s. Tracked land use dynamics and C emissions across tropics.

Post-Masters Research Associate, Oak Ridge National Laboratory, May 2001 - September 2003
Remote-sensing scientist for an ORNL bioenergy assessment and DOE Global Water Cycle Pilot Project. Developed satellite algorithms and led field campaigns.

Graduate Teaching Associate, The Ohio State University, March 1999 - December 2000
Taught introductory ecology and social science courses by lecturing and leading discussion sections. Advised individual students on academics and potential career paths.

Summer Research Fellow, The Ohio State University, June 1999 - September 1999
Designed, funded, and conducted research investigating the mother-young relationship in big brown bats (*Eptesicus fuscus*). Constructed outdoor flight cage and flight-obstacle course.

MEDIA AND SCIENCE COMMUNICATION EXPERIENCE

Interviews and research results have appeared in print, radio and television media including:

- *Television*: NOVA Science NOW “Algal Fuel”, KQED Public Television “Beyond Ethanol”, and David H. Smith Documentary on conservation leadership
- *Radio*: Canadian Broadcast Company “As it Happens”, PRN “Paradise Parking Lot” and a range of international venues from UNFCCC COPs and scientific conferences
- *Print*: Science Magazine’s ScienceNOW, Environmental Research Web, Reuters, Associated Press, Santa Barbara Independent, U.S. News and World Report, Wisconsin State Journal, and Capital Times, Jakarta Post, Mongabay, Frontline, Santa Barbara Independent, DevNet, Yahoo News among many others
 - Print coverage of research on potential land use implications of biofuel expansion selected as “Environment News of the Year” by Science Magazine

SCIENCE LEADERSHIP AND SERVICE

- Selected as peer reviewer for *U.S. Environmental Protection Agency's methodology to account for lifecycle greenhouse gas emissions of biofuels over time*, May-July 2009
- Invited member of the Roundtable on Sustainable Biofuels Indirect Impacts Expert Group
- Organized and moderated AAAS symposium "Biofuels' Uncertain Future: Unraveling the Science and Politics of Indirect Land Use" (Feb 18-22, 2010)
- Co-organized AAAS symposium "Biofuels, Tropical Deforestation and Climate Policy: Key Challenges and Opportunities" (February 12-16, 2009)
- Guest Co-Editor for special issue of *Environmental Research Letters* "Tropical Deforestation and Carbon Emissions" (2007 - 2008)
- Peer reviewer for the following journals: *Science*, *Journal of Geophysical Research*, *Trends in Ecology & Evolution*, *Environmental Management*, *Ecological Applications*, *Earth Interactions*, *Environmental Research Letters*, *Biomass and Bioenergy*, *Biological Conservation*, *Ecology Letters*, *Tropical Conservation Science Journal*, *Environmental Science & Technology*, *Biotropica*, *Tellus B*
- Science advisor for policy initiatives led by the Coalition for Rainforest Nations (2005-2007) and Amazon Forest Carbon Partnership (2006 - present)
- Co-founder of the Bay Area Tropical Forest Network (www.tropicalforestnetwork.org/)
- Editorial Board Member of the journal *Tropical Conservation Science* (2009 - present)
- Facilitated Transdisciplinary Workshop on "Coupled Human-Environment Systems" and several UW-Madison faculty retreats (May - Sept. 2005)
- American Geophysical Union (AGU), Biogeosciences Student Representative (2006)

JOURNAL PUBLICATIONS (+ = student co-author)

Gibbs, H. K., A.S. Ruesch⁺, J. A. Foley, N. Ramankutty, F. Achard, and P. Holmgren. 2010. Pathways of Agricultural Expansion Across the Tropics: Implications for Forest Resources. *Proceedings of the National Academy of Science* (accepted with revisions).

Strassburg, B., A. Balmford, J. Price, R. Davies, **H. K. Gibbs** D. Orme, L. Miles, and A. Kelly. 2010. Global Congruence of Carbon Storage and Biodiversity in Terrestrial Ecosystems. *Conservation Letters* (in press)

Brodie, J.F., and **H.K. Gibbs**. 2009. Bushmeat hunting as climate threat (commentary). *Science* 326: 364-365.

Robertson, G.P., V. H. Dale, O. C. Doering, S. P. Hamburg, J. M. Melillo, M. M. Wander, W. J. Parton, R. Pouyat, P. R. Adler, J Barney, R. M. Cruse, C. S. Duke, P. M. Fearnside, R. F. Follett, **H. K. Gibbs**, et al.. 2008. Sustainable Biofuels Redux. *Science* 322: 49-50.

Patz, J.A., S. H. Olson, C. Uejio, and **H. K. Gibbs**. 2008. Disease emergence from global climate and land use change. *Medical Clinics of North America*. 92(6): 1473-1491.

Gibbs, H. K., M. Johnston, J. A. Foley, T. Holloway, C. Monfreda, N. Ramankutty, and D. Zaks. 2008. Carbon payback times for crop-based biofuel expansion in the tropics: the effects of changing yield and technology. *Environmental Research Letters* 3 034001.

Olander, L. P., **H. K. Gibbs**, M. Steininger, J. J. Swenson, and B. C. Murray. Reference scenarios for deforestation and forest degradation in support of REDD: a review of data and methods. 2007. *Environmental Research Letters* 3 025011

Gibbs, H. K., S. Brown, J. O. Niles, J.A. Foley. 2007. Monitoring and measuring tropical forest carbon stocks: Making REDD a reality. *Environmental Research Letters* 2(4): 045023.

