

## ALEXANDER PFAFF

Duke University, Sanford School of Public Policy  
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### Employment

2007-	DUKE UNIVERSITY	Sanford School of Public Policy	<i>Professor</i>
2005-	COLUMBIA UNIVERSITY	Earth Institute	<i>CGSD then Adjunct Scholar</i>
1995-2005	COLUMBIA UNIVERSITY	SIPA / Economics Department	<i>Asst. then Assoc. Professor</i>

### Education

MASSACHUSETTS INSTITUTE OF TECHNOLOGY 1995 Ph.D. Economics

“The Economics of Deforestation: Evidence from the Brazilian Amazon and New England”

Advisors: Richard Schmalensee, Robert Solow, Robert Stavins, Abhijit Banerjee, James Poterba

Languages: Portuguese and Spanish (a little), French (vanishing)

YALE UNIVERSITY 1988 B.A. Applied Math / Economics, Phi Beta Kappa, summa cum laude

### Service & Outreach

2014-	Oversee Ph.D. students' paid efforts on ecopayment stacking, do outreach to EDF and others.
2013	Steering committee for PARTNERS (people and reforestation) NSF-funded science network.
2013	Co-author, Nicholas Institute policy brief 13-01 (focus groups and survey on climate beliefs).
2013	Main author, World Bank technical paper on Amazon roads, protected areas and deforestation.
2010-2013	World Bank consultations concerning policy, the environment and the use of natural resources.
2010-2013	InterAmerican Development Bank consultations on Latin American forest conservation policy.
2010-2010	CATIE / Efd Costa Rica spring semester visit for dissemination on conservation and policies.
2009-2010	Organization for Tropical Studies briefings for U.S. decision makers and USAID mission staff.
2009-2010	Nicholas Institute for Environmental Policy Solutions white paper and US Senate presentation.
2005-2011	National Academies (NAS / NRC) Committee on the Human Dimensions of Global Change.
2004-2007	NASA SEDAC (Socioeconomic Data / Applications Center), CIESIN User Working Group.
2004-2007	NCEAS (National Center for Ecological Analysis and Synthesis), Scientific Advisory Board.
2003-2005	Land Planning Team to integrate LUCC (soc.science) with GCTE (nat.science) land research.

## Editing/Reviewing

Guest editor for PNAS, program committee contributor for AERE for both Summer and World meetings, and a reviewer for general economic (e.g., AER, ReStat) as well as environment- (e.g., JEEM, REEP, ERE, Land Economics, PNAS, GEC) and development- (e.g., JDE, EDE, World Development) focused journals.

2004-2010 Editorial Board for the journal ‘Population and Environment’, Springer, Social Sciences.

2007-2009 Social Science Research Council, Dissertation Proposal Development Fellowship Program.

## **Refereed Research** [*subsections below: Land & Mitigation, Water & Adaptation, Air & Energy, Information & Audit*]

( \* indicates any lead author) (reverse chronology, working papers to published, in each subsection and subsubsection below)

### **Land & Climate-Change Mitigation** [*subsubsections below: Comparative, Brazilian Amazon, Costa Rica, Other*]

#### COMPARATIVE (including reviews)

##### *Published*

Pfaff, A. \*, G.S. Amacher and E.O. Sills (2013). “Realistic REDD: improving the forest impacts of domestic policies in different settings”. *Review of Environmental Economics and Policy* 7(1):114-135 (doi:10.1093/leep/res023).

Pfaff, A. \* and J. Robalino (2013). “Predicting Policy Impact on Tropical Dry Forest”, in Arturo Sanchez, ed., *Tropical Dry Forests in the Americas: ecology, conservation and management*. Taylor & Francis.

Pfaff, A. \* and J. Robalino (2012). “Protecting Forests, Biodiversity and the Climate: predicting policy impact to improve policy choice”. *Oxford Review of Economic Policy* 28(1):164-179.

Pfaff, A. \*, G.S. Amacher, E.O. Sills, M.J. Coren, K. Lawlor, C. Streck (2012). “Deforestation & Forest Degradation: concerns, causes, policies & their impacts”. Solicited entry in “*Encyclopedia of Resources, Energy and Environmental Economics*”. Elsevier.

Joppa, L. \* and A. Pfaff\* (2011). “Global Protected Area Impacts”. *Proceedings of the Royal Society B* 278(1712):1633-1638.

Pfaff A.\* and R. Walker\* (2010). “Regional Interdependence and Forest ‘Transitions’: substitute deforestation limits the relevance of local reversals”. *Land Use Policy* 27:119-129.

Ricketts T.H. \*, B. Soares-Filho, G. da Fonseca, D. Nepstad, A. Pfaff. et al. (2010) “Indigenous Lands, Protected Areas, and Slowing Climate Change”. *PLoS Biol* 8(3). doi:10.1371/journal.pbio.1000331

Pfaff, A. \*, E.O. Sills, G.S. Amacher, M.J. Coren, K. Lawlor, C. Streck (2010). “Policy Impacts on Deforestation: Lessons from Past Experiences to Inform New Initiatives.” *Nicholas Institute for Environmental Policy Solutions, Duke University, with the support of the Packard Foundation.*

Joppa, L. \* and A. Pfaff\* (2010). “Re-assessing the forest impacts of protection: the challenge of non-random protection & a corrective method”. *Annals of the New York Academy of Sciences* 1185:135–149.

