18th Annual BIOECON Conference
INSTRUMENTS AND INCENTIVE MECHANISMS
FOR BIODIVERSITY CONSERVATION
AND ECOSYSTEM SERVICE PROVISION

14 - 16 September 2016, *Kings College, Cambridge, United Kingdom*

CONFERENCE BOOK

INDEX

18th ANNUAL BIOECON CONFERENCE
Instruments and Incentive Mechanisms for Biodiversity Conservation and Ecosystem Service Provision

14-16 September 2016 **,** *Kings College, Cambridge, United Kingdom*

FINAL PROGRAMME

WEDNESDAY 14 SEPTEMBER	DAY 1: THURSDAY 15 SEPTEMBER		DAY 2: FRIDAY 16 SEPTEMBER
14.00 - 19.30 REGISTRATION AND WELCOME COCKTAIL *Kings College*	7.45 - 8.45	Breakfast	Breakfast
	8.00 - 8.45	Registration	Checkout
	8.45 - 9.00	Welcome Address	Final Announcement
	9.00 - 10.00	Plenary Session 1	Plenary Session 2
	10.00 - 10.30	Coffee break	Coffee break
	10.30 - 12.30	Parallel Sessions A1 - A4	Parallel Sessions D1 - D4
	12.30 - 13.30	Lunch	Lunch
	13.30 - 15.00	Parallel Sessions B1 - B4	Plenary Policy Session 2
	15.00 - 15.30	Coffee break	Coffee break
	15.30 - 17.00	Parallel Sessions C1 - C4	Parallel Sessions E1 - E4
	17.00 - 18.30	Plenary Policy Session 1	
	18.30 - 19.30	BIOECON internal meetings	
	19.15 - 20.00	Pre-dinner Drinks	
	20.00 - 22.00	Social Dinner	

Wednesday 14 September 2016

14:00 – 19:30 BIOECON Registration   *Conference Office*

18:00 - 19:30 Welcome Cocktail   *Back Lawn*

Thursday 15 September 2016

08:00 – 08:45 Registration   *Conference Office*

08:45 – 9:00 Welcome Address – Ben Groom OPENING BIOECON XVIII

09:00 – 10:00 PLENARY SESSION 1

Chair: Andreas KONTOLEON   *Keynes Hall*

Keynote Address

Sir Partha DASGUPTA, University of Cambridge and University of Manchester, UK
Socially Embedded Preferences, Environmental Externalities, and Reproductive Rights

10:00 – 10:30 Coffee break   *Chetwynd Room*

10:30 – 12.30 PARALLEL SESSIONS A1 – A4

10:30 – 12.30 **PARALLEL SESSION A1: UNEP Special Session: Payments for Environmental Services**

Chair: Yohei MITANI   *Keynes Hall*

Katrina MULLAN, University of Montana, USA
Can Tropical Agriculture Be Sustained? Evidence on the Relative Values of 'Old' and 'Young' Agricultural
Land on the Brazilian Amazon Frontier
Discussant: Liv Lundberg

Liv LUNDBERG, Chalmers University of Technology, Sweden
Improving the Cost-Effectiveness of PES through Benefit Targeting & Reverse Auctions - What Determines
the Gains?
Discussant: Zhaoyang Liu

Zhaoyang LIU, University of Cambridge, UK
Smart Payments Only for Smart Minds? An Artefactual Experiment on the Performance of Agglomeration
Bonuses in Conservation Auctions

Discussant: Yohei Mitani

Yohei MITANI, University of East Anglia, UK and Kyoto University, Japan
Hierarchical Agglomeration Bonus for Private Land Conservation
Discussant: Katrina Mullan

10:30 – 12.30 PARALLEL SESSION A2 - Biodiversity and Ecosystem Values I: Agriculture

Chair: Barbara LANGLOIS   *Beves Room*

Ben GROOM, London School of Economics, UK
Putting Biodiversity into Context: Cereal Biodiversity, Production Potential and Technical Efficiency in Ethiopia
Discussant: Basak Bayramoglu

Basak BAYRAMOGLU, INRA-Agro Paris Tech, France
Land Use and Freshwater Ecosystems in France
Discussant: Salvatore Di Falco

Salvatore Di FALCO, Université de Geneve, Switzerland
Climate Shocks and the Emergence of the Reluctant Entrepreneur in Rural Ethiopia
Discussant: Barbara Langlois

Barbara LANGLOIS, Université Paris-Saclay, France
Agroecological Production Possibility Frontiers and the Role of Economic Incentives in the Provision of Ecosystem Services
Discussant: Ben Groom

10:30 – 12.30 PARALLEL SESSION A3 - Fisheries

Chair: **Martin QUAAS**   *Saltmarsh Reception Room*

Eric TROMEUR, AgroParisTech, Université Paris-Saclay, France
Optimal Biodiversity Loss in Multispecies Fisheries
Discussant: Olli Tahvonen

Olli TAHVONEN, University of Helsinki, Finland
What Difference Does it Make? Age Structure, Gear Selectivity, Stochastic Recruitment, and Economic vs. MSY Objectives in the Baltic cod Fishery
Discussant: Angela Münch

Angela MÜNCH, NOAA Northeast Fisheries Science Center, USAObserver Effects in the Gulf of Maine ground Fish Sector?
Discussant: Martin Quaas

Martin QUAAS, Christian-Albrechts Universität zu Kiel, Germany
Global Fish Catches and Trade in the World of 2050
Discussant: Eric Tromeur

10:30 – 12.30 PARALLEL SESSION A4 - Experiments and Behaviour I: Conservation Payments

Chair: Elisabeth GSOTTBAUER   *Saltmarsh Dining Room*

Andreas KONTOLEON , University of Cambridge, UK and Wageningen University, Germany
Unconditional Transfers and Tropical Deforestation. Evidence from a Randomized Control Trial in Sierre Leone
Discussant: Estelle Midler

Estelle MIDLER, Osnabrück University, Germany
Effectiveness of Payments for Water Services: The Impact of Income Inequalities and Entitlements
Discussant: Federico Cammelli

Federico CAMMELLI, Norwegian University of Life Sciences, Norway
Rainforests on Fire: Amazonian Farmers' Response to Fire Policies and Climate Change
Discussant: Elisabeth Gsottbauer

Elisabeth GSOTTBAUER, University of Innsbruck, Austria
Coordination and Inequalities in Agglomeration Payments: An Experimental Analysis
Discussant: Andreas Kontoleon

12:30 – 13:30   Lunch   *Dining Hall*

13:30-15:00 PARALLEL SESSIONS B1 - B4

13:30-15:00 PARALLEL SESSION B1 - Forests I

Chair: Aino ASSMUTH   *Saltmarsh Reception Room*

Jens ABILDTRUP, UMR AgroParisTech – INRA, France
Optimal Rotation Periods: An Application of Contract Theory to Forest Regulation
Discussant: Marc Conte

Marc CONTE, Fordham University, USA
District Subdivision and the Location of Smallholder Forest Conversion
Discussant: Aino Assmuth

Aino ASSMUTH, University of Helsinki, Finland
Optimal Carbon Storage in Generalized Size-Structures Forestry
Discussant: Jens Abildtrup

13:30 – 15.00 PARALLEL SESSION B2 - Stated Preferences I: Inequality and Discounting

Chair: Maria LOUREIRO   *Keynes Seminar Room 2*

Mark KOETSE, VU University Amsterdam, The Netherlands
Expectations on Others as Anchors in Donating to a Public Environmental Good
Discussant: Jasper Meya

Jasper MEYA, University of Oldenburg, Germany
Income Inequality and Willingness to Pay for Public Environmental Goods
Discussant: Maria Loureiro

Maria LOUREIRO, Universidade de Santiago de Compostela, Spain
Promoting Conservation in Shellfish Fisheries: The Role of Economic Incentives and Social Norms
Discussant: Mark Koetse

13:30-15:00 PARALLEL SESSION B3 - Land Use and Deforestation: Evidence from Latin America

Chair: Katharine SIMS *Beves Room*

Charles PALMER, London School of Economics, UK
Was Von Thünen Right? Cattle Intensification and Deforestation in Brazil
Discussant: Silke Heuser

Silke HEUSER, Maastricht University, The Netherlands
Indigenous Land Rights and Deforestation: Evidence from the Brazilian Amazon
Discussant: Katharine Sims

Katharine SIMS, Amherst College, USA
Parks Versus PES: Evaluating Direct and Incentive-Based Land Conservation in Mexico
Discussant: Charles Palmer

13:30-15:00 PARALLEL SESSION B4 - Experiments and Behaviour II: Cooperation and Public Goods

Chair: Benjamin OUVRARD *Saltmarsh Dining Room*

Ganga SHREEDHAR, London School of Economics, UK
Monitoring Networks in a Common Pool Resource Dilemma: Experimental Evidence on Extraction, Punishment and Beliefs
Discussant: Timo Goeschl

Timo GOESCHL, Heidelberg University, Germany
Cooperation in Public Good Games. Calculated or Confused?
Discussant: Benjamin Ouvrard

Benjamin OUVRARD, University of Strasbourg, France, France
Nudge in Networks
Discussant: Ganga Shreedhar

| 15:00 – 15:30 Coffee break | *Chetwynd Room* |

15:30 – 17:00 PARALLEL SESSION C1-C4

15:30 – 17:00 PARALLEL SESSION C1 – Amenity, Restoration and Regulation

Chair: Ian D. HODGE

Keynes Seminar Room 2

Maria LOUREIRO, Universidade de Santiago de Compostela, Spain
Economic Valuation of Climate Change Induced Vinery Landscape Impacts on Tourism Flows in Tuscany
Discussant: Moritz Drupp

Moritz DRUPP, University of Kiel and University of Freiburg, Germany
Truth-Telling to the Regulator? Evidence from a Field Experiment with Commercial Fishermen
Discussant: Ian D. Hodge

Ian D. HODGE, University of Cambridge, UK
Short Term Projects Versus Adaptive Governance: Conflicting Demands in the Management of Ecological Restoration
Discussant: Maria Loureiro

15:30 – 17:00 PARALLEL SESSION C2 - Discounting: Ecosystems, Mortality and Common Property

Chair: Jesús MARÍN-SOLANOMARIN   *Beves Room*

Eli FENICHEL, Yale School of Forestry & Environmental Studies, USA
The Representative Agent Must Die: Using Demographics to Inform Social Discount Rates
Discussant: Stefan Baumgärtner

Stefan BAUMGÄRTNER, University of Freiburg, Germany
The Relationship between Intragenerational and Intergenerational Justice in the Use of Ecosystems and Their Services
Discussant: Jesús Marín-Solano

Jesús MARÍN-SOLANO, Universitat de Barcelona, Spain
Pareto Inefficiency and Dynamic Bargaining in Common Property Resource Games with Asymmetric Players
Discussant: Eli Fenichel

15:30 – 17:00 PARALLEL SESSION C3 - Biodiversity and Ecosystem Values II: Insurance

Chair: Kevin BERRY   *Saltmarsh Reception Room*

Bartosz BARTKOWSKI, Helmholtz Centre for Environmental Research, Germany
Are Diverse Ecosystems More Valuable? A Conceptual Framework of the Economic Value of Biodiversity and its Estimation

Discussant: Yuki Henselek

Yuki HENSELEK, University of Freiburg, Germany
The Economic Insurance Value of Wild Pollinators in Almond Orchards in California
Discussant: Kevin Berry

Kevin BERRY, Yale School of Forestry & Environmental Studies, USA
The Environmental Insurance Trap
Discussant: Bartosz Bartkowski

15:30 – 17:00 PARALLEL SESSION C4 - Experiments and Behaviour III: Developing Countries

Chair: Rüdiger PETHIG   *Saltmarsh Dining Room*

Henry TRAVERS, Imperial College London, UK
Applying the Carrot and Stick in a Cambodian Commons: An Experimental Games Approach to the Investigation of Conservation Incentives
Discussant: Daan Van Soest

Daan VAN SOEST
Efficiency and Practical Feasibility of Payments for Ecosystem Services: Evidence from the Field
Discussant: Rüdiger Pethig

Rüdiger PETHIG, University of Siegen, Germany
Coaseian Biodiversity Conservation. Who Benefits?
Discussant: Henry Travers

17:00 – 18:30   IIED/UNEP panel session

International Institute for Environment and Development and UNEP Panel Session: Upscaling solution for poverty reduction and ecosystem management through conditional transfers

Chair / Moderator: Ina PORRAS   *Keynes Hall*

Panelists:

Sven WUNDER, Principal Scientist, CIFOR
Setting up the scene: the use of conditional transfers, including Payments for Ecosystem Services, to achieve social and environmental objectives

Leshan JIN, Executive Director, China Eco-compensation Policy Research Center (CEPRC)
The Sloping Lands Conversion Programme in the People's Republic of China.

Virgilio VIANA, Executive Director Fundação Amazonas Sustentável
The experience of Bolsa Floresta in Brazil

Abenet MENGISTU, Coordinator of PSNP Public Works; Ministry of Agriculture and Natural Resources
The experience of the Productive Safety Net Programme (PSNP) in Ethiopia

Ina PORRAS, Senior Economist IIED. Key messages from the IIED workshop on upscaling conditional transfers.