Gibbs, H. K. and M. Herold. 2007. Tropical deforestation and carbon emissions: Introduction to special issue. *Environmental Research Letters* 2: 045021.

Patz, J. A., **H. K. Gibbs**, J. A. Foley, and K. Smith. 2007. Climate change and global health: Quantifying a growing ethical crisis. *EcoHealth* 4(4):1612-1910.

Patz, J. A., D. Campbell-Lendrum, **H. K. Gibbs**, and R. Woodruff. 2008. Health Impact Assessment of Global Climate Change: Expanding upon Comparative Risk Assessment approaches for Policy Making. *Annual Reviews of Public Health* 29: 27-39.

Ramankutty, N., **H. K. Gibbs**, F. Achard, R. DeFries, J.A. Foley, and R.A. Houghton. 2007. Challenges in estimating carbon emissions from tropical deforestation. *GCB* 13(1):51-66.

Foley, J.A., G.P. Asner, M.H. Costa, M.T. Coe, R. DeFries, **H. K. Gibbs**, et al. 2007. Amazonian revealed: forest degradation and loss of ecosystem goods and services in the Amazon Basin, *Frontiers in Ecology and Environment* 5(1): 25-32.

Foley, J.A., R. S. DeFries, G. P. Asner, C. Barford, G. Bonan, S. R. Carpenter, F. Stuart Chapin, M. T. Coe, G. C. Daily, **H. K. Gibbs**, J. H. Helkowski, T. Holloway, E. A. Howard, C. J. Kucharik, C. Monfreda, J. A. Patz, I. C. Prentice, N. Ramankutty, P. K. Snyder. 2005. Global Consequences of Land Use. *Science* 309 (5734): 570-574.

Miller, N.L., A.W. King, M.A. Miller, E.P. Springer, M.L. Wesely, K.E. Bashford, M.E. Conrad, K. Costigan, P.N. Foster, **H. K. Gibbs**, J. Jin, J. Klazura, B.M. Lesht, M.V. Machavaram, F. Pan, J. Song, D. Troyan, R.A. Washington-Allen. 2005. The DOE Water Cycle Pilot Study. *Bulletin of the American Meteorological Society* 86(3):359-374.

Wali, M.K., F. Evrendilek, T.O. West, S. Watts, D. Pant, **H. K. Gibbs**, B. McClead. 1999. Assessing terrestrial ecosystem sustainability: Usefulness of modeling regional carbon and nitrogen budgets. *Nature and Resources* 35: 21-33.

Gibbs, H. K. and D. L. Johnson. 1999. Obstacle avoidance by hand-raised, captive-born, and wild-caught big brown bats. *Olentangy River Wetlands Research Park Review*. 10(20): 201-06.

In review

Gibbs, H. K. Biofuel Production on the World's Degraded Land? Journal of Environmental Management (submitted)

Turner, W.R., K. Brandon, T.M. Brooks, C. Gascon, **H. K. Gibbs**, K. Lawrence, R. A. Mittermeier, and E. R. Selig. Global conservation and poverty alleviation (In review, Nature)

In preparation

Gibbs, H. K., C.B. Field, D. Lobel. Wood-based fuels on public lands in the U.S.? (in prep)

Gibbs, H. K., J. Gaskell, R. Naylor, and W. Falcon. From forests to grasslands: A way forward for oil palm? (in prep).

Plevin, R., M. O'Hare, and **H. K. Gibbs**. Uncertainties in greenhouse gas emissions from market-mediated land use change: Even larger than thought? (in prep)

Hertel, T., A. Gollub, **H. K. Gibbs**. Impact of improved emissions factors on estimates of indirect land use change. (in prep)

West, P. **H. K. Gibbs**, J.A. Foley, C. Barford, and J. Wagner. Trading carbon for food: global comparison of carbon storage vs. crop yields on agricultural land. (to be submitted to Science)

Gibbs, H. K., J. A. Foley, N. Ramankutty, F. Achard, and P. Holmgren. Shifting patterns and causes of tropical deforestation across the tropics during the 1980s and 1990s (in prep).

Commissioned review papers, technical reports and book chapters

Gibbs, H. K. 2009. Mapping the World's Degraded Land: A Synthesis of Databases and Methodologies. A background paper commissioned by The Nature Conservancy

Miles, L., Kapos, V., **H. K. Gibbs**, Lysenko, I., Campbell, A. 2008. Mapping Vulnerability of Tropical Forest to Conversion and Resulting Potential CO₂ Emissions: A Rapid Assessment for the Eliasch Review. UNEP World Conservation Monitoring Centre.

Campbell A., Kapos V., Lysenko I., Scharlemann J.P.W., Dickson B., **H. K. Gibbs**, Hansen M., Miles L. 2008. Carbon emissions from forest loss in protected areas. UNEP World Conservation Monitoring Centre. A report commissioned by The Nature Conservancy as part of the PACT 2020 Innovation Initiative in collaboration with UNEP-WCMC and the IUCN World Commission on Protected Areas.

Campbell, A., Miles, L., Lysenko, I., Hughes, A., **H.K. Gibbs**. 2008. Carbon storage in protected areas: Technical report. UNEP World Conservation Monitoring Centre.

Gibbs, H.K. 2007. Estimating National Level Tropical Forest Carbon Stocks and Emissions. Commissioned Paper for the Coalition for Rainforest Nations (CFRN) in support of the UNFCCC Agenda Item #6, Reducing Emissions from Deforestation and Degradation (REDD).