Joppa, L. \* and A. Pfaff\* (2009). "High & Far: biases in the location of protected areas". PLoS ONE 4(12): e8273. doi:10.1371/journal.pone.0008273

Andam, K. \*, P. Ferraro\*, A. Pfaff and A. Sanchez (2007). "Protected Areas and Avoided Deforestation: A Statistical Evaluation". Report of GEF (the Global Environmental Facility of World Bank & UNEP)

## BRAZILIAN AMAZON

### *Working Papers (presented)*

Pfaff, A. \*, J.A. Robalino \* and L.D. Herrera et al. "Amazon Protected Areas' Highly Varied Forest Impacts: location and type".

Pfaff, A. \*, J.A. Robalino \* and L.D. Herrera et al. "Decentralization Given Environment-Development Tradeoffs: federal versus state conservation and impacts on Amazonian deforestation

Herrera, L.D., A. Pfaff and J. Robalino\*. "Protected Areas' Forest Spillovers in the Brazilian Amazon".

Delgado \*, C., A. Pfaff\*, et al. "Will Nearby Protected Areas Constrain Road Impacts On Deforestation?".

Pfaff, A. \*, J. Robalino and R. Walker. "Spatial Transport Dynamics on the Brazilian Amazon Frontier: roads follow roads, making long-run impacts higher than short run".

### *Submitted*

Pfaff A. \*, J. Robalino, R. Walker, S. Perz, W. Laurance, C. Bohrer, J.A. Robalino, S. Aldrich, E. Arima, M. Caldas and K. Kirby. "Clean Development' From Infrastructure Location: spatially varied road impacts on Brazilian Amazon deforestation".

### *Revise & Resubmit*

Pfaff, A. \* J.A. Robalino \*, D. Herrera and C. Sandoval. "Protected Areas' Impacts on Brazilian Amazon Deforestation: examining conservation - development interactions to inform planning ”.

### *Published*

Pfaff, A. \*, J. Robalino \*, E. Lima, C. Sandoval and L.D. Herrera (2013). "Governance, Location and Avoided Deforestation from Protected Areas: greater restrictions can have lower impact, due to differences in location". World Development (<http://dx.doi.org/10.1016/j.worlddev.2013.01.011>).

Pfaff, A. \*, A. Barbieri, T. Ludewigs, F. Merry, S. Perz and E.J. Reis (2009). "Road Impacts in Brazilian Amazonia" in, Keller, M., M. Bustamente, J. Gash and P. Dias, eds., Amazonia and Global Change. American Geophysical Union.

Pfaff A. \*, J.A. Robalino\*, R. Walker, E. Reis, S. Perz, C. Bohrer, S. Aldrich, E. Arima, M. Caldas, W. Laurance and K. Kirby (2007). "Road Investments, Spatial Intensification and Deforestation in the Brazilian Amazon". Journal of Regional Science 47:109-123.

Pfaff A.\* (1999). "What Drives Deforestation in the Brazilian Amazon? Evidence from Satellite and Socioeconomic Data", Journal of Environmental Economics and Management 37(1):26-43.

## COSTA RICA

### *Working Papers (presented)*

Pfaff\*, A., J. Robalino\*, A. Sanchez\* with F. Alpizar and C. Leon. "Changing the Deforestation Impacts of Ecopayments: evolutions (2000-2005) within Costa Rica's PSA".

Robalino, J.A., A. Pfaff, A. Sanchez, L. Villalobos. 2011. "Evaluating Spillover Effects of Land Conservation Policies in Costa Rica". Mimeo, CATIE

### *Submitted*

Alpizar, F., A. Norden, A. Pfaff and J. Robalino. "Effects of Exclusion from a Conservation Policy: negative behavioral spillovers from targeted incentives". Duke U. NIEPS Working Paper EE 13-06.

Alpizar, F., A. Norden, A. Pfaff and J. Robalino. "Behavioral Spillovers from Targeted Incentives: losses from excluded individuals can counter gains from those selected". Duke Univ. NIEPS WP EE 13-07.

### *Revise & Resubmit*

Robalino, J., C. Sandoval, D. Barton, A. Chacon and A. Pfaff "Evaluating interactions of forest conservation policies on avoided deforestation".

### *Published*

Robalino, J.A. and A. Pfaff (2013). "Ecopayments and Deforestation in Costa Rica: a nationwide analysis of PSA's initial years". *Land Economics* 89(3):432-448.

Robalino J.A.\* and A. Pfaff (2012). "Contagious Development: neighbor interactions in deforestation". *Journal of Development Economics* 97:427-436.

Pfaff, A.\*, J.A. Robalino\*, G.A. Sanchez-Azofeifa, K. Andam and P. Ferraro (2009). "Park Location Affects Forest Protection: Land Characteristics Cause Differences in Park Impacts across Costa Rica," *The B.E. Journal of Economic Analysis & Policy*: Vol. 9: Iss. 2 (Contributions), Article 5 (available at: <http://www.bepress.com/bejeap/vol9/iss2/art5> ")

Pfaff, A.\* and J.A. Robalino\* (2009). "Payments for Environmental Services: overview of empirical analyses", chapter 11 (pages 192-207) in Engel, S and C. Palmer, editors, *Avoided Deforestation: Prospects for Mitigating Climate Change*. Routledge Explorations in Environmental Economics.

Andam, K.\*, P. Ferraro\*, A. Pfaff, J. Robalino and A. Sanchez (2008). "Measuring the effectiveness of protected-area networks in reducing deforestation". *PNAS* 105(42):16089-16094.

Pfaff A.\* and S. Kerr\* with R. Cavatassi, B. Davis, L. Lipper, A. Sanchez and J. Timmins (2008). "Effects of Poverty on Deforestation: distinguishing behavior from location" in (ed.) *Economics of poverty, environment and natural resource use*, Wageningen University Environment / Resources.