18:30 – 19:30 BIOECON PARTNER MEETINGS

Scientific and Institutional Partners Meeting *Audit Room*
(BIOECON partners only)

19:15-20:00   Pre-Dinner Drinks *Dining Hall*

20:00-22:00 CONFERENCE SOCIAL DINNER *Dining Hall*

Friday 16 September 2016

08:45 – 9:00 Final Announcements *Keynes Hall*

9:00 – 10:00 PLENARY SESSION 2

Chair: Ben Groom
    Keynes Hall

Keynote Address

Prof. Amy ANDO, University of Illinois and Resources for the Future, USA
Uncertainty in and distribution of the benefits of conservation

10:00 – 10:30 Coffee break *Chetwynd Room*

10:30 – 12:30 PARALLEL SESSIONS D1 - D4

10:30 – 12.30 PARALLEL SESSION D1 - Marine Biodiversity

Chair: Paulo A.L.D. NUNES *Beves Room*

Elizabeth ROBINSON, University of Reading, UK
Optimal Siting and Sizing of Marine Protected Areas in Lower Income Countries: Labor Allocation, Location Decisions, and Incomplete Enforcement
Discussant: Greti Lucaroni

Greti LUCARONI, IUAV University, Italy
Restoration of Improves Biodiversity or Prevention of Biodiversity Loss? The Economic Value of Some Coralligenous Habitats in the North Adriatic Sea
Discussant: Maarten Punt

Maarten PUNT, University of Southern Denmark, Denmark
Noise Signals Value: Trading of Marine Mammals and Seismic Survey Information
Discussant: Paulo A.L.D. Nunes

Paulo A.L.D. NUNES, UNEP Ecosystem Services Economics Unit, Kenya
Understanding and Valuing the Marine Ecosystem Services of the Northern Mozambique Channel
Discussant: Elizabeth Robinson

10:30 – 12.30   PARALLEL SESSION D2 - Stated Preferences II: Developing Country Applications

Chair: Marije SCHAAFSMA   *Saltmarsh Reception Room*

Oleg SHEREMET, University of St Andrews, UK
Consumer Demand for Rhino Horn in Vietnam: Insights from a Choice Experiment
Discussant: Sarobidy Rakotonarivo

Sarobidy RAKOTONARIVO, Bangor University, UK
Willingness-To-Pay or Willingness-To-Accept? Contested Property Rights in Forest Conservation in Madagascar
Discussant: Marije Schaafsma

Marije SCHAAFSMA, University of Southampton, UK
Testing the Reliability of Individual and Group-Based Choice Experiments in a Low-Income Country Context
Discussant: Oleg Sheremet

10:30 – 12.30   PARALLEL SPECIAL SESSION D3 - Integrating ecological and economic analysis to inform policy design to conserve biodiversity and preserve ecosystem services

Chair: Emeline HILY   *Keynes Hall*

Michaela ROBERTS, University of St. Andrews, UK
User Fees Across Ecosystem Boundaries: Are SCUBA Divers Willing to Pay for Terrestrial Biodiversity Conservation?
Discussant: Mark Brady

Mark BRADY, Swedish University of Agricultural Sciences, Sweden

Ecological Intensification of Agriculture: Balancing Future Food Production with Environmental Protection?

Discussant: Ciaran Ellis

Ciaran ELLIS, University of Stirling, UK

Pesticides and Bees: Ecological-Economic Modelling of Bee Populations on Farmland

Discussant: Emeline Hily

Emeline HILY, INRA, France

Cost-Effectiveness of Agri-Environmental Schemes under Climate Change

Discussant: Michaela Roberts

10:30 – 12.30 PARALLEL SESSION D4 - Forests II

Chair: Janne RÄMÖ *Saltmarsh Dining Room*

Philippe POLOMÉ, University of Lyon, France

Forest Owners Motivations for Adopting Programs of Biodiversity Protection

Discussant: Jonathan Quarty

Jonathan QUARTEY, Kwame Nkrumah University of Science and Technology, Ghana

Forestry Policy as a Tool for Biodiversity Conservation in the Ashanti Region of Ghana: Does Equity Matter?

Discussant: Mark Ryan

Mark RYAN, TEAGASC - Agriculture and Food Development Authority, Ireland

Heterogeneous Economic and Behavioural Drivers of the Farm Afforestation Decision

Discussant: Janne Rämö

Janne RÄMÖ, University of Helsinki, Finland

Optimal Continuous Cover Forestry with Dead Wood as a Biodiversity Indicator

Discussant: Philippe Polomé

12:30 – 13:30   Lunch *Dining Hall*

13:30 – 15:00 US Environmental Protection Agency (USEPA) and WCMC UNEP panel session

US Environmental Protection Agency (USEPA) and WCMC UNEP panel session:
How good is good enough? Standards of Evidence to Ensure the Value of Biodiversity is Reflected in
Public and Private Decision-Making in the Context of Ecosystem Services and Natural Capital

Chair/Moderator: James VAUSE *Keynes Hall*

Participants:

James VAUSE, UNEP/WCMC

David SIMPSON, USEPA

Jake REYNOLDS, Cambridge Institute for Sustainability Leadership

Amy ANDO, University of Illinois, USA

Giles ATKINSON, London School of Economics

Bhaskar VIRA, University of Cambridge

15:00 – 15:30 Coffee break	*Chetwynd Room*

15:30 – 17:00 PARALLEL SESSIONS E1-E4

15:30 – 17:00 PARALLEL SESSION E1 - Ecosystem Auctions

Chair: Eirik ROMSTAD   *Beves Room*

Stuart WHITTEN, CSIRO Ecosystem Sciences, Australia
Conservation Tenders in Developed and Developing Countries - Status Quo, Challenges and Prospects
Discussant: Martin Drechsler

Martin DRECHSLER, UFZ-Helmholtz Centre for Environmental Research, Germany
Generating Spatially Optimised Habitat: A Trade-Off Between Social Optimality and Budget Efficiency
Discussant: Eirik Romstad

Eirik ROMSTAD, Norwegian University of Life Sciences, Norway
Bidding Behaviior in Contract Auctions with Incomplete Monitoring
Discussant: Stuart Whitten

15:30 – 17:00 PARALLEL SESSION E2 - Natural Capital and Ecosystem Services

Chair: Shadi ATALLAH   *Keynes Seminar Room 2*

Jean-Michel SALLES, INRA-SUPAGRO, France
Ecosystem Services and Economic Development: Is it Worth to Conserve Natural Capital?
Discussant: *Rintaro Yamaguchi*

Rintaro YAMAGUCHI, Graduate School of Economics, Kyoto University, Japan
Corruption, Institutions, and Sustainable Development: Theory and Evidence from Inclusive Wealth
Discussant: *Shadi Atallah*

Shadi ATALLAH, University of New Hampshire, USA
A Bioeconomic Model of Ecosystem Services Provision: Coffee Berry Borer and Shade-Grown Coffee in Colombia
Discussant: Jean-Michel Salles

15:30 – 17:00 PARALLEL SESSION E3 - Pests and Invasive Species

Chair: Morag MACPHERSON   *Saltmarsh Dining Room*

Oleg SHEREMET,University of St. Andrews, UK
Public Preferences and Willingness to Pay for Forest Disease Control in the UK
Discussant: Ciara Dangerfield

Ciara DANGERFIELD, University of Cambridge, UK
The Effects of Variation in Management Objectives on Responses to Forest Diseases under Uncertainty
Discussant: Morag Macpherson

Morag MACPHERSON, University of Stirling, UK
The Effects of Invasive Pests and Diseases on Strategies for Forest Diversification
Discussant: Oleg Sheremet

15:30 – 17:00 PARALLEL SESSION E4 - Experiments and Behaviour IV: Games

Chair: Marie FERRÉ   *Saltmarsh Reception*
Room

Tobias HALLER, University of Innsbruck, Austria
Provision of Public Goods: Unconditional and Conditional Donations from Outsiders
Discussant: Tanya O'Garra

Tanya O'GARRA, Columbia University, USA
Leading-By-Example and Altruism: Some Insights for Biodiversity Conservation Financing
Discussant: Marie Ferré

Marie FERRÉ, ETH Zürich, Switzerland
Can Agglomeration Payments Induce Sustainable Management of Peat Soils in Switzerland? - A Computerized Framed Experiment
Discussant: Tobias Haller

17:00 CONCLUSION OF BIOECON XVIII

Keynote Speakers

PARTHA DASGUPTA

Sir Partha Dasgupta (Ph.D Economics, University of Cambridge, 1968) is Frank Ramsey Professor Emeritus of Economics at the Department of Economics at the University of Cambridge and Fellow of St John's College. His research work spans five decades and has produced numerous seminal books and papers on welfare and development economics; the economics of technological change; population, environmental, and resource economics; social capital; the theory of games; the economics of global warming, and the economics of fertility and malnutrition. He has initiated and/or led several international environmental policy research programmes and institutions including the Beijer Institute and EAERE. In 2002 he was Knighted by Her Majesty Queen Elizabeth II for services to economics. His work on development and environmental economics has been recognised internationally through numerous accolades including the 2002 Volvo Environment Prize (with Karl Goran Maler); the AERE "Publication of Enduring Quality Award 2003", with Geoffrey Heal, for their seminal book, *Economic Theory and Exhaustible Resources*; the 2007 PEN/John Kenneth Galbraith Award of the American Agricultural Economics Association; the Zayed International Environment Prize of 2010; and the European Lifetime Achievement Award (in Environmental and Resource Economics) from EAERE in 2014. In 2007, together with Erik Maskin he was awarded the Erik Kempe Award in Environmental and Resource Economics. More recently he was awarded the 2015 Blue Planet Prize for Environmental Research, and the 2016 Tyler Prize for his scientific contributions to the field of environmental economics.

AMY W. ANDO

Amy W. Ando (Ph.D. Economics M.I.T 1996) is Professor at the University of Illinois Urbana-Champaign in the Department of Agricultural and Consumer Economics. Prior to joining the faculty at Illinois she worked as a Fellow at Resources for the Future for three years, and she is now a University Fellow at Resources for the Future. She has studied numerous topics in environmental and natural resource economics but her research focuses primarily on the economics of species and habitat conservation. That work includes research to inform optimal conservation planning, descriptive analyses of actual private and public conservation behavior, and research to improve aquatic habitat through better stormwater management policy; a recent set of papers works to develop tools for spatial conservation portfolio choice to reduce the uncertainty in conservation outcomes from climate climate change. Papers emerging from her research have appeared in *Science*, the *Proceedings of the National Academy of Sciences*, the *Journal of Environmental Economics and Management*, *Land Economics*, the *Journal of Law and Economics*, *Conservation Biology*, and numerous other scholarly journals and books. She has served as a handling editor for three major journals in her field. She has worked on major review panels for multidisciplinary grant competitions at the National Science Foundation and participated in expert advisory workshops related to stormwater and wildlife habitat policy for the EPA and the USDA (respectively). Ando served for several years on the Advisory Committee for the Environment Program at the Doris Duke Charitable Foundation and on advisory groups to help the City of Chicago form and evaluate stormwater initiatives.

Book of Abstracts

PLENARY SESSION 1

Socially Embedded Preferences, Environmental Externalities, and Reproductive Rights

Sir Partha DASGUPTA, University of Cambridge and University of Manchester, UK
Aisha Dasgupta

Externalities are the unaccounted for consequences for others of actions taken by one or more persons. They are symptoms of institutional failure, which is why they cannot be eliminated without collective action. When externalities are adverse, the moral directives flowing from them can clash with the exercise of personal rights. In this paper we identify a class of environmental externalities in the contemporary world that accompany procreation. We also identify externalities that are allied to socially embedded preferences for family size. Those preferences can give rise to a heightened demand for children, which exacerbates the adverse environmental externalities we impose on future generations. Family planning offers a tool that is complementary to environmental policies. Our analysis indicates that there may be a need for family planning even when the unmet need for it falls to zero. We draw attention to crude but suggestive estimates of the magnitude of adverse environmental externalities accompanying new births. Our analysis is designed only to raise questions that have been neglected, we do not explore policy implications. Much remains unsettled.

PARALLEL SESSION A1: UNEP Payments for Environmental Services

Can Tropical Agriculture Be Sustained? Evidence on the Relative Values of 'Old' and 'Young' Agricultural Land on the Brazilian Amazon Frontier

Katrina MULLAN, University of Montana, USA
Erin O. Sills, Jill L. Caviglia-Harris

Tropical deforestation has typically been characterized as a process with persistent environmental costs and short-lived economic benefits in the form of one-off timber harvests or 'nutrient mining' of fertile soils for agriculture. The Brazilian government has been engaged in efforts to encourage permanent settlement and intensification on the 'old frontier' of the Legal Amazon. In this paper, we examine whether these efforts, along with development of new agricultural technologies and stricter regulation of new clearing, have raised the returns to using long-deforested land in agriculture. Using a panel survey from 2009, 2005 and 2000, linked to classified remote sensing images of land use, we estimate the relative contributions of newly-deforested and long-deforested land to total property values for small landholders located in established agrarian settlements in the western Brazilian Amazon. We find that, while the value of newly cleared land has remained approximately constant in real terms, the relative value land cleared more than five years previously has risen from effectively zero in 2000 to around half the value of newer land in 2005 and 2009. This is promising for government programs supporting sustained settlement on the old frontier, and suggests that local farmers expect to be able to continue producing, albeit less profitably, as restrictions on further clearing of mature forest are strengthened through domestic and global policy initiatives.

Improving the Cost-Effectiveness of PES through Benefit Targeting & Reverse Auctions - What Determines the Gains?

Liv LUNDBERG, Chalmers University of Technology, Sweden

Martin Persson, Francisco Alpizar, Kristian Lindgren

Successfully implemented, payment for ecosystem services (PES) programs can provide both conservation of nature and financial support to rural communities. There are however concerns about efficiency losses (e.g., lack of additionality or landowners being payed above their opportunity costs of conservation) due to the information asymmetry between the government/protection agencies and landowners. To remedy this, one option is to shift from fixed payments (the most common PES format today) to auction mechanisms for allocating conservation contracts. In the empirical literature, summarized in the first part of this paper, there are few auction based PES programs, but several of them report high efficiency and/or additionality. In this paper we analyse the effectiveness gains from reverse auction and fixed payment schemes using a stylized agent-based model. The PES designs that we study are: fixed payment schemes with and without benefit targeting, an auction with uniform payment per area, an auction with uniform payments per unit of ecosystem services provided, a discriminatory auction and a discriminatory auction with benefit targeting. We explicitly account for the risk of adverse selection and non-additionality, and systematically explore how the distribution and correlation between opportunity costs and ecosystem service provision across land-owners affect the effectiveness of auctions. We find that the gains in effectiveness from reverse auction and fixed payment schemes depends on the characteristics of the landscape where they are implemented, as well as on the baseline compliance with PES conditions. When baseline compliance is high, as it often is in programs for forest conservation, and the correlation between opportunity cost and ecosystem service provision is positive, PES schemes with benefit targeting, provide significantly higher effectiveness. This effect is so strong that, under these circumstances, a fixed price scheme with benefit targeting can give twice the environmental benefit provided by a uniform auction without targeting. Discriminatory auctions, where agents are only payed their submitted bid, are theoretically the most efficient schedule, but if they are repeated over time there are incentives for the participants to learn to optimize their bids. We study these effects and find that when participants optimize their bids, the efficiency of the discriminatory auction decreases down to the level of the uniform auction. The rate of the efficiency decline depends on how opportunity cost is distributed across the landscape.