Olander, L. P., B. C. Murray, **H. K. Gibbs**, M. Steininger. 2007. Establishing Credible National Baselines for Efforts to Reduce Emissions from Degradation and Deforestation. Commissioned Paper for the CFRN in support of the UNFCCC Agenda Item #6, REDD.

Foley, J.A., Ramankutty, N., Leff, B. and **H. K. Gibbs**. 2007. Global land use changes. In: M.D. King, C.L. Parkinson, K.C. Partington and R.G. Williams (Editors), *Our changing planet: The view from space*. Cambridge University Press, New York, pp. 262-265.

Peer-reviewed data publications (+ = student co-author)

Ruesch, A.S⁺ and **H. K. Gibbs**. 2010. Updated global biomass carbon map for the year 2005 based on IPCC Tier-1 Methodology. Oak Ridge National Laboratory (ORNL) Carbon Dioxide Analysis Information Center (CDIAC)

Ruesch, A.S⁺ and **H. K. Gibbs**. 2008. New global biomass carbon map for the year 2000 based on IPCC Tier-1 Methodology. ORNL-CDIAC.

Gibbs, H. K. and S. Brown. 2007. Carbon pools in the forests of tropical Africa: An updated database using the GLC2000 Land Cover Product. NDP-017b. ORNL-CDIAC.

Gibbs, H. K. and S. Brown. 2007. Carbon pools in the forests of tropical Southeast Asia: An updated database using the GLC2000 Land Cover Product. NDP-017b. ORNL-CDIAC.

Gibbs, H. K. 2006. Major World Ecosystem Complexes Ranked by Carbon in Live Vegetation: An Updated Database Using the GLC2000 Land Cover Product. NDP-017b. ORNL-CDIAC.

Gibbs, H. K., R. L. Graham, and R. B. Cook. 2002. The Oak Ridge Reservation Geographic Information System: Potential for Bioenergy Development. Available on-line [<http://mercury.ornl.gov/EDORA/>] from the Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A.

SELECTED PRESENTATIONS

Agricultural Expansion Pathways Across the Tropics: Implications for Carbon Payback Time. Coordinating Research Council of petroleum and automotive manufacturers and engineers, October 21, 2009, Argonne National Laboratory, Chicago, IL (***Invited***)

Estimating Carbon Stocks and Emissions for Avoided Deforestation Project. Meeting of Environmental Trust Funds from Amazonian Countries, July 14, 2009, NYC, NY (***Invited***)

Mapping the World's Degraded Lands. Degraded Lands Workshop, May 13, 2009, Stanford University, CA (***Invited***)

The Biofuels Boom: Ripple Effects on Tropical Forests and Global Climate. The Field Museum of Natural History, February 11, 2009, Chicago, IL (***Invited***)

Mapping Land Sources for Expanding Biofuel Croplands Across the Tropics. American Association for the Advancement of Science Annual Meeting, February 14, 2009, Chicago IL. **(Session Organizer)**

The Biofuels Boom: Promise or Peril for Food, Forests and Climate? National Academies of Science Kavli Frontiers of Science Symposium, November 7, 2008, Irvine, CA **(Invited)**

Carbon Payback Times for Tropical Biofuel Expansion. The Kathryn Fuller Science for Nature Fund 2008 Science for Nature Symposium: Biofuels – Which are More Sustainable?, November 19, 2008, World Wildlife Fund, Washington D.C. **(Invited)**

The Changing Fate of Cleared Land Across the Tropics: Critical New Inputs for Ecosystem Service Evaluation. Land Tenure Center Symposium on Pro-Poor Rewards for Ecosystem Services, April 7-8, University of Wisconsin-Madison. **(Invited)**

Navigating the Biofuels Debate. Union of Concerned Scientists Lunchtime Seminar. March 13, 2008, Washington D.C. **(Invited)**

Tropical Ecosystems and the Biofuels Boom: Navigating a Sustainable Path Forward? Conference on the Ecological Dimensions of Biofuels. March 10, 2008, Washington D.C.

New National-Level Estimates of Tropical Forest Carbon Stocks. United Nations Framework Convention on Climate Change COP-13, Forest Day. December 8, 2007, Bali, Indonesia.

Biofuel Expansion in the Tropics May Increase Global Warming. United Nations Framework Convention on Climate Change COP-13, Forest Day. December 8, 2007, Bali, Indonesia.

Sustainable pathways of biofuel crop expansion in the Tropics? Large-Scale Biosphere-Atmosphere ECO Meeting, September 26-29, 2007. Bahia, Brazil.

Shifting Patterns of Tropical Land Use and Their Implications for Carbon Emissions. Stockholm Resilience Series: Frontiers in Sustainability Science and Policy. Stockholm, Sweden. June 4, 2007. **(Invited)**

Estimating Tropical Forest Carbon Stocks. Coalition for Rainforest Nations Science, Technology, and Methods Workshop. Columbia University Business School, NY. January 22-23, 2007. **(Invited)**

Tracking the fate of cleared land across the Tropics: Critical New Inputs for Ecosystem Service Evaluation. Large-Scale Biosphere-Atmosphere ECO Meeting, October 4-6, 2006. Brasilia, Brazil.