Sanchez-Azofeifa, G.\*, A. Pfaff, J. Robalino and J. Boomhower (2007). "Costa Rica's Payment for Environmental Services Program: Intention, Implementation and Impact". *Conservation Biology* 21(5):1165-1173.

Robalino J.A.\* and A. Pfaff\* with G.A. Sanchez-Azofeifa (2007). "Estimating Spatial Interactions in Deforestation Decisions" in (ed.) *Frontiers of Biodiversity Economics*, Cambridge Univ. Press.

Alpizar, F.\* , A. Blackman\* and A. Pfaff\* (2007). "Payments for Ecosystem Services: why precision and targeting matter". *Resources* 165(spring):20-22.

Pfaff A.\* , S. Kerr\* , L. Lipper\* with R. Cavatassi, B. Davis, J. Hendy and A. Sanchez (2007). "Will Buying Tropical Forest Carbon Benefit The Poor? evidence from Costa Rica". *Land Use Policy* 24:600-610.

Pfaff A.\* and A. Sanchez\* (2004). "Deforestation Pressure and Biological Reserve Planning: A Conceptual Approach & An Illustrative Application for Costa Rica". *Resource and Energy Economics* 26:237-254.

Kerr S.\* , S. Liu\* , A. Pfaff\* and R.F. Hughes (2003). "Carbon dynamics and land-use choices: building a regional-scale, multidisciplinary model." *Journal of Environmental Management* 69:25-37.

Sanchez-Azofeifa G.A.\* , G.C. Daily, A. Pfaff and C. Busch (2003). "Integrity and Isolation of Costa Rica's National Parks and Biological Reserves: examining the dynamics of land-cover change". *Biological Conservation* 109:123-135.

Kerr S.\* , A. Pfaff\* , G.A. Sanchez-Azofeifa\* and M. Boscolo (2001). "How Can Carbon Sequestration in Tropical Forests Be Rewarded? Evidence from Case Of Costa Rica", in *Central America Project, Environment: Conservation and Competitiveness*, HIID, Harvard University Press, Cambridge, MA.

Kerr S.\* , A. Pfaff\* and G.A. Sanchez-Azofeifa\* (2001). "The Dynamics of Deforestation and the Supply of Carbon Sequestration: Illustrative Results from Costa Rica", in *Central America Project, Environment: Conservation and Competitiveness*, HIID, Harvard University Press, Cambridge, MA.

Pfaff A.\* , S. Kerr\* , R.F. Hughes, S. Liu, A. Sanchez, D. Schimel, J. Tosi, V. Watson (2000). "The Kyoto Protocol & Payments for Tropical Forest: An Interdisciplinary Method for Estimating Carbon-Offset Supply and Increasing the Feasibility of a Carbon Market under the CDM". *Ecol. Econ.* 35(2):203.

OTHER (Bolivia, Indonesia, Mexico, Madagascar, Panama, Peru, United States)

*Working Papers (presented)*

Amor\*, D. and A. Pfaff\*. "Sequenced Road Investments and Clearing of the Mayan Forest".

*Submitted*

Pfaff, A.\* , F. Santiago-Avila\* , M. Carnovale and L. Joppa. " Protected Areas' Impacts Upon Land Cover Within Mexico: the need to add politics and dynamics to static land-use economics".

Gimenez, T.\* , A. Pfaff\* , R. Rasolofoson and L. Joppa. "Scaling Up Conservation in Madagascar".

Delgado\*, C., D. A. Conde, J. O. Sexton, F. Colchero, J.J. Swensen and A. Pfaff. "Deforestation dynamics in response to the evolution of the Western Amazonian Inter-Oceanic Highway".

*Published*

Blackman\*, A., A. Pfaff and J. Robalino (forthcoming). “Paper Park Performance: Mexico's Natural Protected Areas in the 1990s”. *Global Environmental Change*.

Haruna, A. \*, A. Pfaff\*, S. van den Ende, and L. Joppa (2014). “Evolving Protected-Areas Impacts in Panama: impact shifts show that plans require anticipation”. *Environmental Research Letters* 9.

Engel, S., C. Palmer and A. Pfaff (2013). “On the Endogeneity of Resource Co-management: theory and evidence from Indonesia”. *Land Economics* 89(2):308-329.

Pfaff A. \* (2000). “From Deforestation to Reforestation in New England, USA”, in Palo, Matti and Heidi Vanhanen, eds. *Global Prospects of Deforestation and Forest Transition*, Kluwer.

## **Water & Climate-Change Adaptation** [*subsections below: Water Quantity & Forecasts, Water Quality & Tests*]

### WATER QUANTITY & FORECASTS

#### *Working Papers (presented)*

Pfaff, A. \*, M.A. Velez \*, K. Broad and R. Taddei. “Learning & Equity under Asymmetric Information: repeated allocation within a bargaining institution”.

Pfaff, A. \* and M.A. Velez \*. “Strategic Use of Weather & Climate Uncertainty: bargaining power from NOT having information?” .

Small, A. \*, D. Osgood, A. Pfaff. “Resource Allocation and Investment Coordination under Uncertainty”.

Mueller, V. \*, A. Pfaff \*, K. Broad, J. Hercio, H. Kazianga and R. Taddei. “Drought’s Impacts in Irrigated Rural Northeast Brazil”

#### *Submitted*

Pfaff, A. \*, M.A. Velez \*, A. Hamoudi, R. Taddei and K. Broad. “Contracts versus Trust in Resource Reallocation: explicit transfer contracts raise both efficiency and equity”.

#### *Revise & Resubmit*

Pfaff, A. \*, M.A. Velez \*, P. Ramos and A. Molina. “A Framed Field Experiment on Water Scarcity in Colombia: path-dependent durable selfishness within a vertical setting”.