Smart Payments Only for Smart Minds? An Artefactual Experiment on the Performance of Agglomeration Bonuses in Conservation Auctions

Zhaoyang LIU, University of Cambridge, UK

Qin Tu, Jintao Xu, Xiaojun Yang, Andreas Kontoleon

Incorporating agglomeration bonuses in a procurement auction is often regarded as a promising direction for the development of Payments for Ecosystem Services (PES). This innovative design is supposed to amplify ecological benefits by eliciting spatially contiguous conservation, as well as to achieve better cost-effectiveness by mitigating the rent-seeking behaviour of the suppliers of ecosystem services holding private information on the opportunity costs of their land. This study undertook the first artefactual experiment on the performance of this PES design using actual forest holders as subjects, with a particular focus on their potential irrational behaviour under cognitive constraints. The experimental outcomes only found significant improvement in spatial coordination in a sub-sample of subjects with better cognitive skills, although the cost-effectiveness of the PES auction was not subject to cognitive constraints. The dual-system decision-making theory suggested that in such a cognitively demanding situation, the subjects with insufficient cognitive skills would be anchored to impulsive and often sub-optimal decisions rather than overriding such intuition with optimised rational bidding strategies, which would threaten the full performance of this PES scheme. This behaviour failure ought to be taken with caution when developing innovative PES schemes with complex features.

Hierarchical Agglomeration Bonus for Private Land Conservation

Yohei MITANI, University of East Anglia, UK and Kyoto University, Japan
Kohei Suzuki

Voluntary incentive schemes have been increasingly used in recent years for biodiversity conservation on private land. However, landowner's voluntary decision results in small and fragmented reserves, which can significantly reduce the conservation benefits. We propose a hierarchical agglomeration bonus (HAB) mechanism to create incentives for agents in a hierarchical spatial structure to promote coordination among agents at the local level. Our HAB mechanism allocates an agglomeration bonus (AB) payment between a local-level bonus rewarding successful local-level coordination and a global-level bonus rewarding successful global-level coordination. In addition to payoff- and risk-dominant equilibria, Pareto-ranked Nash equilibria can arise in our HAB coordination game, which can facilitate and maintain local-level coordination. We conducted a laboratory experiment to explore the performance of the HAB mechanism for a hierarchical spatial structure where three local groups of three individuals are nested in a larger global group. The results show that allocating a higher portion of the total AB to local-level bonuses sharply reduces coordination failure and facilitates a consensus on selecting the payoff dominant strategy at the local-level, leading to a larger-scale, global-level successful coordination. The results suggest that the locally weighted scheme can contribute to habitat connectivity as well as successful global coordination.

PARALLEL SESSION A2 - Biodiversity and Ecosystem Values I: Agriculture

Putting Biodiversity into Context: Cereal Biodiversity, Production Potential and Technical Efficiency in Ethiopia

Ben GROOM, London School of Economics, UK
Francisco Fontes

Ample evidence suggests that, at the micro level, biodiversity positively affects mean yields and decreases the variability of yield. However, most analyses tend to both assume a uniform effect of biodiversity across the studied regions and neglect its effects on the theoretical potential of the farming system. We empirically estimate a True Fixed Effects Stochastic Frontier model using data from the Ethiopian Rural Household Survey1 and set out to investigate the static and dynamic effects of biodiversity on the production frontier as well as descriptively analyze its relationship with technical efficiency. In general we find a positive, but very heterogeneous static effect of biodiversity on cereal production, which seems to be specific to the agro-ecological zone in which the farming occurs. The dynamic effect, consistent with the theoretical notion of a convergence to an "optimal" level of biodiversity, is found to be highly positive and significant only for agro-ecological zones with lower levels of initial biodiversity. Finally, we find that farmers using more biodiverse systems are closer to their estimated maximum production, suggesting positive effects of biodiversity on efficiency, but do not exhibit the highest frontier yields.

Land Use and Freshwater Ecosystems in France

Basak BAYRAMOGLU, INRA-Agro Paris Tech, France
Raja Chakiry Anna Lungarska

Freshwater ecosystems have experienced over the last three decades larger declines in biodiversity than terrestrial and marine ecosystems. In France, this degradation is represented by a decline in the quality and quantity of water, and by changes in the distribution and structure of aquatic biota for some rivers. These

pressures on freshwater ecosystems are mainly human induced and driven by land use changes such as urban development and intensive agriculture. In this paper, we estimate a spatial panel data model to measure the effects of alternative land uses on a selected indicator of the ecological status of surface water, namely a fish-based index. This model allows us to control for both spatial autocorrelation and unobserved individual heterogeneity which may influence water quality. We study the value of the fish-based index in various French rivers at the level of hydrographic sectors observed between 2001 and 2013. Our preliminary estimation results first reveal that spatial autocorrelation coefficients are significant. More importantly, they indicate that the urban land has the greatest adverse impact on freshwater fish populations related to all other land uses. These results suggest that urban development tends to degrade more freshwater bioversity than the other land uses.

Climate Shocks and the Emergence of the Reluctant Entrepreneur in Rural Ethiopia

Salvatore Di FALCO, Université de Geneve, Switzerland

Necessity can make entrepreneurs, this is the result we find for Rural Ethiopia. These entrepreneurs are worse on observables, and perform poorly when compared to other entrepreneurs, further they do not revert to full farming in the presence of opposite positive shocks. We estimate the effect of weather driven negative income shocks on the likelihood of starting non-farm enterprise in rural Ethiopia. We find that farm households that are exposed to random negative rainfall shocks are more likely to start a non-farm enterprise. Contrary to a model of credit constraints with initial capital requirement, we find that entrepreneurial activities are guided by necessity or ex-post income smoothing rather than business opportunity or ex ante risk management strategies. Those business initiated for necessity tend to perform poorly and yet persist overtime, i.e. new entrepreneurs do not revert back to full farming when hit by a positive productivity shock.

Agroecological Production Possibility Frontiers and the Role of Economic Incentives in the Provision of Ecosystem Services

Barbara LANGLOIS, Université Paris-Saclay, France
Vincent Martinet

Agroecosystems are multifunctional: they contribute to human wellbeing in several ways, including the provision of several ecosystem services (ES). The level of these ES are interrelated quantities, and depend on agricultural practices. This provides a complex picture, but among all possible bundles of ES, some may achieve unambiguously better. Since many ecosystem services are public goods, these desirable bundles may not be optimal for farmers, and public policies are needed to achieve a sound management of agroecosystems. Economic incentives, by changing the private prot of farmers, are widely used by public policies : current agroenvironmental policies rely on action-oriented incentives (which tax and subsidise farmers for the practices they implement), while economic theory claims that result-oriented incentives (taxing and subsidising farmers according to the level of ES they provide) are more efficient. However, the complex interrelations between ES, and in particular synergies, can hinder the overall efficiency of result-oriented instruments. With multi-dimensional production possibility sets, we explore all possible bundles of ES provided by various agricultural practices, identify efficient bundles, and investigate the consequences of both types of economic instruments. We build an interdisciplinary modelling framework combining economic and agroecological knowledge. We use state-of-the-art agroecological modelling to develop a

simple integrated bioeconomic model and simulate the impacts of a set of agricultural practices on a large set of ecosystem services. With this simulated agroecological data, we first represent all achievable bundles of ecosystem services in a multi-dimensional production possibility set. Second, we identify the efficient bundles. And third, we compute the farmer's profit associated to each set of practices and determine which bundle is preferred by a rational farmer, how the two types of economic incentives can modify this choice, and the required policy budget to make the farmer achieve a certain bundle of ES. Our results explicit the trade-offs between ES in agroecosystems, identify all socially efficient bundles of ES, and explore the economic incentives required to make private interest and efficient options coincide.

PARALLEL SESSION A3 - Fisheries

Optimal Biodiversity Loss in Multispecies Fisheries

Eric TROMEUR, AgroParisTech, Université Paris-Saclay, France
Luc Doyen

As marine ecosystems are under pressure worldwide, many scientists and stakeholders advocate the use of ecosystem-based approaches for fishery management. In particular, management policies are expected to account for the multispecies nature of fisheries. However, numerous fisheries management plans remain based on single species concepts such as Maximum Sustainable Yield (MSY) and Maximum Economic Yield (MEY), that respectively aim at maximizing catches or profits of single species or stocks. In this study, we assess the sustainability and profitability of multispecies MSY and MEY in a mixed fishery with technical interactions. First, we analytically show how multispecies MSY and MEY can induce overharvesting and extinction of species with low productivity and low monetary value. It implies that multispecies harvesting policies can entail major biodiversity loss. Second, we identify and discuss incentives on effort costs and landing prices, as well as technical regulations, that could promote biodiversity conservation and more globally sustainability. However it turns out that these incentives can be very demanding in economic terms, which significantly questions the bio-economic relevance of MMSY-MMEY strategies for operationalizing the ecosystem approach. Finally, a numerical example based on the coastal fishery in French Guiana illustrates the analytical findings.

What Difference Does it Make? Age Structure, Gear Selectivity, Stochastic Recruitment, and Economic vs. MSY Objectives in the Baltic cod Fishery

Olli TAHVONEN, University of Helsinki, Finland
Martin F. Quaas, Rüdiger Voss

We study optimal harvesting of Baltic cod applying an age-structured model with harvest and mesh size as optimized variables. The model is quantified by data on population dynamics, fish market demand, harvesting technology and costs. Recruitment of Baltic cod is influenced by the irregular inflow of oxygen-rich water from the North Sea and ecologists conjecture that management should maintain older age classes that have higher egg survivability under adverse environmental conditions. This is shown true since catch is maximized if harvest could be targeted only to the oldest age class. However, given the existing gear, maximization of catch leads to pulse fishing with high economic losses. Constant annual catch based on existing gear is maximized with large mesh size and high level of effort, again implying major economic

losses. In contrast, the economically optimal solution is a transition toward a steady state with smooth catch and economic surplus. In spite of these large differences between the economic optimum and various MSY equilibria revealed by the age-structured model, the classic biomass model for Baltic cod suggests that the difference is unimportant. Harvesting costs decrease with population size but as a consequence of optimized mesh size the maximized annual economic surplus is attained at lower population level than maximized constant catch. Stochastic occurrence of favorable environmental conditions implies threefold increase in recruitment but the difference in stochastically optimized harvest is negligible compared to deterministic feedback solutions.

Observer Effects in the Gulf of Maine ground Fish Sector?

Angela MÜNCH, NOAA Northeast Fisheries Science Center, USA
Chad Demarest

This study examines empirically if fishing vessels of the Gulf-of-Maine groundfish sector fleets changed their effort, location and catch composition if the trip was observed. Observer data for this particular fleet is used to estimate discard rates which are subtracted from the multispecies quotas. Based on the argumentation that the incentive to change behavior when observed varies with the level of quota utilization and gear employed, the empirical analysis is conducted gear group specific as well as trips are further selected into groups to differentiate. It is shown that fishing locations were shifted if fishing trips were observed irrespective of the gear group. However, while sink gillnetters significantly decreased their fishing effort, in particular, if catch contained restrained species, bottom otter trawlers increased their effort, in particular, if catch involved non-restrained species.

Global Fish Catches and Trade in the World of 2050

Martin QUAAS, Christian-Albrechts Universität zu Kiel, Germany
Julia Hoffmann, Katrin Kamin, Linda Kleemann, Christian Möllmann, Jörn O. Schmidt, Guilherme A. Stecher Justiniano Pinto, Rudi Voss

develop and apply two types of new global bio-economic models: First, we use a global predator-prey model with interacting demand functions, and, second, a regional generalized Schaefer model that covers the large marine ecosystem's (LME's) fisheries that interact on global fish markets. We use the shared socio-economic pathways (SSPs, also used by IPCC) for income and population scenarios. Management that differentiates for ecological groups (predatory and forage fishes) may potentially increase catches from 112 to 160 million tons, but at the cost of increased uncertainty. At current (or better) effectiveness of fishery management, total fish catches could be sustained in spite of increasing expenditures for food and increasingly efficient fishing technology, but human consumption would have to shift to less valuable forage fish. The estimated global production of marine capture fish can most likely provide each human being in 2050 with the WHO recommendation of 11kg fish/person. However, there is a distributional challenge, as some large marine ecosystems will not provide enough catches for their local consumption. In the future, some LMEs in East Asia, West Africa and West South America are likely to be fish net exporters.

PARALLEL SESSION A4 - Experiments and Behaviour I: Conservation Payments

Unconditional Transfers and Tropical Deforestation. Evidence from a Randomized Control Trial in Sierra Leone

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Beccy Wilebore, Maarten Voors, Erwin Bulte, David Coomes

Unconditional conservation payments are increasingly used by conservation NGOs as a means to further their environmental objectives. One key objective in many conservation projects that use such incentives is the protection of tropical forest ecosystems in buffer zone areas around protected parks. We use a randomized controlled trial (RCT) to evaluate the impact of unconditional livelihood payments to local communities on land use outside a protected area – the Gola Forest, a biodiversity hotspot on the border of Sierra Leone and Liberia. Detailed satellite imagery data from before and after the intervention was used to determine land use changes in treated and control villages. We find little or mixed support for the hypothesis that unconditional payments reduce land clearance (even in the short term). In one of our samples we find weak evidence of the reverse result. Payments were also found not to affect agricultural activity. The study constitutes one of the first attempts to use RCT evidence to evaluate the efficacy of conservation payments and provides insights for further research.

Effectiveness of Payments for Water Services: The Impact of Income Inequalities and Entitlements

Estelle MIDLER, Osnabrück University, Germany
Stefanie Engel, Unai Pascual, Juan-Camilo Cardenas

Payment for Ecosystem Services (PES) are economic incentives frequently used to promote environmentally-friendly farming practices. They have been implemented across a wide range of contexts and countries and results showed wide variations in their effectiveness. We are interested in two particular questions: i) how inequalities impact the effectiveness of PES? and ii) how existing user rights or entitlements impact the effectiveness of a PES scheme. To answer these questions we conduct a simple lab experiment where two players interact, one upstream player and one downstream player. The upstream player can decide to use his land to produce crops, thereby using water, or to conserve. Production causes a damage for the downstream player, while conservation allows her to meet her water consumption needs. A transfer between the downstream and the upstream player is then introduced. Our results show that inequalities affect the effectiveness of a PES, in particular PES are more effective when they reduce inequalities between poor and rich players. We found no impact of entitlements. Finally, we investigate the interactions between social preferences, inequalities and PES.