Estimating National Level Tropical Forest Carbon Stocks and Emissions. Pre-Session for the UNFCCC Workshop on COP11 Agenda Item #6 organized by the Coalition for Rainforest Nations Rome, Italy. August 28-29, 2006. **(Invited)**

Tracking the Fate of Cleared Land Across Africa: Critical New Inputs for Ecosystem Service Evaluation. *Plenary Session of Conservation International's Annual Symposium, Defying Nature's End: The African Context*. Antannarivo, Madagascar. June 20-24, 2006. **(Invited)**

Tracking the Fate of Cleared Land Across the Tropics: Critical New Inputs for Ecosystem Service Evaluation. Conservation International's Center for Applied Biodiversity Brownbag, Washington, D.C. May 24, 2006. **(Invited)**

Estimating Tropical Deforestation and Carbon Emissions: What We Need, What We Have, and How to Make Ends Meet. Coalition for Rainforest Nation's Policy Workshop on the UNFCCC COP-11 Agenda Item #6. Columbia University, NY. 13-14 March, 2006. **(Invited)**

An Improved Spatial Data Set of Tropical Deforestation Rates for the 1980s and 1990s. The American Geophysical Union Fall Meeting. San Francisco, CA. 5-9 December, 2005.

Estimating tropical land cover change dynamics for the 1980s and 1990s. The 6th Open Meeting of the Human Dimensions of the Global Environmental Change Research Community, Bonn, Germany. October 9-13.

Tracking the fate of deforested land in Central America. NASA Marshall Space Flight Center, Huntsville, AL. 24-25 August 2005. **(Invited)**

Addressing Major Uncertainties in Rates of Tropical Deforestation. Department of Energy Global Change Education Program End of the Summer Meeting, Washington, D.C. 22-24 August 2005. Reducing Uncertainty in Rates of Tropical Deforestation and Associated Carbon Emissions. International Earth System Science Postdoctoral Network Meeting. Breckenridge CO. 23-25, June 2005.

Challenges in Estimating Global Tropical Deforestation in the 1980s and 1990s. Oral Presentation. The American Geophysical Union Fall Meeting. 13-17 December, 2004.

Challenges in Estimating Tropical Deforestation in the 1980s and 1990s. Lucc Workshop on Impacts of changes in land use and management on carbon stocks and turn-over in the tropics. Institute of Geography, University of Copenhagen, Denmark. 23-25 August, 2004.

R. A. Washington-Allen, A. W. King, M. A. Sale, and F. Pan. Geographic Portability of the Relationships between LAI, FPAR, and Spectral Vegetation Indices. The American Geophysical Union Spring Meeting, Washington D.C. 28-31 May 2002.

UNIVERSITY LEADERSHIP POSITIONS

- The Nelson Institute Director Search and Screen Committee 2007
- The Nelson Institute Research Committee, Student Representative 2006-2008
- Project Associate on the Nelson Institute Mission Review Team 2005
- Madison Ecology Group (MEG) Graduate Student Representative 2003-2005
- Nelson Institute for Environmental Studies Land Resources Student Rep. 2003-2004
- Undergraduate Honors Thesis Reading Group Mentor 2003-2004
- Graduate Student Council Mentor Awards Selection Committee 2003-2004
- Member of the School of Natural Resources' Seminar Committee 2000-2001
- Executive member of The Graduate Student Organization (OSU) 2000-2001
- School of Natural Resources' Director Search Committee 2000-2001
- Vice-president of the School of Natural Resources' Honor Society 1998-1999
- School of Natural Resources' Student Leadership Forum Representative 1997-1999

PROFESSIONAL DEVELOPMENT TRAINING

- Policy Training Workshop, Washington D.C., Jan 2010
- Media Training for Scientists by Intermedia Communications Training, Jan 2009
- Science Writing and Communication Workshop, Jan 2009
- Conflict Management and Group Facilitation: Practiced resolving conflicts with diverse stakeholders groups in international settings, Jersey Island, May 2005
- Strategic Mission Review and Assessment: Trained in assessing mission and mission drift in academic setting and leading and analyzing self-assessments of faculty Apr-June, 2005

Holly K. Gibbs

David H. Smith Conservation Research Fellow
Stanford University
The Woods Institute for the Environment
Program on Food Security and the Environment
473 Via Ortega
Stanford, CA 94305

Phone: (513) 720-2784
E-mail: hgibbs@stanford.edu

EDUCATION

Post-Doctoral Research Fellow, Stanford University, October 2008 – present

Focus: U.S. biofuels policies and implications for carbon balance and conservation

Advisors: Rosamond Naylor, Woods Institute, and Chris Field, Dept. of Global Ecology

Ph.D. Environment and Resources, University of Wisconsin-Madison, October 2008

Dissertation: Shifting pathways of tropical land use and their implications for carbon

emissions. Advisor: Jonathan Foley, Center for Sustainability and the Global Environment

M.S. Natural Resources, The Ohio State University, March 2001

Thesis: Human-induced changes in global vegetation and climatic parameters

Specialization: Remote sensing, geographic information systems, and spatial modeling

B.S. Natural Resources (Degree of Distinction), Ohio State University, March 1999, *cum laude*

Thesis: Obstacle avoidance by hand-raised, captive-born, and wild-caught big brown bats