#### *Published*

Pfaff, A. \*, M.A. Velez \*, R. Taddei and K. Broad (2013). “Unequal Information, Unequal Allocation: bargaining field experiments in NE Brazil”. *Environmental Science & Policy* 26:90-101.

Fonseca\*, M., A. Pfaff\* and D. Osgood (2012). “The Advantage of Resource Queues over Spot Resource Markets: decision coordination in experiments under resource uncertainty”. *American Journal of Agricultural Economics* 94(5):1136-1153.

Pfaff, A.\* and M.A. Velez\* (2011). "Efficiency and Equity in Negotiated Resource Transfers: contributions and limitations of trust with limited contracts". *Ecological Economics*, doi:10.1016/j.ecolcon.2011.10.009

Broad K.\* , A. Pfaff\* , R. Taddei\* with S. Arumugam, U. Lall and F.A. de Souza Filho (2007). "Climate, Stream Flow Prediction and Water Management in Northeast Brazil: societal trends and forecast value". *Climatic Change* 84:217-239.

Broad K.\* , A. Pfaff\* and M.H. Glantz (2002). "Effective & Equitable Dissemination of Seasonal-to-Interannual Climate Forecasts: policy implications from the Peruvian fishery during El Nino 1997-98". *Climatic Change* 54(4):415-438.

Pfaff A.\* and D.M. Petee\* (2001). "Generating Probabilities in Support of Societal Decision Making: the case of abrupt climate change". *EOS (American Geophysical Union)*, May 15, 2001.

Pfaff A.\* , K. Broad\* and M.H. Glantz\* (1999). "Who benefits from seasonal-to-interannual climate forecasts?" *Nature* 397(6721):645-646, February 25<sup>th</sup>.

## WATER QUALITY & TESTS

### *Submitted*

Pfaff, A., A. Schoenfeld, K.M. Ahmed and L. van Geen. "Reducing Arsenic Exposure in Bangladesh: new evidence of the impacts of insufficient testing and health-risk communication from a tubewell and household survey".

### *Published*

Soumya\* , H.B., A. Pfaff\* , L. Benneer, A. Tarozzi, K.M. Ahmed, A. Schoenfeld and A. van Geen (2013). "Evolution of households' responses to the groundwater arsenic crisis in Bangladesh: information on environmental health risks can have increasing behavioral impact over time". *Environment and Development Economics*. To date, published online: doi:10.1017/S1355770X13000612

Benneer, L.\* , A. Tarozzi, A. Pfaff, H.B. Soumya, K.M. Ahmed and A. van Geen (2013). "Impacts of a Randomized Controlled Trial in Arsenic Risk Communication on Household Water Supply Choices in Bangladesh". *Journal of Environmental Economics and Management* 66(2):226-240.

Chen, Y.\* , A. van Geen, J. Graziano, A. Pfaff, M. Madajewicz, F. Parvez, I. Hussain, V. Slavkovich, T. Islan and H. Ahsan\* (2007). "Reduction in Urinary Arsenic Levels in Response to Arsenic Mitigation Efforts in Araihasar, Bangladesh". *Environmental Health Perspectives* 115(6):917-923.

Opar A.\* , A. Pfaff\* , A.A. Seddique, K.M. Ahmed, J.H. Graziano, and A. van Geen\* (2007). "Responses of 6500 Households to Arsenic Mitigation in Araihasar, Bangladesh". *Health & Place* 13:164.

Madajewicz M.\* , A. Pfaff\* , J. Graziano, A. van Geen, I. Hussein, H. Momotaj, R. Sylvi, and H. Ahsan (2007). "Can Information Alone Both Improve Awareness and Change Behavior? Arsenic contamination of groundwater in Bangladesh". *Journal of Development Economics* 84:731-754.

Ahmed, M.F.\* , S. Ahuja, M. Alauddin, S.J. Hug, J.R. Lloyd, A. Pfaff, T. Pichler, C. Saltikov, M. Stute and A. van Geen\* (2006). "Ensuring Safe Drinking Water in Bangladesh". *Science* 314: 1687-88.

Madajewicz M. \* and A. Pfaff\* (2004). “Social Survey Data”, in Rosenboom, J. ed. Not Just Red or Green: an analysis of arsenic data from 15 upazilas of Bangladesh. UNICEF Arsenic Policy Support Unit.

## **Air & Energy**

### *Submitted*

Chaudhuri S. \* and A. Pfaff\*. “Fuel-choice and indoor air quality: a household-level perspective on economic growth and the environment”.

### *Published*

Mueller, V. \*, A. Pfaff\*, J. Peabody, Y. Liu, and K.R. Smith (2013). “Improving Stove Evaluation Using Survey Data: who received which intervention matters”. *Ecological Economics* 93:301-312.

Mueller, V. \*, A. Pfaff\*, J. Peabody, Y. Liu, and K.R. Smith (2011). “Demonstrating bias and improved inference for stoves’ health benefits”. *Int’ J. of Epidemiology* doi: 10.1093/ije/dyr150

Pattanayak, S.K.\* and A. Pfaff\* (2009). “Behavior, Environment and Health in Developing Countries: evaluation and valuation”. *Annual Review of Resource Economics* 1:183-217.

Pfaff A. \*, S. Chaudhuri\* and H. Nye (2004). “Household Production & Environmental Kuznets Curves: examining the desirability and feasibility of substitution”. *Envir & Resource Economics* 27(2):187-200.