Rainforests on Fire: Amazonian Farmers' Response to Fire Policies and Climate Change

Federico CAMMELLI, Norwegian University of Life Sciences, Norway
Arild Angelsen

Fires in the Brazilian Amazon forest threatens Brazil's efforts in reducing deforestation. While the impact of recurring drought and land use change on fire occurrence and propagation is relatively well documented, ignition sources remain understudied. Fires are frequently related to burning land in preparation for crop cultivation or pasture. Costly fire control and adoption of fire-free land preparation techniques reduce negative fire risk externalities. Their implementation represent a typical coordination problem for

smallholder farmers, where a socially optimal outcome can also be a dominant strategy for the individual farmer, provided their neighbors also adopt fire control and fire-free practices. We implemented a framed field experiment (FFE) sampling 576 smallholder farmers in four municipalities in the state of Parà. Participants draw upon their real-world experiences, providing external validity to the experiments. This is the first study assessing fire policies' impact in the Brazilian Amazon outside of protected areas, where fires are indeed prevalent. We examined three fire mitigation policies: command and control (CAC), payment for environmental services (PES), and community based fire management (COM). Policy mechanisms are evaluated under two climate change scenarios: stable and increasing drought frequency. The latter is expected to exacerbate uncontrolled fire use. Increasing drought risk indeed undermines fire control compared to the stable risk scenario. However, all policies impacts on fire control and alternatives adoption score higher under increasing than under stable risk. Higher external risk discourage the adoption of fire-free farming, but policies effectively counteract this. A post-experiment questionnaire revealed a shared norm prescribing fire control. Paradoxically, this norm hampers the effect of communication: in a coordination game participants have incentives to reveal their true preferences, but a taboo on uncontrolled fire use limits credible communication. While no silver bullet policy emerges, the CAC treatment scores high and is the only treatment that significantly affects beliefs, which is a critical variable in coordination problems.

Coordination and Inequalities in Agglomeration Payments: An Experimental Analysis

Elisabeth GSOTTBAUER, University of Innsbruck, Austria
Stefanie Engel, Frank Wätzold, Martin Drechsler

Payments to compensate farmers undertaking conservation measures are increasingly used to foster biodiversity on private land. Most payments focus to encourage action at the individual or farm-level only, yet some elements of biodiversity can be more effectively encouraged if conservation is targeted at a larger, landscape-level. The latter requires collective action and coordination of beneficiaries. This paper experimentally investigates the effectiveness of agglomeration payments when pre-play contracting in the form of side payments is allowed and groups of beneficiaries are heterogeneous. We also explore if fairness preferences, measured by simple modified ultimatum and dictator games, interact with provided incentives and are able to account for policy performance. Our preliminary findings suggest that side payments are able to lead to moderate and high cooperation among agents. We also find that side payments were foremost used to undo initial wealth inequalities, which shows a significant taste for equitable outcomes among our participants.

PARALLEL SESSION B1 - Forests I

Optimal Rotation Periods: An Application of Contract Theory to Forest Regulation

Jens ABILDTRUP, UMR AgroParisTech – INRA, France
Frank Jensen, Anne Stenger, Jette Bredahl Jacobsen

In this paper we construct a general principal-agent model to discuss voluntary subsidies to a forest owner to increase the rotation period in a situation with asymmetric information about the owner´s cost type. It is shown that for the forest owner with low cost the voluntary subsidy shall be based on differences in the

objective functions between the principal and the agent. However, for an owner with high costs the subsidy shall also include an incentive cost to secure correct revelation of the owner´s cost type. The general model is used to study various forest owner objectives such as maximization of the value of timber, maximization of the social welfare and maximization of a mix between the timber value and the social welfare. With welfare maximization there is no difference in the objective functions between the regulator and the forest owner so no contract is necessary. We also investigate the implications of regulator uncertainty about the forest owner payoff. Both when the regulator perceives a wrong objective function for the forest owner and when regulator is uncertain about the objective function of the owner, uncertainty may imply a lower welfare compared to a situation with full certainty about the forest owners goal.

District Subdivision and the Location of Smallholder Forest Conversion

Marc CONTE, Fordham University, USA
Philip Shaw

In Indonesia, forests are converted to agroforestry systems by plantation opera- tors and smallholders. Smallholder tenure is insecure, while plantations are granted concessions to forested land by government agencies. A unique GIS data set that distinguishes smallholder and plantation operations is used to test the prediction that an increased threat of plantation operation causes smallholder conversion of less desirable forest patches. Nonparametric analyses find that higher plantation threat forces smallholders to convert forests on steeper land that is further from the nearest road and deeper into the forest. These results hold whether plantation threat is measured by districts that were rezoned after Suharto's resignation or by previous plantation activity. Insecure tenure imposes a welfare loss of \$1; 734 to \$5; 256 per hectare (in 2010 USD) from the increased carbon emissions associated with conversion deeper in the forest, which results from insecure smallholder tenure.

Optimal Carbon Storage in Generalized Size-Structures Forestry

Aino ASSMUTH, University of Helsinki, Finland
Janne Rämö, Olli Tahvonen

We study economically optimal carbon storage in size-structured forest stands using a generalized model that allows the choice of management regime to be made endogenously. Optimal harvests may be based only on thinnings, implying continuous cover forestry, or on both thinnings and clearcuts, implying even-aged forestry. We consider carbon stored in living trees, in dead tree matter and in timber products, and gradual carbon release from decaying dead tree matter and timber products. Forest growth is depicted using an empirically estimated transition matrix model for Norway spruce. The optimization problem is solved in its general dynamic form by applying bilevel optimization with gradient-based interior point methods and a genetic algorithm. We show that carbon pricing postpones thinnings and increases stand density by directing harvests to larger trees. Carbon pricing increases rotation age and may well imply a regime shift from clearcuts to continuous cover forestry. In continuous cover solutions, the steady state harvesting interval and the diameter distribution of the standing and harvested trees change according to carbon price. Valuing carbon storage is shown to increase the sawlog ratio of timber yields. We show that carbon storage is maintained not only in the standing trees but also in in timber products, and to a lesser

extent in dead tree matter. Additionally, we present estimates of the marginal costs of carbon storage on stand level.

PARALLEL SESSION B2 - Stated Preferences I: Inequality and Discounting

Expectations on Others as Anchors in Donating to a Public Environmental Good

Mark KOETSE, VU University Amsterdam, The Netherlands
Jetske A. Bouma, Dominic Hauck

In environmental valuation studies, donations are often used for obtaining a lower bound estimate of willingness to pay. In this paper we analyse the potential problem that donations may not be independent of the donations of others, which would impair the use of donations as a measure of economic value. In this paper we analyse the impact on donations of: (1) expectations on other people's donations, and (2) realisations of other's people's donations. For this we conduct a contingent valuation study, measuring the willingness to donate of Dutch citizens to a fund from which land is bought for farmers who wish to switch from intensive to non-intensive farming. We use three independent but identically sampled respondent samples. We measure people's expectations on other people's donations in each treatment, provide no feedback in the control treatment, and provide feedback on actual donations of others in the two experimental treatments. We find that both the decision to donate and the donation amount depend to a large extent on expectations of other people's donations. Providing feedback on other people's donations has a small or no effect on total donations, but it does significantly change the effect of expectations on other people's behaviour on donations.

Income Inequality and Willingness to Pay for Public Environmental Goods

Jasper MEYA, University of Oldenburg, Germany
Stefan Baumgärtner, Moritz A. Drupp, Jan M. Munz, Martin F. Quaas

We study how the distribution of income among members of society, and income inequality in particular, affects social willingness to pay (WTP) for environmental public goods. We find that social WTP for environmental goods increases with mean income, and decreases (increases) with income inequality if and only if environmental goods and manufactured goods are substitutes (complements). Furthermore, social WTP for environmental normally changes more elastically with mean income than with income inequality. We derive adjustment factors for benefit transfer to control for differences in income distributions between a study site and a policy site. For illustration, we quantify how social WTP for environmental public goods depends on the respective income distribution for empirical case studies in Sweden, China and the World. We find that the effects of adjusting for income inequality can be substantial.

Promoting Conservation in Shellfish Fisheries: The Role of Economic Incentives and Social Norms

Maria LOUREIRO, Universidade de Santiago de Compostela, Spain
Maria Alló

The shellfish sector suffers from the overexploitation of many species. The aim of this paper is to analyze through a choice experiment (CE) the preferences of shellfish gatherers with respect to a proposed conservation management program; assessing the role of time preferences and the impact of poaching on shellfish fisheries. In terms of time preferences, we find that shellfish gatherers are quite impatient with regards to their extraction levels, which can be a consequence of the risky environment in which they operate. Furthermore, we find that the presence of poachers increases the shellfish gatherers discount rates about 2.67%.

PARALLEL SESSION B3 - Land Use and Deforestation: Evidence from Latin America

Was Von Thünen Right? Cattle Intensification and Deforestation in Brazil

Charles PALMER, London School of Economics, UK
Francisco Fontes

This paper examines whether patterns of cattle intensification, deforestation, and pasture expansion in the Brazilian state of Rondônia are consistent with the land rent framework, in which location and distance to markets is a key determinant of rents. A panel dataset of household lots, collected between 1996 and 2009, is used to test the hypothesis that the further a household is from market the more likely it will extensify cattle production, deforest, and expand pasture in response to rising demand for beef and milk. Results from a fixed effects model suggest empirical support for the theory. Pasture area is significantly increasing while forest is significantly decreasing in lots located further away from the market relative to those closer to the market. Patterns of land use, however, differ depending upon the forest type and commodity considered. Primary forest may be 'spared' closer to market though perhaps at the cost of greater conversion of secondary forest. Households with greater endowments of forest tend to deforest more than those with smaller ones.

Indigenous Land Rights and Deforestation: Evidence from the Brazilian Amazon

Silke HEUSER, Maastricht University, The Netherlands
Ariel BenYishay, Daniel Runfola, Rachel Trichler

Concerns over the expropriation of and encroachment on indigenous communities' lands have led to greater formalization of these communities' rights in a number of developing countries. We study whether formalization of indigenous communities' land rights affects the rate of deforestation in both the short and medium terms. Beginning in 1995, the Government of Brazil formalized the rights of several hundred indigenous communities whose lands cover more than 40 million hectares in the Amazon region and provided support for these rights' enforcement. We study the program's impacts using a long time-series of satellite-based forest cover data. Using both matched samples of treated and comparison communities and plausibly

exogenous variation in the timing of formalization, we find no effect of these protections on satellite-based greenness measures. This is true even for communities that received support for surveillance and enforcement of these rights. Notably, we observe low counterfactual rates of deforestation on communities' lands between 1982 and 2014, suggesting that indigenous land rights programs should not uniformly be justified on the basis of their forest protection, at least in the medium term.

Parks Versus PES: Evaluating Direct and Incentive-Based Land Conservation in Mexico

Katharine SIMS, Amherst College, USA
Jennifer M. Alix-Garcia

Protected areas (PAs) and payments for ecosystem services (PES) are the top two mechanisms available for countries to achieve international REDD agreements, yet there are few empirical comparisons of their effects. We estimate the impacts of PAs and PES on forest conservation, poverty reduction and population change at the locality level in Mexico in the 2000s. Both policies conserved forest, generating an approximately 20-25% reduction in expected forest cover loss. PES created statistically significant but small poverty alleviation while PAs overall were neutral for livelihoods. Estimates by individual policy type for the same level of deforestation risk indicate that biosphere reserves and PES balanced conservation and livelihood goals better than strict protected areas or mixed use areas. This suggests both direct and incentive-based instruments can be effective but that financial support, flexible zoning and explicit recognition of livelihood goals are key components of conservation that does not harm livelihoods.

PARALLEL SESSION B4 - Experiments and Behaviour II: Cooperation and Public Goods

Monitoring Networks in a Common Pool Resource Dilemma: Experimental Evidence on Extraction, Punishment and Beliefs

Ganga SHREEDHAR, London School of Economics, UK
Alessandro Tavoni, Carmen Marchiori

Experimental evidence suggests the careful design of monitoring institutions is critical to mitigate a tragedy of the commons. However most of this evidence is drawn from the implicit assumption of perfect monitoring i.e. everyone can observe and punish everyone else. This experimental study investigates how alternative monitoring institutions, modelled through networks, influences extraction, beliefs, punishment and efficiency in a common pool extraction dilemma. We focus on differences between the complete network, undirected circle, directed circle and line networks. Our results show that the structure and properties of monitoring network significantly affects extractions from the common pool resource, beliefs about other's expected extractions, punishment and efficiency. We find that complete networks, are the least efficient, with higher extraction, beliefs over other expected extraction and punishment. Lastly, we show that higher beliefs over others expected extractions are associated with higher extraction from the common pool resource.

Cooperation in Public Good Games. Calculated or Confused?

Timo GOESCHL, Heidelberg University, Germany
Johannes Lohse

Recent experiments suggest that contribution decisions in a public goods game (PGG) are more likely to be cooperative if based on intuition rather than reflection. This paper (i) reinvestigates the behavioral impact of so-called cognitive style in the PGG; and (ii) connects it with an earlier literature on the role of cognitive failure (confusion). This is motivated by the possibility that the method of time pressure, commonly used to identify cognitive style, invites confusion as a confounding factor. Two channels for such confounds are identified and experimentally tested: A heterogeneous treatment effect of time pressure depending on subject's confusion status and a direct impact of time pressure on subjects' likelihood of being confused. Our reinvestigation on the behavioral impact of time pressure confirms that cognitive style matters, but that deliberation rather than intuition drives cooperation. The confounding effect of confusion is not found to be direct, but to operate through a heterogeneous treatment effect. Time pressure selectively reduces average contributions among those subjects whose contributions can confidently be interpreted as cooperative rather than confused.

Nudge in Networks

Benjamin OUVRARD, University of Strasbourg, France, France

This paper presents a model of voluntary contributions for a local public good, with individuals in a fixed network (circle or star). We first characterize the equilibrium conditions in the absence of outside incentives. We then consider the introduction of an informational nudge, which is the announcement of the socially optimal contribution, under both complete and incomplete information regarding individuals' position in the network. We show that, whatever the level of information the regulator has, a nudge may induce higher levels of aggregate contributions in the circle network, and reduces strategic uncertainty. However, in the star network, the level of information available to the regulator matters, as a nudge may not necessarily increase the level of aggregate contributions, nor reduce strategic uncertainty.