Specialization: Environmental science, wildlife biology and natural resources

HONORS AND AWARDS

- Science Magazine's "Environment News of the Year" 2009
- National Academies of Science Kavli Frontiers of Science Fellow 2008
- David H. Smith Conservation Post-Doctoral Research Fellowship 2008-2010
- Papers selected as "Best of 2007" and "of 2008" by Env Res. Letters 2007 & 2008
- Selected as International Young Scholar by IGBP – START program 2006
- Department of Energy's Graduate Environmental Research Fellowship 2005-2008
- Outstanding Student Paper Award, American Geophysical Union 2004
- Natural Resources Competitive Graduate Student Research Grant 2000
- Student Alumni Society's Outstanding Student Leadership Award 1999
- Awarded "Outreach Project of The Year" by The Ohio State University for "Increasing Diversity in the Environmental Field" series 1999
- The Ohio State University's Honors Summer Research Fellowship 1998
- The Pressey Honors Endowment 1998
- Research Award from the U.S. Fish and Wildlife Service 1998
- Highest rank in the School of Natural Resources' Proposal Competition 1997

PROFESSIONAL EXPERIENCE

David H. Smith Conservation Research Fellow, Stanford University, October 2008 - present
Leading research on the impacts of U.S. climate and biofuels policies on tropical forest conservation, climate change, and food security.

Energy, Carbon and Land Use Consultant, Various, January 2006 - present
Organizations include EKO Asset Management Partners, Carbon Conservation, Winrock International, Conservation International, Starling Resources, and the Tropical Forest Group. Assess and map forest carbon, bioenergy potentials and other ecosystem services.

Doctoral Research Fellow, University of Wisconsin-Madison, August 2003 - September 2008
Developed statistical models to reconcile and hybridize estimates of tropical deforestation during the 1980s and 1990s. Tracked land use dynamics and C emissions across tropics.

Post-Masters Research Associate, Oak Ridge National Laboratory, May 2001 - September 2003
Remote-sensing scientist for an ORNL bioenergy assessment and DOE Global Water Cycle Pilot Project. Developed satellite algorithms and led field campaigns.

Graduate Teaching Associate, The Ohio State University, March 1999 - December 2000
Taught introductory ecology and social science courses by lecturing and leading discussion sections. Advised individual students on academics and potential career paths.

Summer Research Fellow, The Ohio State University, June 1999 - September 1999
Designed, funded, and conducted research investigating the mother-young relationship in big brown bats (*Eptesicus fuscus*). Constructed outdoor flight cage and flight-obstacle course.

MEDIA AND SCIENCE COMMUNICATION EXPERIENCE

Interviews and research results have appeared in print, radio and television media including:

- *Television*: NOVA Science NOW “Algal Fuel”, KQED Public Television “Beyond Ethanol”, and David H. Smith Documentary on conservation leadership
- *Radio*: Canadian Broadcast Company “As it Happens”, PRN “Paradise Parking Lot” and a range of international venues from UNFCCC COPs and scientific conferences
- *Print*: Science Magazine’s ScienceNOW, Environmental Research Web, Reuters, Associated Press, Santa Barbara Independent, U.S. News and World Report, Wisconsin State Journal, and Capital Times, Jakarta Post, Mongabay, Frontline, Santa Barbara Independent, DevNet, Yahoo News among many others
 - Print coverage of research on potential land use implications of biofuel expansion selected as “Environment News of the Year” by Science Magazine

SCIENCE LEADERSHIP AND SERVICE

- Selected as peer reviewer for *U.S. Environmental Protection Agency's methodology to account for lifecycle greenhouse gas emissions of biofuels over time*, May-July 2009
- Invited member of the Roundtable on Sustainable Biofuels Indirect Impacts Expert Group
- Organized and moderated AAAS symposium "Biofuels' Uncertain Future: Unraveling the Science and Politics of Indirect Land Use" (Feb 18-22, 2010)
- Co-organized AAAS symposium "Biofuels, Tropical Deforestation and Climate Policy: Key Challenges and Opportunities" (February 12-16, 2009)
- Guest Co-Editor for special issue of *Environmental Research Letters* "Tropical Deforestation and Carbon Emissions" (2007 - 2008)
- Peer reviewer for the following journals: *Science*, *Journal of Geophysical Research*, *Trends in Ecology & Evolution*, *Environmental Management*, *Ecological Applications*, *Earth Interactions*, *Environmental Research Letters*, *Biomass and Bioenergy*, *Biological Conservation*, *Ecology Letters*, *Tropical Conservation Science Journal*, *Environmental Science & Technology*, *Biotropica*, *Tellus B*
- Science advisor for policy initiatives led by the Coalition for Rainforest Nations (2005-2007) and Amazon Forest Carbon Partnership (2006 - present)
- Co-founder of the Bay Area Tropical Forest Network (www.tropicalforestnetwork.org/)
- Editorial Board Member of the journal *Tropical Conservation Science* (2009 - present)
- Facilitated Transdisciplinary Workshop on "Coupled Human-Environment Systems" and several UW-Madison faculty retreats (May - Sept. 2005)
- American Geophysical Union (AGU), Biogeosciences Student Representative (2006)

JOURNAL PUBLICATIONS (+ = student co-author)

Gibbs, H. K., A.S. Ruesch⁺, J. A. Foley, N. Ramankutty, F. Achard, and P. Holmgren. 2010. Pathways of Agricultural Expansion Across the Tropics: Implications for Forest Resources. *Proceedings of the National Academy of Science* (accepted with revisions).

Strassburg, B., A. Balmford, J. Price, R. Davies, **H. K. Gibbs** D. Orme, L. Miles, and A. Kelly. 2010. Global Congruence of Carbon Storage and Biodiversity in Terrestrial Ecosystems. *Conservation Letters* (in press)

Brodie, J.F., and **H.K. Gibbs**. 2009. Bushmeat hunting as climate threat (commentary). *Science* 326: 364-365.