Pfaff A. \*, P. Barelli and S. Chaudhuri (2004). “Aid, Economic Growth and Environmental Sustainability: rich-poor interactions and environmental choices in developing countries”. *Int’l J. of Global Environmental Issues* 4:139-159 (special issue on growth and environment, submission invited)

Pfaff A. \*, S. Chaudhuri\* and H. Nye (2004). “Endowments, Preferences, Technologies and Abatement: growth-environment microfoundations”. *Int’l J. of Global Environmental Issues* 4:209-228 (invited)

## **Information & Audits**

### *Working Papers (presented)*

Pfaff, A. \* and K. Rao\* . “Incentives to Self Report: regulatory treatment of voluntary disclosures”.

Rao, K. \*, A. Pfaff, M. Isanuk, J. Lee, D. Prager, N. Tarui. “What Drives Environmental Self-Reporting? roles of past and future regulatory effort”.

### *Published*

Yin, H. \*, A. Pfaff and H.C. Kunreuther (2011). “Can Environmental Insurance Succeed Where Others Fail? the case of underground storage tanks”. *Risk Analysis* (selected one of the best papers of 2011 by the journal’s editorial staff). January. doi: 10.1111/j.1539-6924.2010.01479.x

Pfaff A.\* and C.W. Sanchirico\* (2004). “Big Field, Small Potatoes: An Empirical Assessment of EPA’s Self-Audit Policy”. *Journal of Policy Analysis & Management* 23(3):415-432.



Graff Zivin J.\* and A. Pfaff\* (2004). “To Err on Humans is not Benign: Incentives for Adoption of Medical Error Reporting Systems”. *Journal of Health Economics* 23:935-949.

Kahn M.E.\* and A. Pfaff\* (2000). “Informal Economies, Information and the Environment”. *Journal of International Affairs* 54(2):525-544.

Pfaff A.\* and C.W. Sanchirico\* (2000). “Environmental Self-Auditing: Setting the Proper Incentives for Discovery and Correction of Environmental Harm”. *J. Law, Economics & Organization* 16(1):189-208.

### **Funding**

2014 World Wildlife Fund, research grant (Duke, \$4,000/1 student); PI. Assessment of the forest impacts of programs to certify production processes within timber concessions in Peru and in Cameroon.

2014 Gothenberg University, research grant (Duke, \$7,200/1 student); PI. Examination of welfare impacts from permitting eco-services suppliers, like farmers, to sell multiple services to distinct markets.

2013 World Wildlife Fund, research grant (Duke, \$8,000/1 student); PI. Assessment of the forest impacts of programs to certify production processes within timber concessions in Peru and in Cameroon.

2012 Tinker Foundation, Institutional Grant (Duke, \$438,848/3 years); CoPI. Assessment of a recent pilot and potential new strategies for a Mexican forest agency to link ecoservices users and producers.

2010 NSF DMUU (at Columbia Univ.); PI for Ceará and Colombia’s subcontract to Duke (over 5 years). Experiments and surveys on institutional impacts on decisions under climate/water uncertainty.

2010 Tinker Foundation, Institutional Grant (CATIE, \$159,500/2 years); CoPI. Examining the impacts of ecopayments in Costa Rica for motivations and magnitudes of spillovers suggesting new designs.

2010 IAI (Inter-American Institute for Global Change Research) (\$127,100/2 years); PI. Empirical work on the impacts on deforestation of conservation policies, extending prior work with new regions.

2010 Duke U., CCVBP internal grant (2 years, Jim Clark PI); CoPI. Examine empirically links between deforestation and malaria in the Brazilian Amazon, with a focus on both climate and behavior.

2009 IFPRI (International Food Policy Research Institute)(\$30,168/1 year); PI. Examining empirically the responses of rainfed agricultural households to the provision of forecasts of seasonal rainfall.

2009 Duke U., CGC internal grant (\$30,000/1 year); PI. Extending in four ways, each with new coauthor, our field experiments concerning bargaining institutions and water, now carried out in Colombia.

2009 NSF DMUU (center extension); PI for Ceará (\$80,217). Group decisions under climate uncertainty, field experiments about bargaining institutions with local water stakeholders in Ceará, NE Brazil.

2008 Packard Foundation grant to Duke/Nicholas Institute (\$250,000/6 months); CoI for Lessons Learned, reviewing impacts on deforestation of conservation policies and of other potential policy levers.

2008 Tinker Foundation, Institutional Grant (\$140,000/2 years); CoPI. Examine impacts on deforestation of protected areas in Mexico, building upon analysis of land use and park impacts in Costa Rica.