PARALLEL SESSION C1 – Amenity, Restoration and Regulation

Economic Valuation of Climate Change Induced Vinery Landscape Impacts on Tourism Flows in Tuscany

Maria LOUREIRO, Universidade de Santiago de Compostela, Spain
Paulo A.L.D. Nunes

It is widely acknowledged that landscape features can play a major role in determining tourism demand. The present article assesses the impact of vinery landscape and high-quality wine production on regional tourism flows in Tuscany, an important tourist region in Italy and renowned for its enchanting countryside. Thus, vinery landscape and high-quality wine production have been included as explanatory variables in our model for tourism flows. This model has been estimated for both international and domestic markets for the whole region of Tuscany. Estimation results confirm that land areas devoted to the production of these

superb Tuscan wines, in the particular case of Siena including the Brunello di Montalcino, play an important role in explaining international tourism flows. In this context, we estimate climate-change-induced impacts on vinery landscape and quality wines in the tourism sector. These are estimated to cause a loss in the tourism revenues of nearly 15 and 20 million Euros a year, respectively, for 2020 and 2050, for the Tuscany region. Such losses are quite significant, and reiterate the urgency to identify and implement adequate policy options so as to moderate such land use changes, and respective negative welfare impacts.

Truth-Telling to the Regulator? Evidence from a Field Experiment with Commercial Fishermen

Moritz DRUPP, University of Kiel and University of Freiburg, Germany
Menusch Khadjavi, Martin F. Quaas

Determining to what extent economic agents tell the truth to their regulating authority is of major economic importance, from banking to environmental regulation. By means of an artefactual field experiment, we examine truth-telling of German commercial fishermen towards their regulator, the European Union (EU). The EU has recently enacted a ban on discarding unwanted fish catches to the sea, which is not fully monitored and controlled yet. The regulator thus depends on fishermen's truth-telling, while economic theory predicts substantial dishonesty. Using a coin-tossing game, we test whether truth-telling in a neutral setting differs from behavior in two treatments with different EU framings. We find that fishermen misreport coin tosses to their advantage, albeit to a lesser extent than standard theory predicts. Misreporting is larger among fishermen who are faced with the EU flag, but fishermen do not cheat more if the source of EU funding is made salient. Our findings imply that instead of assuming some given degree of dishonesty, regulators can strategically adopt regulatory approaches and their communication to curb dishonesty.

Short Term Projects Versus Adaptive Governance: Conflicting Demands in the Management of Ecological Restoration

Ian D. HODGE, University of Cambridge, UK
William M. Adams

Managers of ecological restoration initiatives face contradictory demands. On the one hand they have to raise funds from a variety of sources through competitive procedures for individual projects. These projects require the specification of deliverable outputs within a relatively short project period. On the other hand, ecologists are arguing that the complexity of ecosystem processes means that it is not possible to know how to deliver predetermined outcomes and that governance should be adaptive, long term and implemented through networks of stakeholders. This debate parallels a debate in public administration between New Public Management and more recent proposals for a new approach, sometimes termed Public Value Management. Both of these approaches have strengths. Projectification provides control and accountability to funders. Adaptive governance recognises complexity and provides for long term learning, building networks and adaptive responses. We suggest an institutional architecture that aims to capture the major benefits of each approach based on public support dedicated to ecological restoration and long term funding programmes.

PARALLEL SESSION C2 - Discounting: Ecosystems, Mortality and Common Property

The Representative Agent Must Die: Using Demographics to Inform Social Discount Rates

Eli FENICHEL, Yale School of Forestry & Environmental Studies, USA
Matthew J. Kotchen, and Ethan Addicott

Benefit-cost analyses of long-lived public projects—such as those related to environmental protection, infrastructure, education, and health—require a social discounting process. The Ramsey Rule provides the backbone for modern discounting. A critical parameter in the Ramsey Rule is the utility discount rate, UDR, or rate of pure time preference. There is a split in the literature as to whether policymaker should treat the UDR as a purely normative decision or should back it out from market behavior. We offer a third approach, based on life expectancy. We exploit the fact that multiple generations are extant at any point in time, and the social UDR must reflect an aggregation over how these generations care about their own future utilities. We use the approach to derive estimates of the social UDR for nearly all countries of the world, and find social UDRs range between 1.5% and 4.0%, with a global estimate of 2-3%. We also place our empirical results in the context of deriving the overall social discount rate, and find results that are strikingly close to those often used in practice. For example, we derive social consumption discount rates between 2% and 6% for the United States, which compares well to OMBs 3-7 percent range. We explore the impact of heterogeneous social UDRs, which depend on region specific demographics, on a climate integrated assessment model.

The Relationship between Intragenerational and Intergenerational Justice in the Use of Ecosystems and Their Services

Stefan BAUMGÄRTNER, University of Freiburg, Germany
Martin F. Quaas, Stefanie Sievers-Glotzbach

Conflicts between intragenerational and intergenerational justice in the use of ecosystems and their services may arise in the design and implementation of sustainability policy. We present a model that depicts the relationship between intragenerational and intergenerational justice (`justice-relationship') against the backdrop of given ecological, economic and societal circumstances. These include the quality and quantity of ecosystem services, population development, substitutability of ecosystem services, technological progress, institutions for granting resource utilization rights, and political restrictions on redistribution. With this model, we numerically simulate how different assignments of resource utilization rights to potential ecosystem users impact on the justice-relationship depending on system determinants.

Pareto Inefficiency and Dynamic Bargaining in Common Property Resource Games with Asymmetric Players

Jesús MARÍN-SOLANO, Universitat de Barcelona, Spain
Anna Castañer, Carmen Ribas

The problem of aggregation of preferences for asymmetric players having different utilities and discount rates is addressed. It is illustrated how time-consistent cooperative strategies can be Pareto dominated by

noncooperative feedback Nash equilibria. A dynamic bargaining procedure with nonconstant weights is presented. Nonconstant weights are obtained as the maximizers of a Nash welfare function. Three common property resource games are analyzed. Linear strategies are derived for appropriated weight functions including, in particular, those obtained from a dynamic Nash bargaining procedure.

PARALLEL SESSION C3 - Biodiversity and Ecosystem Values II: Insurance

Are Diverse Ecosystems More Valuable? A Conceptual Framework of the Economic Value of Biodiversity and its Estimation

Bartosz BARTKOWSKI, Helmholtz Centre for Environmental Research, Germany

It was repeatedly observed that there is no established economic framework for valuing biological diversity. This paper summarises concepts of biodiversity value from the ecological and economic literatures and puts them into a comprehensive and consistent framework. It is argued that biodiversity is the main carrier of option value and insurance value, and also has spill-over value. On that basis, an extension of the TEV framework is proposed to incorporate biodiversity values better. Finally, a number of specific challenges of biodiversity as an economic good are identified and used as criteria to inform the choice of suitable valuation methods.

The Economic Insurance Value of Wild Pollinators in Almond Orchards in California

Yuki HENSELEK, University of Freiburg, Germany
Alexandra-Maria Klein, Stefan Baumgärtner

Biodiversity can provide an economic insurance value against the uncertain provision of ecosystem services for risk-averse economic agents. For uncertain pollination services, we determine the risk premium and the economic insurance value of wild pollinators in almond orchards for a risk-averse farmer. For this, we describe pollination services as a distribution, which can be analysed by statistical methods. Thus, we determine the mean, standard deviation, coefficient of variation and skewness of the distribution. Further, we develop an ecological-economic model to determine the risk premium and insurance value of wild pollinators in general, and apply this model to empirical data on flower visits of honeybees (Apis mellifera) and wild pollinators such as several wild bee species (e.g., Andrena spp., Osmia spp.) and other wild insect pollinator species to almond trees in California. Results show that wild pollinating species can both increase or decrease the riskiness of a pollination distribution. That is, it is dependent on the measure for variance (standard deviation or coefficient of variation) that is evaluated. Thus, wild pollinators can or cannot have an insurance value depending on the risk preferences of the economic agent.

The Environmental Insurance Trap

Kevin BERRY, Yale School of Forestry & Environmental Studies, USA
Eli P Fenichel

Common pool resources can provide backstop livelihoods and insure individuals against collapse of private endeavors. When private and common pool endeavors are interconnected, investment in one may put the

other asset at risk. We model Senegalese farmers choosing whether to grow crops, a private activity, and or raise livestock on common pool pastureland. Locust outbreaks damage the crops, but not livestock, which are used as savings and insurance. Livestock can increase the likelihood of locust outbreaks via ecological processes related to grassland degradation. Individuals self-insure against catastrophe by holding livestock, which increases overall risk. We show how the incentive to self-protect or self-insure changes with various property rights schemes and levels of ecological detail. We also demonstrate how the common pool nature of pasture causes individuals to over invest in livestock, regardless of access to crop insurance.

PARALLEL SESSION C4 - Experiments and Behaviour III: Developing Countries

Applying the Carrot and Stick in a Cambodian Commons: An Experimental Games Approach to the Investigation of Conservation Incentives

Henry TRAVERS, Imperial College London, UK
Tom Clements, EJ Milner-Gulland

The use of incentives to encourage sustainable natural resource use is widespread in conservation. Typically, such measures might include law enforcement activities and, increasingly, payments for ecosystem services. In this study, an experimental games approach was used to investigate the effect of such interventions on the resource appropriation of smallholder farmers living within a Cambodian protected area. We used a common pool resource game to measure extraction under treatments designed to mimic the institutional arrangements associated with different conservation interventions, focusing on the potential crowding out effect of combining both reward payments and penalties (in which the risk of a penalty weakens the effect of positive incentives in reducing resource extraction). In isolation, we found little difference in the effect of individual and collective payment structures on resource extraction, but behaviour differed when payments were combined with external enforcement. Extraction was unaffected by adding external enforcement to collective payments, but increased for individual payments. This 'crowding out' increased when payments were coupled with a higher probability of detection. These results suggest that the conservation behaviours that individual-based payments for ecosystem services aim to incentivise may be undermined when payments operate in combination with rule enforcement.

Efficiency and Practical Feasibility of Payments for Ecosystem Services: Evidence from the Field

Daan VAN SOEST

Abstract/paper to be included in on-line version of conference book.

Coaseian Biodiversity Conservation. Who Benefits?

Rüdiger PETHIG, University of Siegen, Germany
Thomas Eichner

We assume that the global public good 'biodiversity' is positively correlated with that share of land which is effectively protected by land-use restrictions against the deterioration of habitats and ecosystems. The willingness-to-pay for biodiversity conservation is positive in developed countries (North), but very low

(here: zero) in developing countries (South). Taking the no-policy scenario (Regime 1) as our point of departure, we analyze two concepts of biodiversity conservation: the northern countries' coordinated action for efficient land protection in the North (Regime 2) and financial support of biodiversity conservation from North to South (Regime 3). The focus is on changes in biodiversity and welfare of the world economy's move from Regime 1 to the Regimes 2 and 3 and to the Regime 4, consisting of the combination of the Regimes 2 and 3. In a parametric version of the model, we derive a number of unexpected and undesirable results. It is possible that the move from Regime 1 to Regime 2 reduces biodiversity and welfare in North and South. Regime 3 fares better, but it hardly improves welfare and biodiversity in our simulations. Although Regime 4 is socially optimal, the North or the South is worse off in Regime 4 than in Regime 1 for some subsets of parameters.

PLENARY SESSION 2

Uncertainty in and distribution of the benefits of conservation

Prof. Amy ANDO, University of Illinois and Resources for the Future, USA
Abstract/paper to be included in on-line version of conference book.

PARALLEL SESSION D1 - Marine Biodiversity

Optimal Siting and Sizing of Marine Protected Areas in Lower Income Countries: Labor Allocation, Location Decisions, and Incomplete Enforcement

Elizabeth ROBINSON, University of Reading, UK
Heidi J Albers, Louis Preonas

Using a spatially-explicit bio-economic model, this paper demonstrates how the optimal size, enforcement, and location for a marine protected area (MPA) in a lower-income country depend on characteristics central to such countries: low management budgets; low-valued alternative opportunities for fishers; and distance costs to fishing locations. A budget-constrained manager chooses the optimal MPA size, location, and enforcement level to maximize yield, income, or fish stock. The resulting spatial Nash equilibrium of fishing locations and effort at a steady state fish stock incorporates labor allocation decisions across income-generating activities, fishing location decisions as a function of distance costs and other fishers' behavior, and any MPA restrictions. Reflecting a range of policy goals and the low management budgets in Costa Rica and Tanzania, this analysis shows that optimal MPAs differ markedly across goals and budget levels. Results discuss how managers can make tradeoffs between the size, location, and enforcement level in MPAs to improve the outcomes from those MPAs; that illegal harvest in MPAs can be optimal, especially when small levels of enforcement solve some of the open access over-extraction problem; that fish dispersal and fishers' location decisions imply that MPA policies have marinescape-wide implications including leakage; and that MPAs that generate exit from fishing rather than marginal declines or re-locating fishing produce high conservation benefits.

Restoration of Improves Biodiversity or Prevention of Biodiversity Loss? The Economic Value of Some Coralligenous Habitats in the North Adriatic Sea

Greti LUCARONI, IUAV University, Italy
Stefania Tonin, Margherita Emma Turvani

Marine biodiversity provides valuable benefits to human beings, some of those easily recognized, such as the provision of food, some much less well known, such as climate regulation; yet people lack a direct experience of their economic values since no relevant market exists. This study reports the results of a contingent valuation exercise to estimate the public's willingness to pay (WTP) to improve and to engage in control biodiversity losses in some rare coralligenous habitats in the Venetian North Adriatic Sea, called Tegnue. Coralligenous habitats constitute one of the most important 'hot spot' of species diversity in the Mediterranean, notoriously affected by a loss of biodiversity as a consequence of human activities such as over-fishing and pollution, sediment deposition, recreational fishing and trawling, diving. A major threats is the increasing frequency of Abandoned, Lost or otherwise Discarded Fishing Gears (ALDFG) at sea. We surveyed a sample of the Italian population and we found that WTP for interventions aimed to improving biodiversity through removal and restoration operations in the area is distinctly higher than the WTP for the control and monitoring to obtain prevention of further biodiversity loss. Our findings suggest that respondents perceive prevention and control activities as disentangled from restoration, the benefit of which can be clearly recognizable in their time horizon, while the benefits of monitoring are perceived as much more ambiguous and less controllable.