Robertson, G.P., V. H. Dale, O. C. Doering, S. P. Hamburg, J. M. Melillo, M. M. Wander, W. J. Parton, R. Pouyat, P. R. Adler, J Barney, R. M. Cruse, C. S. Duke, P. M. Fearnside, R. F. Follett, **H. K. Gibbs**, et al.. 2008. Sustainable Biofuels Redux. *Science* 322: 49-50.

Patz, J.A., S. H. Olson, C. Uejio, and **H. K. Gibbs**. 2008. Disease emergence from global climate and land use change. *Medical Clinics of North America*. 92(6): 1473-1491.

Gibbs, H. K., M. Johnston, J. A. Foley, T. Holloway, C. Monfreda, N. Ramankutty, and D. Zaks. 2008. Carbon payback times for crop-based biofuel expansion in the tropics: the effects of changing yield and technology. *Environmental Research Letters* 3 034001.

Olander, L. P., **H. K. Gibbs**, M. Steininger, J. J. Swenson, and B. C. Murray. Reference scenarios for deforestation and forest degradation in support of REDD: a review of data and methods. 2007. *Environmental Research Letters* 3 025011

Gibbs, H. K., S. Brown, J. O. Niles, J.A. Foley. 2007. Monitoring and measuring tropical forest carbon stocks: Making REDD a reality. *Environmental Research Letters* 2(4): 045023.

Gibbs, H. K. and M. Herold. 2007. Tropical deforestation and carbon emissions: Introduction to special issue. *Environmental Research Letters* 2: 045021.

Patz, J. A., **H. K. Gibbs**, J. A. Foley, and K. Smith. 2007. Climate change and global health: Quantifying a growing ethical crisis. *EcoHealth* 4(4):1612-1910.

Patz, J. A., D. Campbell-Lendrum, **H. K. Gibbs**, and R. Woodruff. 2008. Health Impact Assessment of Global Climate Change: Expanding upon Comparative Risk Assessment approaches for Policy Making. *Annual Reviews of Public Health* 29: 27-39.

Ramankutty, N., **H. K. Gibbs**, F. Achard, R. DeFries, J.A. Foley, and R.A. Houghton. 2007. Challenges in estimating carbon emissions from tropical deforestation. *GCB* 13(1):51-66.

Foley, J.A., G.P. Asner, M.H. Costa, M.T. Coe, R. DeFries, **H. K. Gibbs**, et al. 2007. Amazonian revealed: forest degradation and loss of ecosystem goods and services in the Amazon Basin, *Frontiers in Ecology and Environment* 5(1): 25-32.

Foley, J.A., R. S. DeFries, G. P. Asner, C. Barford, G. Bonan, S. R. Carpenter, F. Stuart Chapin, M. T. Coe, G. C. Daily, **H. K. Gibbs**, J. H. Helkowski, T. Holloway, E. A. Howard, C. J. Kucharik, C. Monfreda, J. A. Patz, I. C. Prentice, N. Ramankutty, P. K. Snyder. 2005. Global Consequences of Land Use. *Science* 309 (5734): 570-574.

Miller, N.L., A.W. King, M.A. Miller, E.P. Springer, M.L. Wesely, K.E. Bashford, M.E. Conrad, K. Costigan, P.N. Foster, **H. K. Gibbs**, J. Jin, J. Klazura, B.M. Lesht, M.V. Machavaram, F. Pan, J. Song, D. Troyan, R.A. Washington-Allen. 2005. The DOE Water Cycle Pilot Study. *Bulletin of the American Meteorological Society* 86(3):359-374.

Wali, M.K., F. Evrendilek, T.O. West, S. Watts, D. Pant, **H. K. Gibbs**, B. McClead. 1999. Assessing terrestrial ecosystem sustainability: Usefulness of modeling regional carbon and nitrogen budgets. *Nature and Resources* 35: 21-33.

Gibbs, H. K. and D. L. Johnson. 1999. Obstacle avoidance by hand-raised, captive-born, and wild-caught big brown bats. *Olentangy River Wetlands Research Park Review*. 10(20): 201-06.

In review

Gibbs, H. K. Biofuel Production on the World's Degraded Land? Journal of Environmental Management (submitted)

Turner, W.R., K. Brandon, T.M. Brooks, C. Gascon, **H. K. Gibbs**, K. Lawrence, R. A. Mittermeier, and E. R. Selig. Global conservation and poverty alleviation (In review, Nature)

In preparation

Gibbs, H. K., C.B. Field, D. Lobel. Wood-based fuels on public lands in the U.S.? (in prep)

Gibbs, H. K., J. Gaskell, R. Naylor, and W. Falcon. From forests to grasslands: A way forward for oil palm? (in prep).

Plevin, R., M. O'Hare, and **H. K. Gibbs**. Uncertainties in greenhouse gas emissions from market-mediated land use change: Even larger than thought? (in prep)

Hertel, T., A. Gollub, **H. K. Gibbs**. Impact of improved emissions factors on estimates of indirect land use change. (in prep)

West, P. **H. K. Gibbs**, J.A. Foley, C. Barford, and J. Wagner. Trading carbon for food: global comparison of carbon storage vs. crop yields on agricultural land. (to be submitted to Science)

Gibbs, H. K., J. A. Foley, N. Ramankutty, F. Achard, and P. Holmgren. Shifting patterns and causes of tropical deforestation across the tropics during the 1980s and 1990s (in prep).