- 2008 Blum Center for Developing Economies (\$50,000 direct costs/1 year with potential extension); CoI. In Tanzania, test strategies for disseminating improved stoves that lower fuel cost and emissions.
- 2007 IAI (Inter-American Institute for Global Change Research) (\$109,850/2 years); PI. Empirical analysis of the impacts on deforestation of conservation policies, focused upon differences by ecosystem.
- 2007 Duke U., CCVBP internal grant (\$50,000/1 year); PI. Examine empirically households' demand for well water arsenic tests as well as their responses to test information provided in different ways.
- 2007 ISERP (Institute for Social and Economic Research and Policy, C.U.) seed grant (\$15,000); CoPI. Examine communication of climate/water forecasts to NE Brazil intermediaries and end users.
- 2007 Columbia U., Earth Institute CCI grant (\$25,000/1 year); CoPI. Examine rainfed agriculture in Ceará to understand climate/water risk management/vulnerability and the potential for use of forecasts.
- 2007 EPA Partnership for Clean Indoor Air (\$200,000/2 years); CoI on Columbia Univ. subcontract from Enterprise Works for air quality monitoring, information intervention and evaluation of impact.
- 2006 Columbia U., Earth Institute CCI grant (\$30,000/1 year); CoI. Examine the acceptability and use of improved stoves in Kenya as a pilot for extended research, with baseline and follow up surveys.
- 2006 NSF Human & Social Dynamics (\$748,296/3 years); CoPI. Model collective action in public goods, with empirical tests based on pilot interventions to supply safe community wells in Bangladesh.
- 2006 FAPERJ/CNPq – NEMESIS (R599,106/3 years); CoI, in a large group, for census-tract deforestation in the Brazilian Amazon. Brazilian research funding for modeling spatial effects in deforestation.
- 2005 NASA 'LBA' (\$278,702 based at Michigan State U./2 years); PI. Econometric analysis of land use. Extends Amazon predictive deforestation model through spatial disaggregation and carbon link.
- 2005 Tinker Foundation, Institutional Grant (\$140,000/2 years); PI. Examine stakeholder views on current and proposed water allocation and water supply and allocation policies in Ceará State, NE Brazil.
- 2004 Social Sciences and Humanities Research Council of Canada (\$84,000/3 years U.Alberta); land PI. Extend analyses of land-use drivers in Costa Rica to examine the impacts of payments and parks.
- 2004 NSF DMUU (\$5.7m/5 years); PI for Ceará (~ \$600,000). Group decisions under climate uncertainty, examining decisions in field experiments with multiple water stakeholders in Ceará, NE Brazil.
- 2004 NOAA OGP CSI (\$448,346/3 years based at U. Miami); CoPI. To analyze impacts upon stakeholder groups in Ceará State, Brazil of changing reservoir releases based upon stream flow forecasts.
- 2002 ISERP (Institute for Social and Economic Research and Policy, Columbia) seed grant (\$15,000); PI. Work in new locations in Bangladesh to study interventions and responses for arsenic in water.
- 2002 NASA 'LBA' (\$600,000 based at Michigan State U./3 years); PI. Econometric analysis of land use in the Amazon, yielding deforestation predictive model linked to local, spatial clearing dynamics.

- 2002 Tinker Foundation, Institutional Grant (\$110,000/2 years); PI. Using many spatially detailed datasets, improve on existing analysis of Amazonian deforestation and to start analysis of fragmentation.
- 2001 ISERP (Institute for Social and Economic Research and Policy, Columbia) seed grant (\$10,000); PI. Team building and preliminary analyses for a Brazilian Amazon forests/fragmentation project.
- 2001 FAO (United Nations Food and Agriculture Organization) Letter of Agreement (\$42,000/1 year); PI. Extend Costa Rican forest-carbon analyses to address poverty-environmental-services linkages.
- 2000 NSF – MMIA (Methods & Models in Integrated Assessment) grant (\$700,000 total/3 years); CU PI. Extend carbon-baseline analysis; estimate a carbon sequestration supply function for Costa Rica.
- 2000 NCEAS (National Center for Ecological Analysis and Synthesis (NSF/UCSB)) (\$44,000/2 years); PI. Project meetings to extend our dynamic integrated model of land use and carbon in Costa Rica.
- 2000 Columbia U., Earth Institute grant (\$150,000/30 months); PI with M. Madajewicz. For well arsenic information dissemination in Bangladesh, with baseline survey extension and response survey.
- 1998 Tinker Foundation, Institutional Grant (\$99,000/2 years); PI. Interdisciplinary analysis to develop a carbon-sequestration baseline for Costa Rica in support of the potential for its trading of carbon.
- 1998 NCEAS (National Center for Ecological Analysis and Synthesis (NSF/UCSB)) (\$42,000/2 years); PI. Project meetings for the development of integrated analysis of land use and carbon in Costa Rica.
- 1997 CERC (Center for Environmental Research and Conservation) Interdisciplinary Grant (\$5,000); PI. Join economics & ecology in studying determinants of forest fragmentation in Brazilian Amazon.
- 1996 CERC (Center for Environmental Research and Conservation) Interdisciplinary Grant (\$5,000); PI. To develop an economic and ecological project team to study land use and carbon in Costa Rica.
- 1994 MIT Joint Program on the Science and Policy of Global Change. One year of full-time thesis support to combine satellite and socioeconomic data to study drivers of Brazilian Amazon deforestation.
- 1993 SSRC (Social Science Research Council) IPFP Fellow. Included thesis research in Brazil, 6-12/93. Econometric analysis of Brazilian Amazon deforestation and development of language skills.
- 1990 NSF Graduate Fellow, 3 years of support (received J. Javits award too but could not accept both).

### **Teaching, Advising & Dissemination**

#### **Teaching**

##### DUKE UNIVERSITY

Collective Action (PPS579S, ENV579S)

Economic Evaluation of Sustainable Development (PPS574, ENV572)

Political Economy I & II (PPS901 & 902, core courses for SSPP,UPEP PhD)

Microeconomics & Policy (PPS303, core course for the PPS undergraduates)

Advanced Microeconomics and Policy (PPS818, advanced MPP core course)

Microeconomics & Policy (PPS810, 1<sup>st</sup> of two core MPP economics courses)

#### UNIVERSIDAD DE LOS ANDES

Environmental Economics (summer 2013)

#### COLUMBIA UNIVERSITY

Environmental Economics: W4625 (BA,MA); ENVBN0353 (midcareer); G6450 (Economics PhD).

Economics of Sustainable Development: W4329 (Economics BA, SIPA MA, non-economics PhD).

Management and Development of Water Systems: W4100, co-taught (Engineering BS, SIPA MA).

Environmental Policy Workshop (team course with clients): U8905 (SIPA MA), U9232 (SIPA MA).

Microeconomics and Macroeconomics (SIPA MA): U4603 (1 semester); U4595/U4596 (2 semesters) and proposed a significant revamping of this curriculum which was implemented the following year.