Noise Signals Value: Trading of Marine Mammals and Seismic Survey Information

Maarten PUNT, University of Southern Denmark, Denmark
Brooks A. Kaiser

This paper explores competition over the ocean as a sound transmission medium between marine mammals and oil exploration activities. Seismic surveying uses underwater sound transmission to increase information regarding the presence or absence of hydrocarbon resources and therefore lowers expected costs of subsequent exploratory drilling and reduces additional search costs. However, this surveying may interfere with marine mammals' use of the medium and reduce fitness amongst these populations by shifting behavior away from optimal feeding, migration, and reproduction patterns. Seasonally ice-covered Arctic waters temporally constrain seismic surveying opportunities, so that spatial planning over the transmission medium's use is required to mitigate environmental damages. We develop a spatially explicit model to examine these tradeoffs on the Western Greenlandic coast. We find that important changes in the surveying plans take place when whales are taken into consideration.

Understanding and Valuing the Marine Ecosystem Services of the Northern Mozambique Channel

Paulo A.L.D. NUNES, UNEP Ecosystem Services Economics Unit, Kenya
Andrea Ghermandi

The Northern Mozambique Channel (NMC) region is host to one of world's outstanding terrestrial and marine biodiversity areas. The coastal communities and economies of the region are intimately dependent on its marine and coastal resources, through fishing, tourism and other economic activities, making its management and protection of key importance to the countries. The NMC region is currently at a crossroad regarding its future socio-economic development and environmental status due to the concomitant presence of: (1) rich natural assets, as yet only moderately impacted by human activities; (2) rapidly evolving socio-economic drivers and pressures (e.g., demographic change, growth of tourism and oil and gas sectors); and (3) a strong need to achieve sustainable livelihoods and poverty reduction. This study

deals with understanding and valuing the coastal and marine ecosystem services in the NMC region with the goals to (1) providing monetary estimates of the benefits provided by key coastal and marine ecosystem services, (2) identifying and prioritizing current knowledge gaps, and (3) providing guidance and recommendations to the local policy and decision-makers on how ecosystem service values can help to sustainably manage the existing natural capital. Six key coastal and marine ecosystem services are identified: coastal tourism, coastal recreation, fishery, mariculture, carbon sequestration and coastal protection. A range of economic valuation techniques is implemented to provide spatially explicit monetary estimates of the current flow of ecosystem services values for each of the six ecosystem services as well as aggregated values at the province or Exclusive Economic Zone (EEZ) level. We implement the Driver-Pressure-State-Impact-Response (DPSIR) conceptual framework in the investigation of a range of social, economic, environmental and governance indicators, specifically at the province level for each of the NMC countries. We consider six categories of indicators: (1) biodiversity; (2) ecosystem service value flows; (3) multidimensional poverty; (4) institutional responses; (5) pressures; (6) drivers. Each of the categories includes one or more sub\categories and between three and eleven distinct indicators, for a total of 32 distinct indicators. The indicator values are standardized and aggregated in composite indices for each of the components of the DPSIR framework. The values of the composite indices for each of the countries or provinces in the Western Indian Ocean are analysed with the help of spider diagrams. In the face of competing actions and interests by different users and stakeholders, economic valuation of the benefits provided by coastal and marine ecosystems in the region can help increase the magnitude and level of integration of regional environmental policies, thus potentially helping to guide the NMC towards a sustainable growth path.

PARALLEL SESSION D2 - Stated Preferences II: Developing Country Applications

Consumer Demand for Rhino Horn in Vietnam: Insights from a Choice Experiment

Oleg SHEREMET, University of St Andrews, UK
Nick Hanley, Martina Bozzola, Alexander Kasterine, Douglas C. MacMillan

The international demand for endangered animal and plant species as traditional medicine, luxury foods and curios is strong and rising, especially in eastern Asia. The illegal poaching of wildlife to supply this market represents an immediate and growing threat to the survival of many endangered species. To counter the illegal international wildlife trade, the global community remains committed to supply-side trade restrictions and enforcement of poaching laws. However, despite these actions recovery in the populations of many species is being threatened by rising poaching rates over the last 10 years. In this paper, we use a choice experiment undertaken with over 850 residents of Vietnam, in order to investigate how the demand for rhino horn varies according to its source attributes. The survey sample includes 244 respondents who reported having either purchased or used rhino horn medicinal products in the past 5 years and a further 433 who expressed some interest in purchasing rhino horn medicinal products in the future. In particular, we estimate willingness to pay for horn that differs according to source (farmed, semi-wild, farmed) harvesting method (lethal and non-lethal), rarity of the rhino species and price. We also compare preferences elicited in the context of illegal trade in rhino horn, compared to legalised trade, and how consumer preferences vary according to socio-economic variables such as income. We find that preferences are significantly influenced by source and harvesting method and income level, with non-lethal harvesting and wild sourced horn generally preferred especially by the richest consumers, who are also the

consumers most likely to have previously bought horn products. Under a legal trade demand would fall for all horn types and consumer groups.

Willingness-To-Pay or Willingness-To-Accept? Contested Property Rights in Forest Conservation in Madagascar

Sarobidy RAKOTONARIVO, Bangor University, UK
Jette Jacobsen, Mahesh Poudyal, Alexandra Rasoamanana, Neal Hockley

Where property rights over forest resources are not explicit or are contested, the effectiveness of conservation may be undermined and it can be difficult to estimate the welfare impacts of forest conservation on local people. In particular, researchers face the dilemma of estimating respondents' Willingness To Pay (WTP) for rights to forests, or their Willingness To Accept (WTA) compensations for foregoing these rights. We carried out a discrete choice experiment with respondents living next to a new protected area in Eastern Madagascar, using a split-sample design to administer both WTP and WTA formats, followed by debriefing interviews. The DCE survey examined the welfare impacts of forest protection within a REDD+ project in the eastern rainforest of Madagascar. Our objectives were to: 1) examine the differences in the patterns of responses to the WTA and WTP formats, 2) assess the performance of these two formats in this context on three criteria: respondents' perceptions of the survey, levels of protest responses, and compatibility with very low incomes; 3) investigate respondents' attitudes to conservation restrictions and property rights over forestlands. We found that the format affected respondents stated preferences: 86% of WTA respondents strongly favoured support for an improved rice project and secure tenure for one hectare of forestlands whereas 53% of the WTP respondents showed the opposite preferences. The WTA format was perceived to be more plausible and consequential, led to fewer protest responses, and was more appropriate given very low incomes. Seventy-three percent of respondents did not accept the legitimacy of state protection and strongly aspired to secure forest tenure. The use of WTP may thus be inappropriate even if respondents do not hold formal rights over the resources. Our findings also suggest that current conservation models may not be viable and achieve just compensations.

PARALLEL SPECIAL SESSION D3 - Integrating ecological and economic analysis to inform policy design to conserve biodiversity and preserve ecosystem services

User Fees Across Ecosystem Boundaries: Are SCUBA Divers Willing to Pay for Terrestrial Biodiversity Conservation?

Michaela ROBERTS, University of St. Andrews, UK
Nick Hanley, Will Cresswell

While ecological links between ecosystems have been long recognised, management rarely crosses ecosystem boundaries. Coral reefs are susceptible to damage through terrestrial run-off, and failing to account for this within management threatens reef protection. We conducted choice experiments with SCUBA divers on the island of Bonaire, Caribbean Netherlands, to estimate willingness to pay to reduce terrestrial overgrazing, where this would be expected to reduce reef health decline. Willingness to pay was estimated using the multinomial, random parameter and latent class logit models. Large variation was found between estimates calculated with the multinomial and random parameter logit models and the latent class model, likely due to the presence of a class of respondents with a positive cost coefficient.

Willingness to pay for improvements to reef quality was positive for the majority of respondents, though the latent class model identified one class with zero willingness to pay (class share: 0.16). Estimates from the latent class model determined willingness to pay between $34.10 - $109.58/year, dependent on class membership. This represents a significant source of funding for terrestrial conservation, and illustrates the potential for user fees to be applied across ecosystem boundaries.

Ecological Intensification of Agriculture: Balancing Future Food Production with Environmental Protection?

Mark BRADY, Swedish University of Agricultural Sciences, Sweden
Ullrika Sahlin, Yann Clough, Alison Bailey, Zoltan Elek, Katarina Hedlund, Thomas Koellner, Lorenzo Marini, Ola Olsson, Patrick Poppenborg, Sarah Redlich, Stanisław Świtek, Viki Takacs, Stijn van Gils and Henrik G. Smith

The great challenge facing agriculture is meeting growing demand for food and bioenergy while simultaneously reducing its contribution to environmental degradation, particularly climate change, water pollution and loss of biodiversity. Yet conserving biodiversity can even benefit agriculture through its provisioning of intermediate ecosystem services such as soil fertility, pollination of flowering crops and biological control of crop pests. It is therefore argued that ecological intensification—whereby farmers implement measures to conserve biodiversity—could be used to substitute environmentally damaging inputs with higher levels of intermediate ecosystem services; thus balancing food production with environmental protection. Evaluating the potential of ecological intensification to meet this challenge efficiently is though far from straight-forward, due to the complexity of interactions between farming and biodiversity. For the first time we test an integrated ecological-economic modelling approach for optimizing multiple ecosystem services in real agricultural landscapes. In our approach we link an empirical economic optimization model (ES-Farm) to a GIS based ecosystem services production function (Multi-PF), which together can be used to optimize the spatial distribution of measures to boost flows of ecosystem services. The focus so far has been on applying the integrated model to two real landscapes in Sweden and the Netherlands to demonstrate the integration and use of the ecological and economic models to find optimal solutions and hence evaluate the efficacy of ecological intensification. Preliminary results indicate that ecological intensification has the potential to boost future agricultural productivity while reducing environmental degradation, but it will involve potentially substantial short-term costs to farmers to achieve higher levels of services in the future. Policy needs also to target the scale at which various service providing organisms operate, the landscape. Consequently, the time lag between implementing measures to benefit biodiversity and realizing higher flows of ecosystem services, as well as the current policy focus on the farm scale, is likely to hinder ecological intensification under the current Common Agricultural Policy framework.

Pesticides and Bees: Ecological-Economic Modelling of Bee Populations on Farmland

Ciaran ELLIS, University of Stirling, UK
Nick Hanley, Adam Kleczkowski, David Goulson

Production of insect-pollinated crops typically relies on both pesticide use and pollination, leading to a potential conflict between these two inputs. In this paper we combine ecological modelling with economic analysis to investigate the effects of pesticide use on wild and commercial bees, whilst allowing farmers to partly offset the negative effects of pesticides on bee populations by creating more on-farm bee habitat. Farmers have incentives to invest in creating wild bee habitat to increase pollination inputs. However, the

optimal allocation of on-farm habitat strongly depends on the negative effects of pesticides, with a threshold-like behaviour at a critical level of the impairment. When this threshold is crossed, the population of wild bees becomes locally extinct and their availability to pollinate breaks down. We also show that availability of commercial bees masks the decrease in pollination services which would otherwise incentivise farmers to conserve the wild pollinator population, therefore indirectly leading to local wild bee extinction. The paper demonstrates the importance of combining ecological modelling with economics to study sustainability in the provision of ecosystem services in agro-ecosystems.

Cost-Effectiveness of Agri-Environmental Schemes under Climate Change

Emeline HILY, INRA, France
Martin Drechsler, Frank Wätzold

Climate change is expected to be one of the key threats for biodiversity conservation in this century. Conservation literature has pointed to the inadequacy of current biodiversity conservation practices relying predominantly on static approaches and showed the need to develop "climate-proof" conservation strategies. However, this debate has taken place largely in the conservation planning literature so far and ignored incentive-based conservation policy instruments such as conservation payments. Our general understanding is thus poor about how should conservation payments be designed so that they can contribute to biodiversity conservation under climate change in a cost-effective manner. In this work we develop an ecological-economic model and investigate the cost-effectiveness of various payment design options showing varying degrees of payments' differentiation and targeting in a landscape whose dynamics is driven by climate change, while considering the impact of changes in key economic and ecological parameters. We provide the first comparative cost-effectiveness analysis of conservation payment designs in a changing climate on a conceptual level. Our results demonstrate the significant cost-effectiveness gains enabled by payments targeting and differentiation for biodiversity conservation under climate change. Moreover, we demonstrate the existence of connectivity/area trade-offs, whose intensity is dulled by the speed of climate change.

PARALLEL SESSION D4 - Forests II

Forest Owners Motivations for Adopting Programs of Biodiversity Protection

Philippe POLOMÉ, University of Lyon, France

Since economic incentives are typically fairly low for many non-industrial private forest owners, it is of interest for public policy to examine whether other motives might play a role on adoption of Biodiversity-related-Protection Programs. In a survey of non-industrial private forest owners, a number of current programs, that include biodiversity protection to some degree, are investigated: Prosilva, environmental associations, other programs of forest management. Across the survey, adoption amounts to 22% for all the programs jointly, and is shown to depend on economic, social and intrinsic motives, with significant crowding-out only between the economic and intrinsic motives, that is, intrinsic motives likely lessen the effectiveness of economic incentives. That does not occur with social motives; these results constitute a test of the "reputational crowding-out" theory of Bénabou and Tirole (2006) [1]. Adoption of any program is strongly negatively correlated to the others. Nearly no respondent adopted the Natura 2000 program.

Forestry Policy as a Tool for Biodiversity Conservation in the Ashanti Region of Ghana: Does Equity Matter?

Jonathan QUARTEY, Kwame Nkrumah University of Science and Technology, Ghana

This paper assesses the equity effect of forestry policy as a means of influencing biodiversity conservation among forest communities in Ghana. It employs a quantitative approach, with primary data collected through a two-stage probability sampling procedure from forest districts in Ghana. A sample of 158 households provided complete responses to questionnaire which were analyzed to ascertain the extent of equity associated with forestry policy implemented in Ghana. The analysis focuses on whether through forestry policy there had been any significant transfer of forest benefits from richer to the poorer households, which could provide incentive for forest conservation. The Lorenz curve and Gini-index was constructed to assess the extent of forestry income distribution among households. Also, Chi-square test of independence was used to verify the extent of association between forestry policy and the resulting forestry policy induced equity levels. The study finds that inequity exists in forest communities with respect to the distribution of forestry policy benefits. A Gini-index of 0.36 meant that on the average, the poorest of two forest community households earned about 64 percent of the forest community mean income, which is less than US$1.00 per day. The null hypothesis that forestry policy is independent of the resulting inequity was rejected at the 5% level, suggesting a significant association between forestry policy and inequity. We conclude that the equity effect of forestry policy in Ghana has been negative and would constitute a major challenge to the realization of biodiversity conservation and ecosystem service provision.