Commissioned review papers, technical reports and book chapters

Gibbs, H. K. 2009. Mapping the World's Degraded Land: A Synthesis of Databases and Methodologies. A background paper commissioned by The Nature Conservancy

Miles, L., Kapos, V., **H. K. Gibbs**, Lysenko, I., Campbell, A. 2008. Mapping Vulnerability of Tropical Forest to Conversion and Resulting Potential CO₂ Emissions: A Rapid Assessment for the Eliasch Review. UNEP World Conservation Monitoring Centre.

Campbell A., Kapos V., Lysenko I., Scharlemann J.P.W., Dickson B., **H. K. Gibbs**, Hansen M., Miles L. 2008. Carbon emissions from forest loss in protected areas. UNEP World Conservation Monitoring Centre. A report commissioned by The Nature Conservancy as part of the PACT 2020 Innovation Initiative in collaboration with UNEP-WCMC and the IUCN World Commission on Protected Areas.

Campbell, A., Miles. L., Lysenko, I., Hughes, A., **H.K. Gibbs**. 2008. Carbon storage in protected areas: Technical report. UNEP World Conservation Monitoring Centre.

Gibbs, H.K. 2007. Estimating National Level Tropical Forest Carbon Stocks and Emissions. Commissioned Paper for the Coalition for Rainforest Nations (CFRN) in support of the UNFCCC Agenda Item #6, Reducing Emissions from Deforestation and Degradation (REDD).

Olander, L. P., B. C. Murray, **H. K. Gibbs**, M. Steininger. 2007. Establishing Credible National Baselines for Efforts to Reduce Emissions from Degradation and Deforestation. Commissioned Paper for the CFRN in support of the UNFCCC Agenda Item #6, REDD.

Foley, J.A., Ramankutty, N., Leff, B. and **H. K. Gibbs**. 2007. Global land use changes. In: M.D. King, C.L. Parkinson, K.C. Partington and R.G. Williams (Editors), *Our changing planet: The view from space*. Cambridge University Press, New York, pp. 262-265.

Peer-reviewed data publications (+ = student co-author)

Ruesch, A.S⁺ and **H. K. Gibbs**. 2010. Updated global biomass carbon map for the year 2005 based on IPCC Tier-1 Methodology. Oak Ridge National Laboratory (ORNL) Carbon Dioxide Analysis Information Center (CDIAC)

Ruesch, A.S⁺ and **H. K. Gibbs**. 2008. New global biomass carbon map for the year 2000 based on IPCC Tier-1 Methodology. ORNL-CDIAC.

Gibbs, H. K. and S. Brown. 2007. Carbon pools in the forests of tropical Africa: An updated database using the GLC2000 Land Cover Product. NDP-017b. ORNL-CDIAC.

Gibbs, H. K. and S. Brown. 2007. Carbon pools in the forests of tropical Southeast Asia: An updated database using the GLC2000 Land Cover Product. NDP-017b. ORNL-CDIAC.

Gibbs, H. K. 2006. Major World Ecosystem Complexes Ranked by Carbon in Live Vegetation: An Updated Database Using the GLC2000 Land Cover Product. NDP-017b. ORNL-CDIAC.

Gibbs, H. K., R. L. Graham, and R. B. Cook. 2002. The Oak Ridge Reservation Geographic Information System: Potential for Bioenergy Development. Available on-line [<http://mercury.ornl.gov/EDORA/>] from the Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A.

SELECTED PRESENTATIONS

Agricultural Expansion Pathways Across the Tropics: Implications for Carbon Payback Time. Coordinating Research Council of petroleum and automotive manufacturers and engineers, October 21, 2009, Argonne National Laboratory, Chicago, IL (***Invited***)

Estimating Carbon Stocks and Emissions for Avoided Deforestation Project. Meeting of Environmental Trust Funds from Amazonian Countries, July 14, 2009, NYC, NY (***Invited***)

Mapping the World's Degraded Lands. Degraded Lands Workshop, May 13, 2009, Stanford University, CA (***Invited***)

The Biofuels Boom: Ripple Effects on Tropical Forests and Global Climate. The Field Museum of Natural History, February 11, 2009, Chicago, IL (***Invited***)

Mapping Land Sources for Expanding Biofuel Croplands Across the Tropics. American Association for the Advancement of Science Annual Meeting, February 14, 2009, Chicago IL. **(Session Organizer)**

The Biofuels Boom: Promise or Peril for Food, Forests and Climate? National Academies of Science Kavli Frontiers of Science Symposium, November 7, 2008, Irvine, CA **(Invited)**

Carbon Payback Times for Tropical Biofuel Expansion. The Kathryn Fuller Science for Nature Fund 2008 Science for Nature Symposium: Biofuels – Which are More Sustainable?, November 19, 2008, World Wildlife Fund, Washington D.C. **(Invited)**

The Changing Fate of Cleared Land Across the Tropics: Critical New Inputs for Ecosystem Service Evaluation. Land Tenure Center Symposium on Pro-Poor Rewards for Ecosystem Services, April 7-8, University of Wisconsin-Madison. **(Invited)**

Navigating the Biofuels Debate. Union of Concerned Scientists Lunchtime Seminar. March 13, 2008, Washington D.C. **(Invited)**

Tropical Ecosystems and the Biofuels Boom: Navigating a Sustainable Path Forward? Conference on the Ecological Dimensions of Biofuels. March 10, 2008, Washington D.C.