#### **Advising**

Postdocs Valerie Mueller, Florence Kondylis, Darby Jack, Harounan Kazianga, Maria Alejandra Velez, Miguel Fonseca, Juan Robalino, Ariaster Chimeli

PhD Programs Director of Graduate Studies, UPEP (Univ. Program in Enviro. Policy), Duke Univ. Social Science advisor EEEB (Ecology, Evolution & Enviro. Biology), Columbia Univ.

PhD Students David Kaczan, Luz Angela Rodriguez, Diego Herrera Garcia, Soumya Balasubramanya, Lucas Joppa, Dalia Amor Conde, Juan Robalino, Renzo Taddei, numerous committees

MA Theses Andrew Knutson, Emily Petersen, Francisco Santiago-Avila, Morgan Fleming, Theo Gimenez, Abbie Turiansky, Akiko Haruna, Deepak Kumar, Nicholas Hurwit, Cesar Delgado, Mayumi Kawaii, Benjamin Harris, Alisa Opar, Amy Schoenfeld

BA Programs BA advisor in Economics, Columbia Univ., including original joint major on environment

BA Theses Ashlyn Karan, Zachary West, Matthew Isanuk, Krishna Rao, Howard Nye, Daniel Prager, John Lee, Ankur Kapoor, Dorothy Hwang, Stephan Whitaker

#### **Dissemination -- presentations of my research (*AY10-11 onward*)**

Forthcoming: Climate Economics Chair's seminar (April 3, 2015); Paris, France

Forthcoming: INRA's Forest Economics Laboratory (April 1, 2015); Nancy, France

Forthcoming: EDF's Economics Advisory Council (January 3, 2015); Boston, MA

U.S. EPA's National Center for Environmental Economics (NCEE), Washington D.C. Presented the paper "Realistic REDD: integrating conservation and development via road locations and thus impacts?". 12/9/14

ACES 2014 Conference, "Biodiversity Gains From Coordinated Environmental Markets", Washington, DC. Presented "Considering Challenges for Stacking within Incentives for Firms and Landowners". 12/8/14

Heartland Workshop on Environmental and Resource Economics, Urbana-Champaign, IL. Co-author Diego Herrera presented "Brazilian Amazon Parks' Spillovers: evidence and a migration mechanism". 10/1/14

World Congress of Environmental and Natural Resource Economists (5<sup>th</sup>), Istanbul. Co-author Luis Diego Herrera presented "Brazilian Amazon Parks' Spillovers: evidence and a migration mechanism". 7/1/14

Indiana University, experimental group, Bloomington, Indiana. Co-author Maria Alejandra Velez presented "Path-Dependent Extraction Constrains Collective Action: high scarcity and durable selfishness" 6/19/14

London School of Economics, the 'Climate Change and Environment Research Seminar', London, England. Presented "Why Integrate Conservation and Development? Amazon roads' locations and impacts". 5/14/14

University of California at Santa Barbara 'Land Use and Ecosystem Services Provision', Santa Barbara, CA. Presented "Why Integrate Conservation and Development? Amazon roads' locations and impacts". 5/2/14

CONAFOR (Mexican forest agency) workshop to consider Fondos Concorrentes, Guadalajara, Mexico. Presented as a research team our findings from field work plus applications and extensions. 3/13-14/14

Universidad Iberoamericana & CIDE, workshop on policies to enhance eco-services, Mexico City, MX. Presented "Integrating Development and Environment within Policy Design and Evaluation". 3/12/14

EAERE Workshop, keynote for "Evaluating Forest Conservation Initiatives: new tools and policy needs" workshop, Barcelona, Spain. Presented "Reconciling Rigor and Practicality: roles of context". 12/10/13

Interamerican Development Bank, Conservation Strategy Fund workshop on "Using Economic Tools for Transport Sector Investments", Washington, DC. Presented "Roads' Heterogeneous Impacts". 11/6/13

Interamerican Development Bank, Conservation Strategy Fund workshop "Integrating Ecosystem Services into Project Appraisal", Washington, DC. Presented "Evaluating Environmental Policy Impacts". 11/6/13

European Economic Association meeting, Environmental Economics Session V, Gothenburg, Sweden. Co-author Anna Norden presented "Effects of Exclusion from a Targeted Forest Incentive". 8/28/13

ICCB (Society of Conservation Biology), "Policy Insights from Frontiers of Evidence-based Conservation" double session, Baltimore, MD. Presented "Protected-Area Impacts on Amazonian Deforestation". 7/23/13

EAERE (European Association of Environmental and Resource Economists) summer meeting, Toulouse, France. Co-author Francisco Alpizar presented "Unintended Consequences of Forest Targeting". 6/2013

EfD (Environment for Development network) annual research meeting, Zimbabwe. Co-author Francisco Alpizar presented "Unintended Consequences of Targeting Forest Conservation Incentives". 4/2013

Zoological Society of London, "Protected Areas: are they safeguarding biodiversity?", London, England. Presented land-use policy research overview "Principles for Estimating Protected Area Impact". 11/08/12.