Heterogeneous Economic and Behavioural Drivers of the Farm Afforestation Decision

Mark RYAN, TEAGASC - Agriculture and Food Development Authority, Ireland
Cathal O'Donoghue

Using Ireland as a case study, this paper examines the farm afforestation decision in the context of incentivising farm afforestation to provide ecosystem services such as carbon sequestration to mitigate greenhouse gas production. Farm incomes and characteristics are observed using a longitudinal dataset and forest incomes are modelled in a life-cycle theoretical framework. The results show that there is a relationship between financial drivers and the likelihood of planting but we also find that there is a cohort of older smaller farmers that will never plant, and for whom negative cultural attitudes are stronger than financial drivers. In addition, this paper also identifies a cohort of large, younger farmers who might plant if the forest income is greater than the agricultural income. We also find that for many farmers the afforestation decision involves a wider complex of contemporaneous farm decisions. This paper concludes that a "one size fits all" programme based solely on financial incentives may not be the most appropriate means to encourage further farm afforestation.

Optimal Continuous Cover Forestry with Dead Wood as a Biodiversity Indicator

Janne RÄMÖ, University of Helsinki, Finland
Olli Tahvonen

In this study we analyze continuous cover forest management with dead wood as biodiversity indicator. We study mixed species stands consisting of Norway spruce (*Picea abie*s (L.) Karst.), birch (*Betula pendula* Roth. and *B. pubescens* Ehrh.) and other broadleaves (e.g. oak (*Quercus sp*.), maple (*Acer sp*.), beech (*Fagus silvatica*), aspen (*Populus tremula*)). The analysis is based on an economic description of continuous cover forestry using an empirically estimated size-structured transition matrix model. For dead wood we use size-specific decomposition rates, with lower limits on the total amount of dead wood varying between 0 and 40 m3 ha-1. The optimization problem is solved in its general dynamic form using gradient-based interior point methods. Increasing the dead wood volume requirement has only small effect on the total stand density, but increases species diversity. In addition, increasing the dead wood requirement has only a minor effect on the total harvested amount, but harvests shift from timber harvests to biodiversity fellings to maintain the dead wood volume. In the optimal steady state with high levels of dead wood requirement, two harvesting cohorts emerge: one for timber harvests, and the other for biodiversity fellings. Increasing dead wood requirement decreases steady state net timber income by over 30% compared to unconstrained solution.

PARALLEL SESSION E1 - Ecosystem Auctions

Conservation Tenders in Developed and Developing Countries - Status Quo, Challenges and Prospects

Stuart WHITTEN, CSIRO Ecosystem Sciences, Australia
Tobias Wünscher, and Jason F. Shogren

Conservation tenders – or procurement auctions – are a competitive mechanism, in which payment for ecosystem service contracts are allocated to landholders based on their submitted bids. These encompass a price and sometimes a measure for the environmental services the landholder offers to provide. This special edition comprises a set of papers from a workshop on conservation tenders across developed and developing countries. These papers assess the status quo, and the challenges and prospects of tendering approaches. Four high level lessons emerge: 1) Conservation tender performance has been robust; 2) Developed – developing country conservation tender differences are modest; 3) Conservation tender prospects are dependent on political and institutional support; and 4) Optimal conservation tender design is circumstance specific.

Generating Spatially Optimised Habitat: A Trade-Off Between Social Optimality and Budget Efficiency

Martin DRECHSLER, UFZ-Helmholtz Centre for Environmental Research, Germany

Auctions have been proposed as alternatives to payments for environmental services when spatial interactions and costs are better known to landowners than to the conservation agency (asymmetric information). Recently, an auction scheme was proposed that delivers optimal conservation in the sense that social welfare is maximized. I examined the social welfare and the budget efficiency delivered by this scheme, where social welfare represents the difference between the monetized ecological benefit and the conservation cost incurred to the landowners and budget efficiency is defined as maximizing the ecological benefit for a given conservation budget. For the analysis, I considered a stylized landscape with land patches that can be used for agriculture or conservation. The ecological benefit was measured by an objective function that increases with increasing number and spatial aggregation of conserved land

patches. I compared the social welfare and the budget efficiency of the auction scheme with an agglomeration payment, a policy scheme that considers spatial interactions and that was proposed recently. The auction delivered a higher level of social welfare than the agglomeration payment. However, the agglomeration payment was more efficient budgetarily than the auction, so the comparative performances of the 2 schemes depended on the chosen policy criterion–social welfare or budget efficiency. Both policy criteria are relevant for conservation. Which one should be chosen depends on the problem at hand, for example, whether social preferences should be taken into account in the decision of how much money to invest in conservation or whether the available conservation budget is strictly limited.

Bidding Behavior in Contract Auctions with Incomplete Monitoring

Eirik ROMSTAD, Norwegian University of Life Sciences, Norway
Frode Alfnes

It is well known from the compliance literature that whenever it costly to monitor agents' compliance to contract terms, compliance is likely to be incomplete. This paper goes one step further by examining the implications of incomplete compliance on agent bidding behavior for contracts. Auction result in more effective resource allocation. From a monitoring perspective we show allocation contracts to least cost also produces another gain – that less resources need to be spend on monitoring and enforcement. To get full use of this insight one needs to have auction procedures that provide incentives for truthful revelation of agents' private alternate incomes. Our second result is that this property is lost when monitoring is incomplete unless the expected value of compliance exceeds the expected value of noncompliance. We demonstrate this result using an economic experiment for a reverse multi-unit auction.

PARALLEL SESSION E2 - Natural Capital and Ecosystem Services

Ecosystem Services and Economic Development: Is it Worth to Conserve Natural Capital?

Jean-Michel SALLES, INRA-SUPAGRO, France
Sidnoma Traoré, Mabel Tidball

Environmental and resource economists have followed several ways to take into account the role of natural environment in economic growth. Many studies have explored how exhaustible resources or pollution may constitute limits to growth. However, as noted by Partha Dasgupta (2008), economists mostly neglected nature when modeling economic growth. In this paper, we regard nature as a capital that enter in a production function and in which a representative agent can invest in order to restore it. We study how different interactions between natural and man-made capitals can affect growth. The paper highlights the impact of the weight given to natural capital in the production of final good in growth. Our results show that different forms of interactions between the two capitals can lead either to an endogenous growth or to steady state in the long run.

Corruption, Institutions, and Sustainable Development: Theory and Evidence from Inclusive Wealth

Rintaro YAMAGUCHI, Graduate School of Economics, Kyoto University, Japan
Kong Joo Shin

Institutional quality has been known to be a key factor explaining economic growth, and more recently, sustainable development. Comparing corruption linked to either resource extraction or land development, we first consider theoretically how institutions affect natural capital shadow prices and degradation. In the corrupt land development model, total land value could be positive or negative; and the effect of institutions is not symmetric in both models. Taking corruption control as an example, we then study how institutions affect various components of natural capital, as well as inclusive wealth, using data from Inclusive Wealth Report. Fixed country effects estimates using panel data show significantly positive effect of corruption control on the change of non-renewable resources, and some limited results for forest and agricultural land. Also, the effect of resource abundance on some resources are found. We broadly observe corruption control affects positively natural capital per capita, but the channels and lead time could be different depending on subcategories.

A Bioeconomic Model of Ecosystem Services Provision: Coffee Berry Borer and Shade-Grown Coffee in Colombia

Shadi ATALLAH, University of New Hampshire, USA
Miguel I. Gómez, Juliana Jaramillo

Transitioning from intensive, sun-grown coffee systems to shade-grown coffee systems is being promoted as a promising ecosystem-based climate adaptation strategy. Intercropping shade trees with coffee trees can produce pest control services, crop growth services through improved soil fertility, and timber. Depending on the shade cover levels, however, the joint production of these services might be complementary or competitive in the way they impact coffee yields. We develop a computational, bioeconomic model to find the range of shade cover for which the benefits of the ecosystem services provided by shade trees justify the ensuing yield reduction associated with shade-grown coffee production systems. First, to model the plant-level provision of pest control services, we specify the relationship between shade, coffee berry temperature, and coffee berry borer infestations. Second, we model shade induced crop growth ecosystem services through a concave effect of shade cover on coffee yields. Third, we account for the market value of timber in the shade-grown coffee system. We conduct computational experiments to evaluate increasing levels of shade cover and rank them based on farm expected net present values (ENPVs). We do so for three price premium levels for shade-grown coffee. Using parameters from coffee regions in Colombia, and accounting for a moderate price premium for shade-grown coffee ($0.3/kg, or 10%), our simulation results indicate that, under coffee berry borer infestations, the ENPVs in the climate-smart system are higher but only for shade cover levels between 8% and 37%. When a farmer receives a large price premium ($0.5/kg, or 16%), the benefits of shade-induced ecosystem services outweigh the costs and opportunity costs of their provision, even in the absence of coffee berry borer infestations and pest control services.

PARALLEL SESSION E3 - Pests and Invasive Species

Public Preferences and Willingness to Pay for Forest Disease Control in the UK

Oleg SHEREMET,University of St. Andrews, UK
John R. Healey, Christopher P. Quine, Nick Hanley

Invasive pests and diseases in trees impose a range of costs on society related to losses in timber values, impacts on recreational opportunities and effects on forest biodiversity. These social costs of pest and disease outbreaks should be considered when assessing control options and developing public policy. The preferences and willingness to pay of the UK general public for a range of forest disease control measures were investigated using a discrete choice experiment. In total, 605 respondents were surveyed. A majority of respondents were aware of general disease characteristics, with Dutch elm disease and Chalara ash dieback the most well-known specific diseases. We find that disease control programs for publicly-owned forests, and forests owned by charitable trusts are more likely to be supported by the public than equivalent control programs for privately owned, commercial forests. The nature of scientific uncertainty about diseases does not seem to affect choices significantly. Higher respondent income, greater ex-ante knowledge about tree diseases, and more frequent visits to forests are correlated with greater willingness to support forest disease control programs. Better knowledge about tree diseases also makes respondents' choices less random. However, among those who completed the experiment, there is a strong negative sentiment against some disease control measures, such as clear felling of a forest, and against chemical and biocide spraying. We conclude that there is significant public support for part-financing forest disease control policies in the UK, but that this is conditional on forest ownership and the control measures used.

The Effects of Variation in Management Objectives on Responses to Forest Diseases under Uncertainty

Ciara DANGERFIELD, University of Cambridge, UK
A.E. Whalley, N. Hanley, J.R. Healey and C.A. Gilligan

The real options approach provides a powerful tool for determining the optimal time at which to adopt disease control measures given that there is uncertainty about the future spread of an invading pest or pathogen. Previous studies have considered the timing of control from the point of view of a central planner. However, decisions regarding the deployment of control measures are typically taken by individual forest managers, who may have widely differing objectives. In this article we investigate how management objectives impact the optimal timing of control measures given uncertainty in disease spread. Our results show that differences in management objectives can lead managers to act at different times, and potentially never adopt disease control. In particular, these differences in the timing of disease control for diverse types of managers becomes more significant if the disease impacts the range of benefits from the forest to different extents. This creates tensions at the landscape scale where there are managers with divergent objectives due to the transferable externality (the disease). Our results have important implications for national decision making bodies and suggest that incentives may need to be targeted at specific groups to ensure a coherent response to disease control.

The Effects of Invasive Pests and Diseases on Strategies for Forest Diversification

Morag MACPHERSON, University of Stirling, UK
Adam Kleczkowski, John R. Healey, Chris Quine and Nick Hanley

Diversification of the tree species composition of production forests is a frequently advocated strategy to increase resilience to pests and diseases, however there is a lack of a general framework to analyse the impact of economic and biological conditions on the optimal planting strategy in the presence of tree disease. To meet this need we use a novel bioeconomic model to quantitatively assess the effect of tree disease on the optimal planting proportion of two tree species. We nd that diversifying the species composition can reduce the loss from disease even when the benet from the resistant species is small. However this key result is sensitive to a pathogen's characteristics (probability of arrival, time of arrival, rate of spread of infection) and the costs (damage of the disease to the susceptible species and reduced benet of planting the resistant species). This study provides an exemplar framework which can be used to help understand the eect of a pathogen on forest management strategies.

PARALLEL SESSION E4 - Experiments and Behaviour IV: Games

Provision of Public Goods: Unconditional and Conditional Donations from Outsiders

Tobias HALLER, University of Innsbruck, Austria
Esther Blanco, James M. Walker

The provision of public goods often benefits a larger group than those who can actively provide the public good. This paper addresses institutional arrangements between subjects who can provide a public good (insiders) and subjects who also benefit from the public good but cannot provide it (outsiders) due to technical, physical or institutional reasons. Using laboratory experiments, we compare a setting of passive outsiders to situations where outsiders can either make unconditional or conditional transfers to the insiders. The primary behavioral questions are to what extent outsiders will use the opportunity to subsidize the contributions of insiders and how insiders will respond to those subsidies. In summary, outsiders do make transfers. On average, however, there is little evidence of reciprocal increases in contributions by insiders to transfers offered. Moreover, transfers and contributions to the public good tend to decrease across decision rounds, leaving provision levels of the public good lower than a baseline condition with no opportunities for transfers from outsiders.

Leading-By-Example and Altruism: Some Insights for Biodiversity Conservation Financing

Tanya O'GARRA, Columbia University, USA
Matthew R. Sisco

Global efforts to stem the ongoing decline in global biodiversity will require a substantial increase in funding for conservation activities. One potential source of funding is private donations. We study the potential for high initial donations by 'leaders' to motivate greater levels of contributions to biodiversity conservation, using an experimental approach in which we assign players to the role of leader and follower. We find that despite a positive relationship between leader and follower contributions, followers give less compared to a control group without a leader. It is suggested that the salient role of a follower reduces intrinsic altruism in followers, which can only be counteracted by good - albeit not excessively good - examples set by leaders. This suggests that – contrary to current thinking in charitable fundraising - announcing high initial donations by 'leaders' may be inefficient, and may reduce baseline contribution levels of potential donors. Other mechanisms to raise awareness may be more effective.