New National-Level Estimates of Tropical Forest Carbon Stocks. United Nations Framework Convention on Climate Change COP-13, Forest Day. December 8, 2007, Bali, Indonesia.

Biofuel Expansion in the Tropics May Increase Global Warming. United Nations Framework Convention on Climate Change COP-13, Forest Day. December 8, 2007, Bali, Indonesia.

Sustainable pathways of biofuel crop expansion in the Tropics? Large-Scale Biosphere-Atmosphere ECO Meeting, September 26-29, 2007. Bahia, Brazil.

Shifting Patterns of Tropical Land Use and Their Implications for Carbon Emissions. Stockholm Resilience Series: Frontiers in Sustainability Science and Policy. Stockholm, Sweden. June 4, 2007. **(Invited)**

Estimating Tropical Forest Carbon Stocks. Coalition for Rainforest Nations Science, Technology, and Methods Workshop. Columbia University Business School, NY. January 22-23, 2007. **(Invited)**

Tracking the fate of cleared land across the Tropics: Critical New Inputs for Ecosystem Service Evaluation. Large-Scale Biosphere-Atmosphere ECO Meeting, October 4-6, 2006. Brasilia, Brazil.

Estimating National Level Tropical Forest Carbon Stocks and Emissions. Pre-Session for the UNFCCC Workshop on COP11 Agenda Item #6 organized by the Coalition for Rainforest Nations Rome, Italy. August 28-29, 2006. **(Invited)**

Tracking the Fate of Cleared Land Across Africa: Critical New Inputs for Ecosystem Service Evaluation. *Plenary Session of Conservation International's Annual Symposium, Defying Nature's End: The African Context*. Antannarivo, Madagascar. June 20-24, 2006. **(Invited)**

Tracking the Fate of Cleared Land Across the Tropics: Critical New Inputs for Ecosystem Service Evaluation. Conservation International's Center for Applied Biodiversity Brownbag, Washington, D.C. May 24, 2006. **(Invited)**

Estimating Tropical Deforestation and Carbon Emissions: What We Need, What We Have, and How to Make Ends Meet. Coalition for Rainforest Nation's Policy Workshop on the UNFCCC COP-11 Agenda Item #6. Columbia University, NY. 13-14 March, 2006. **(Invited)**

An Improved Spatial Data Set of Tropical Deforestation Rates for the 1980s and 1990s. The American Geophysical Union Fall Meeting. San Francisco, CA. 5-9 December, 2005.

Estimating tropical land cover change dynamics for the 1980s and 1990s. The 6th Open Meeting of the Human Dimensions of the Global Environmental Change Research Community, Bonn, Germany. October 9-13.

Tracking the fate of deforested land in Central America. NASA Marshall Space Flight Center, Huntsville, AL. 24-25 August 2005. **(Invited)**

Addressing Major Uncertainties in Rates of Tropical Deforestation. Department of Energy Global Change Education Program End of the Summer Meeting, Washington, D.C. 22-24 August 2005. Reducing Uncertainty in Rates of Tropical Deforestation and Associated Carbon Emissions. International Earth System Science Postdoctoral Network Meeting. Breckenridge CO. 23-25, June 2005.

Challenges in Estimating Global Tropical Deforestation in the 1980s and 1990s. Oral Presentation. The American Geophysical Union Fall Meeting. 13-17 December, 2004.

Challenges in Estimating Tropical Deforestation in the 1980s and 1990s. LUCS Workshop on Impacts of changes in land use and management on carbon stocks and turn-over in the tropics. Institute of Geography, University of Copenhagen, Denmark. 23-25 August, 2004.

R. A. Washington-Allen, A. W. King, M. A. Sale, and F. Pan. Geographic Portability of the Relationships between LAI, FPAR, and Spectral Vegetation Indices. The American Geophysical Union Spring Meeting, Washington D.C. 28-31 May 2002.

UNIVERSITY LEADERSHIP POSITIONS

- The Nelson Institute Director Search and Screen Committee 2007
- The Nelson Institute Research Committee, Student Representative 2006-2008
- Project Associate on the Nelson Institute Mission Review Team 2005
- Madison Ecology Group (MEG) Graduate Student Representative 2003-2005
- Nelson Institute for Environmental Studies Land Resources Student Rep. 2003-2004
- Undergraduate Honors Thesis Reading Group Mentor 2003-2004
- Graduate Student Council Mentor Awards Selection Committee 2003-2004
- Member of the School of Natural Resources' Seminar Committee 2000-2001
- Executive member of The Graduate Student Organization (OSU) 2000-2001
- School of Natural Resources' Director Search Committee 2000-2001
- Vice-president of the School of Natural Resources' Honor Society 1998-1999
- School of Natural Resources' Student Leadership Forum Representative 1997-1999

PROFESSIONAL DEVELOPMENT TRAINING

- Policy Training Workshop, Washington D.C., Jan 2010
- Media Training for Scientists by Intermedia Communications Training, Jan 2009
- Science Writing and Communication Workshop, Jan 2009
- Conflict Management and Group Facilitation: Practiced resolving conflicts with diverse stakeholders groups in international settings, Jersey Island, May 2005
- Strategic Mission Review and Assessment: Trained in assessing mission and mission drift in academic setting and leading and analyzing self-assessments of faculty Apr-June, 2005