BioEcon, Cambridge University, Cambridge, England. Duke PhD student Diego Herrera presented our research on "Costa Rican & Brazilian Amazon Protected Areas' Differing Forest Spillovers". 9/19/12

Energy Modeling Forum Snowmass Meeting, Spatial Integrated Assessment Session, Aspen. Presented land-use research overview "Econometric Approaches to the Determinants of Deforestation". 7/23/12

European AERE Summer Environmental & Resource Economics conferences, Prague. Duke PhD student Diego Herrera presented our research on “Brazilian Amazon Protected Areas’ Forest Spillovers”. 6/28/12

AERE Summer Environmental & Resource Economics conferences, Asheville. PhD student Anna Norden presented our research on “Unintended Consequences from Targeting of Eco-services Payments”. 6/5/12

AERE Summer Environmental & Resource Economics conferences, Asheville, NC. Presented results in two new papers within the talk “ Negative & Positive Local Forest Spillovers from Protected Areas”. 6/4/12

Columbia U., Interdisciplinary Workshop in Sustainable Development, New York, NY. Duke PhD student Diego Herrera presented our research on “Brazilian Amazon Protected Areas’ Forest Spillovers”. 4/20/12

Universidad de los Andes (Distinguished Visitor), Bogota. Presented research overview paper “Protecting Forests, Biodiversity and the Climate: explaining observed variation in policy impact”. 4/10/12

Environmental & Energy Policy Forum, Baker Center, U. of Tennessee, Knoxville. Presented “Estimating Avoided Deforestation by Protection Type: can governance + location = forest + livelihoods?”. 3/8/12

Association of American Geographers Annual Meeting, “Changing Landscapes, the Amazon to the Andes” sessions, New York, NY. Presented ‘Estimating Avoided Deforestation by Protection Type’. 2/26/12.

Oregon State University, Dept. of Agricultural and Natural Resource Economics, Corvallis, OR. Presented the paper ‘Estimating Avoided Deforestation by Protection Type’ (on Acre & Brazilian Amazon). 2/17/12.

Stanford University, Woods Institute for the Environment with Rockeller Foundation, Alto, CA. Invited participant in Uncommon Dialog concerning ‘Ecosystem Services and Human Well Being’. 12/7-8/11.

AGU (American Geophysical Union), in a session on trends in deforestation, San Francisco, CA. Presented the paper “Brazilian Amazon Roads & Parks: temporal & spatial deforestation dynamics”. 12/7/11

Stanford University, Woods Institute for the Environment, Palo Alto, CA. Presented the paper “Protecting Forests, Biodiversity and the Climate: explaining observed variation in policy impact”. 12/6/11

Heartland Workshop on Environmental and Resource Economics, Urbana-Champaign, IL. Presented the paper “PA Siting Rules & Brazilian Amazon Deforestation: for whom & by whom matter”. 10/23/11.

University of Wisconsin, Land Tenure Center, “Land Tenure & Forest Carbon Workshop”, Madison, WI. Presented the paper “Estimating Avoided Deforestation by Protection Type”. 10/21/11

University of Wisconsin, Department of Agricultural & Applied Economics, Madison, WI. Presented the paper “Contracts versus Trust in Water Allocation: experimental evidence from NE Brazil” 10/20/11.

AERE Annual Summer Conference, Seattle, WA. Presented paper “Decentralization and Environment-Development Tradeoffs: federal versus state conservation choice & Amazonian deforestation”. 6/10/11

AERE Annual Summer Conference, session on ‘Water’, Seattle, WA. Presented the paper “Contracts versus Trust in Water Allocation: experimental evidence from Northeast Brazil”. 6/9/11.

ICARUS conference on climate adaptation, session on ‘Adaptation & Water Allocation’, Ann Arbor, MI. Coauthor Renzo Taddei gave “Assessing Adaptation with Asymmetric Climate Information”. 5/5/11.

ICARUS conference on climate adaptation, session on 'Adaptation & Water Allocation', Ann Arbor, MI. Presented the paper "Contracts versus Trust in Water Allocation". 5/5/11.

Virginia Tech University, Department of Forest Resources & Environmental Conservation, Blacksburg, VA. Presented the paper "Roads' Impacts in the Brazilian Amazon". 4/4/11

COGERH, headquarters of this water agency, Fortaleza, Ceara, Brazil. Coauthor Renzo Taddei presented to technicians tailored details from our ICID session "Allocating Water & Water Information". 2/4/11.

COGERH, meeting of four water committees of the Jaguaribe and Banabuiú rivers, Limoeiro do Norte. Coauthor Renzo Taddei presented from our ICID "Allocating Water & Water Information". 1/27/11.

ASSA in AERE (Association of Environmental and Resource Economists) session, Denver, CO. Presented the paper "Roads' Heterogeneous Forest Impacts: Brazilian Amazon frontier spatial dynamics". 1/7/11

Duke University, Conservation Strategy Fund's "Tiger Conservation Policy Workshop", Durham, NC. Presented "Evaluating Impacts of Roads and Protected Areas upon Deforestation / Habitat". 11/16/10

GEF (Global Environment Facility), invited presenter at STAP (Scientific and Technical Advisory Panel) workshop, Washington, DC. "Measuring the performance of protected area systems", 11/1-3/10

GLP (Global Land Project) 2010 Open Science Meeting, Arizona State University, Tempe, AZ. Presented the analyses "Protected Areas and Brazilian Amazon Deforestation: modeling and evaluation". 10/18/10

UGEC (Urbanization and Global Environmental Change) International Conference, Tempe, AZ. Presented the paper "Roads' Heterogeneous Forest Impacts: Brazilian Amazon spatial frontier dynamics". 10/17/10

Yale University / UNITAR Conference on Environmental Governance and Democracy in New Haven, CT. Presented "Inequities in Climate-Adaptation Bargaining" & "Can Contracts Improve Adaptation?" 9/18/10.

ICID: climate, sustainability and development in the semi-arid, Fortaleza, Ceará, Brazil. Presented a session "Allocating Water & Water Information" (seven research talks, with co-author Renzo Taddei). 8/18/10.

World Congress of Environmental and Natural Resource Economists (4<sup>th</sup>), Montreal. Co-author Luis Diego Herrera presented "Evaluating the Deforestation Impacts of Brazilian Amazon Protected Areas". 7/1/10.