Can Agglomeration Payments Induce Sustainable Management of Peat Soils in Switzerland? - A Computerized Framed Experiment

Marie FERRÉ, ETH Zürich, Switzerland
Stefanie Engel, Elisabeth Gsottbauer

Peat soil degradation substantially contributes to national greenhouse gas emissions in many countries. Their preservation is therefore crucial in the achievement of national climate change mitigation goals. However, peat soil degradation is usually a consequence of productive utilization of these soils, and preservation is in conflict with such usage, as it would require to reduce the drainage intensity. Due to the organization of the drainage systems at a community level, regulating the water table requires farmers' cooperation. Agglomeration payments have been proposed by economists as an approach to promote cooperation among land users for the provision of ecosystem services. However, peat soils differ in their nature and state of degradation. This translates into heterogeneity among landowners' opportunity costs for adopting an alternative land use on these soils. We developed a dynamic, computerized, and interactive framed economic experiment to represent the decision situation of Swiss peatland farmers and conducted it with agricultural students. We compare the effects of fixed versus variable agglomeration payment schemes and a baseline without policy on the implementation of a more sustainable land use. We also analyze the impact of social preferences on policy design and effectiveness. We find that both policy options are environmentally effective, but the fixed payment is most effective in incentivizing farmers to adopt the more sustainable land use as compared to a payment scheme following farmers' respective opportunity costs. Risk aversion, social preferences, and farming identity are observed as the most determinant factors in explaining this result. Furthermore, we find that the level of inequality in income distribution is higher with the variable than with the fixed payment scheme, and the variable payment reveals to be less cost-effective in preserving the remaining peat soil layers as compared to the fixed payment.

Logistical Details

The entire conference will take place within the **historic premises of Kings College** (founded in 1441 by Henry VI). It is one of the 31 colleges in the University of Cambridge and is renowned for its 'backs' overlooking the river Cam as well as its Chapel and choir. Once you arrive at the main entrance of Kings College please ask the **College porter** to direct you to the **Conference Office** which will be where you can collect your room key as well as any relevant printed information (programme, book of abstracts etc.). The **Conference Office** is located in the Scotts Building. The Office can also be used to store personal belongings if needed. **Room check out is strictly 9:30 am.**

Please note the following details regarding the scheduling of the event:

Wednesday 14th of September – Arrival date
Please go to the Conference office and collect keys. The office will be staffed from 2pm-8pm. Please let us know if you will arrive outside these hours. In this case, you will collect your key from the Porter's lodge located at the main entrance of Kings College. The porters lodge is open 24 hours a day so it is not a problem if you are delayed in getting into town.

There are no day activities scheduled for the 14th of September so you may wish to take the opportunity of strolling around the historic city centre. Details of places to visit, restaurants, pubs etc. can be found at: http://www.cam.ac.uk/cambarea/tourist/ or here http://www.visitcambridge.org/visitor-information

Details about the history and features of Kings College can be found at: http://www.kings.cam.ac.uk/visit/index.html

Visiting the historic Chapel at Kings: though there is no mass or choir in September you are welcome to visit the Chapel (access is free for conference delegates if you are wearing your conference badge).

A welcome reception will be held at 6pm on the 14th in Kings College (in the courtyard weather permitting). This will be concluded by 7:30 pm so that delegates can stroll into the nearby historic city centre to explore the local restaurants and pubs.

Thursday 15th – Friday 15th - Main Conference
The conference takes place in the **Scotts** and **Keynes Buildings**. The main Dining Hall is located in the **Wilkins Building (see map provided at registration)**. If you have special dietary requirements please inform Ms. Kristel Suijs at bioecon@bioecon-network.org before the end of August (those who have done so via the on line payment web-site need not do so again). There is no formal dress code for the conference banquet dinner.

The conference venue will also have an **exhibition area** (close to the coffee break location) where delegates are free to pin up posters or display flyers, books, policy reports etc.

Scientific programme

The full scientific programme and papers will be uploaded on the Conference website at: http://www.bioecon-network.org/pages/18th_2016/18th_2016.html

Each conference day commences with one **keynote address**. This year's speakers are:

Professor Sir Partha Dasgupta, University of Cambridge

Professor Amy Ando, University of Illinois

The scientific programme consists of **parallel sessions** with academic papers. Each paper presented is allocated a 30 minute slot of which 20 minutes are for the presentation by the author, 5 minutes for comments by the designated discussant and the remaining 5 minutes for other questions, exchanges and comments.

The conference programme also includes **special policy sessions** that are run by the policy organisations that support BIOECON.. The policy sessions keep with the spirit of the BIOECON network which aims to bring together the academic and policy communities that work on the economics of biodiversity conservation. These sessions aim to critically evaluate current scientific knowledge and identify knowledge gaps that should be filled in order to produce new and improved actionable and effective biodiversity policy recommendations.

Instructions for paper presenters, discussants and session chairs.

The seminar rooms will be equipped with a laptop, power projector and screen.

Paper presenters are requested to upload their presentations on the seminar room's laptop 10 minutes before the start of their session.

Paper discussants: Most (if not all) paper presenters also act as discussant to another paper in their session. Please consult the programme to see if and which papers you are to discuss. Paper discussants are kindly requested to download the paper and prepare your comments. If you have any difficulties in downloading papers please notify Ms. Kristel Suijs at bioecon@bioecon-network.org.

Session chairs: Please consult the programme to see if you are chairing any sessions. If so please promptly proceed to the relevant seminar room and confirm that presenters and discussants are present. Please ensure that all speakers stay within the time limits. If there are any IT difficulties during the session please contact the Conference Registration desk. If you are unable to chair the session please inform the organisers as soon as possible.

Internet access, printing and other office services support.

Details on how to access Wi-Fi within Kings College will be provided with your welcome pack. Printing facilities and other office support services are limited. Contact conference staff if you need such assistance and we will do our best to help.

Reaching Cambridge

From Stansted Airport: The rail station is beneath the airport. Trains run regularly from Stansted to Cambridge and take less than half an hour. For fares and timetable please see: http://www.nationalrail.co.uk/. Once at the Cambridge station, King's College is a short taxi ride away. Alternatively you can take a bus to the city centre (5-10 minutes) and then Kings College is a few minutes walk away (see http://goo.gl/maps/Z3CO)

There is also a direct coach service from/to the airport: http://www.nationalexpress.com/

From Heathrow Airport: Upon arriving at Heathrow Airport there is a direct coach service from the Central Bus Station to the centre of Cambridge. The Central Bus Station is well signed and coach tickets for all services can be purchased from the Travel Centre in the station. If you prefer to pre-book your ticket, or wish to check timetables or fares, this can be done at www.nationalexpress.com.

Coaches leave Heathrow approximately every 30 minutes, and take approximately 2.5 hours to reach Cambridge. Coaches arrive at Cambridge Parkside stop in central Cambridge**. ** King's College is then a short taxi ride away (taxis can be normally found at the bus stop) or alternatively a 20 minute walk. See map for walking path: http://goo.gl/maps/j62F

From other airports: Coaches are also available from Gatwick to Cambridge (4 hours) and Luton to Cambridge (1.5 hours). They also arrive at the Cambridge Parkside stop

From Central London: Trains are available to Cambridge from Kings Cross Station (approximately 1 hour) and Liverpool St Station (1-1.5 hours). See http://www.nationalrail.co.uk/ for further details. King's College is a short taxi ride away from the from the train station (approx. 5-10 minutes).

By Road: Local road connections can be found at

http://www.kings.cam.ac.uk/images/general/roadmap1.jpg

Please note that the College has no parking spaces. The town car parks are a relatively short distance from the College, but do allow extra time for parking since the city is always busy. For details on car parks, see: https://www.cambridge.gov.uk/car-parks-map

Taxi from airports:

Especially if you are travelling in groups it may be worth looking into sharing a taxi into Cambridge from the airport you will be landing at. Price and booking details can be found at:

http://www.airportlynx.co.uk/   http://www.mastercab.co.uk/

http://www.panthertaxis.co.uk/   http://www.camtaxiairport.co.uk/

Additional nights accommodation:

The costs for additional nights will be at your own expense. If you have any additional accommodation requirements please contact Ms. Kristel Suijs at bioecon@bioecon-network.org.

There is no guarantee that we can accommodate extra nights at Kings College as the premises are booked for other events all that week. If a room cannot be found you can book a room in another College here

http://www.cambridgerooms.co.uk/

or a hotel room or B&B using the information provided here:

http://www.cambridgebedbreakfasts.co.uk/

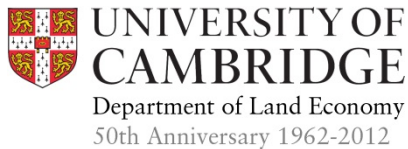http://www.accommodation.cam.ac.uk/VisitingCambridge/Listings.aspx

Conference Sponsors

The **Grantham Research Institute on Climate Change and the Environment** is a research centre at the London School of Economics and Political Science (LSE). The Institute's research looks at the economics of climate change, and aims to inform policy and academic debate.

The **University of Cambridge** is one of the world's foremost research universities. The University is made up of 31 Colleges and over 150 departments, faculties, schools and other institutions. Cambridge has many notable alumni, including 90 Nobel laureates who have been affiliated with it. The **Department of Land Economy** is a leading international centre, providing a full programme of taught courses and research groups focusing on the law and economics of property, spatial planning, and environment.

The **Centre for International Environmental Studies (CIES)** at The Graduate Institute was established in 2010 for the purpose of developing political, legal and economic discourse on problems related to the global environment. It is dedicated to the better understanding of the social, economic and political facets of global problems related to the environment. CIES is also intended as a focal point for studies on the role of international institutions and governance in the resolution of international environmental problems for the Institute, Geneva, and the wider academic research community.

Fondazione Eni Enrico Mattei (FEEM) is a nonprofit, nonpartisan research institution devoted to the study of sustainable development and global governance. FEEM has grown to become a leading research centre, providing timely and objective analysis on a wide range of environmental, energy and global economic issues.

FEEM's mission is to improve through research the quality of decision-making in public and private spheres. This goal is achieved by creating an international and multidisciplinary network of researchers working on several innovative programmes, by providing and promoting training in specialized areas of research, by disseminating research results through a wide range of outreach activities, and by delivering directly to policy makers via participation in various institutional fora.

United Nations Environment Programme (UNEP), established in 1972, is the voice for the environment within the United Nations system. UNEP acts as a catalyst, advocate, educator and facilitator to promote the wise use and sustainable development of the global environment.

UNEP work encompasses:

- Assessing global, regional and national environmental conditions and trends
- Developing international and national environmental instruments
- Strengthening institutions for the wise management of the environment.

IUCN, the **International Union for Conservation of Nature** brings together governments, non-governmental organizations, scientists, businesses and communities to make the right decisions for people and for the planet.

IUCN mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

International Institute for Environment and Development (IIED) is one of the UK's leading policy and action research organisations that promotes sustainable development so as to improve livelihoods and protect the environments on which these livelihoods are built. IID specialises in linking local priorities to global challenges. IIED is based in London and works in Africa, Asia, Latin America, the Middle East and the Pacific, with some of the world's most vulnerable people. IIED works with them to strengthen their voice in the decision-making arenas that affect them - from village councils to international conventions."

The **European Association of Environmental and Resource Economists** (**EAERE**) is an international scientific association which aims are:
- to contribute to the development and application of environmental and resource economics as a science in Europe;
- to encourage and improve communication between teachers, researchers and students in environmental and resource economics in different European countries;
- to develop and encourage the cooperation between university level teaching institutions and research institutions in Europe.

Founded in 1990, EAERE has over 1200 members in 80 countries from Europe and beyond, from academic institutions, the public sector, and the private industry. Interests span from traditional economics, agricultural economics, forestry, and natural resource economics. EAERE through its Journals,(ERE REEP, its Annual Conference, Summer Schools, and other activities provides many fora for exchanging ideas relevant to the allocation and management of natural and environmental resources.
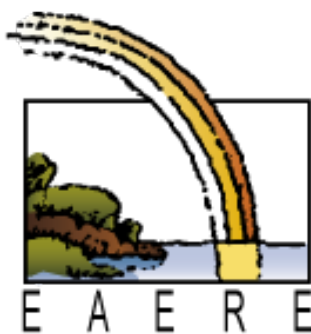
About BIOECON

BIOECON (**BIOdiversity and Economics for Conservation – BIOECON**) is an interdisciplinary network aiming to advance economic theory and policy for biodiversity conservation. BIOECON assembles economists, lawyers and scientists from leading international academic and research institutions and main policy organisations working on design and implementation of cutting edge economic incentives for biodiversity conservation.

The network is the outgrowth of a project supported by the European Commission under the Fifth Framework Programme contributing to the implementation of Key Action 2: Global Change, Climate and Biodiversity within the Energy, Environment and Sustainable Development Programme. After its conclusion, the partners have continued to operate the conference in recognition of the large group of students and academics interested in working in this field, and in recognition of the need for a forum for their work. Over the past ten years, the network and conference has also served as a forum for policy organisations and government analysts to gather and to consider biodiversity and conservation issues as well.

In 2011 the Network was institutionalised, enlarging its partnership to outstanding institutions and research centres all over the world, working on biodiversity issues under different perspectives, reaching thus the number of thirty members.

The principal aim of BIOECON is to investigate the economic and policy driven forces responsible for decline of biodiversity, and accordingly, to develop and implement tools, i.e. incentive mechanisms, that could halt if not reverse the effects of these forces.

BIOECON wants to encourage: (i) to utilise a multidisciplinary approach to assess the social forces behind biodiversity change; (ii) to assess the ecological and socio-economic consequences of this change, (iii) to comprehend the interplay of these consequences; and (iv) to provide concrete policy responses for addressing biodiversity change. These overarching aims are pursued via individual projects developed within the network partnership on all three levels of biodiversity, namely the genetic, species, and ecosystem level.

BIOECON serves as a catalyst to spread the main results of research and practices on these themes, through a series of activities, amongst which its annual meeting, that represents an opportunity for networking, and sharing lessons and experiences with other researchers, environmental professionals, international organizations and policy makers.

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