17th Annual BIOECON Conference
**EXPERIMENTAL AND BEHAVIOURAL ECONOMICS
AND THE CONSERVATION OF BIODIVERSITY AND ECOSYSTEM SERVICES**

13-15 September 2015, *Kings College, Cambridge, United Kingdom*
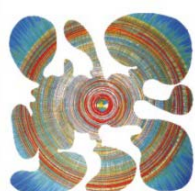
CONFERENCE BOOK

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PROGRAMME

Programme Overview

SUNDAY 13 SEPTEMBER	DAY 1: MONDAY 14 SEPTEMBER		DAY 2: TUESDAY 15 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	

Sunday 13 September 2015

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

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

Monday 14 September 2015

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

08:45 – 9:00 Welcome Address – OPENING BIOECON XVII

09:00 – 10:00 PLENARY SESSION 1   *Keynes Hall*

Chair: Ben Groom

<u>Keynote Address</u>

Prof. Daan van Soest, University of Tilburg, The Netherlands
On the (ir-) relevance of other-regarding preferences in environmental and resource conservation problems

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

10:30 – 12.30 PARALLEL SESSIONS A1 – A4

10:30 – 12.30 PARALLEL SESSION A1 - Agri Environmental Payments: Contract Design & Participation

Chair: Geraldine Murphy   *Beves Room*

Jussi LANKOSKI, OECD
Cost-Effectiveness of Alternative Payment and Auction Designs for Biodiversity Conservation in Agriculture
Discussant: *Martin Drechsler*

Frank WÄTZOLD, Brandenburg University of Technology Cottbus-Senftenberg, Germany
The Cost-Effective Length of Contracts for Payments to Compensate Land Owners for Biodiversity
Conservation Measures
Discussant: Rosa Mato Amboage

Rosa MATO AMBOAGE, University of York, UK
Cooperation and Risk Sharing in Public-Private Partnerships for the Management in Invasive Species
Discussant: Geraldine Murphy

Geraldine MURPHY, Teagasc Rural Economy and Development Programme, Ireland
Modelling the Participation Decision in Agri-Environmental Schemes
Discussant: Jussi Lankoski

10:30 – 12.30 PARALLEL SESSION A2 - Payments for Environmental Services: Impact Analysis

Chair: Rodrigo Arriagada   *Keynes Seminar Room 2*

Sebastien DESBUREAUX, Université d'Auvergne-CERDI, Clermont-Ferrand, France
How Protected Areas Reduce Deforestation? An Exploration of the Economic and Political Mechanisms for Madagascar's Rainforests (2001-12)
Discussant: Saudamini Das

Saudamini DAS, Institute of Economic Growth, India
Value of Planted Mangroves as Nursery and Habitat for Artisanal and Commercial Fishery
Discussant: Luz Rodriguez

Luz RODRIGUEZ, Duke University, USA.
Creating New, Local Ecopayments Institutions in Mexico: A Framed Field Experiment on Trust, Sanctions & Local Coordination
Discussant: Rodrigo Arriagada

Rodrigo ARRIAGADA, Department of Agricultural Economics, Center for Applied Ecology and Sustainability, Interdisciplinary Center for Intercultural and Indigenous Studies, Pontificia Universidad Católica de Chile
Creating Protected Areas on Public Lands: Is there Room for Additional Conservation?
Discussant: Sebastien Desbureaux

10:30 – 12.30 PARALLEL SESSION A3 - Experiments and Behaviour in Conservation

Chair: Benjamin Gramig   *Keynes Hall*

Maria LOUREIRO, University of Santiago de Compostela, Spain
Sharing the Gains and Sharing the Pains in Forest Management
Discussant: Marc Conte

Marc CONTE, Fordham University, USA
Quality Information and Procurement Auction Outcomes: Evidence from a Payment for Ecosystem Services Laboratory Experiment
Discussant: George Hutchinson

George HUTCHINSON, Gibson Institute for Land, Food and Environment, and Institute for Global Food Security, and UKCRC Centre of Excellence for Public Health (NI), Queen's University Belfast, UK
Time Preference Risk Preferences and Behavioral Response to Health Services of a Park Land Ecosystem: An Experimental Economics Approach
Discussant: Benjamin Gramig

Benjamin GRAMIG, Purdue University, USA
Framing Conservation Tillage: The Role of Economic, Altruistic and Environmental Values
Discussant: Maria Loureiro

10:30 – 12.30 PARALLEL SESSION A4 - Field Experiments in Conservation Payments

Chair: Kent Messer   *Saltmarsh Dining Room*

Nick HANLEY, University of St Andrews, Scotland, UK
The Effects of Peer Group Information and Group Size on Spatial Coordination in Agri-Environment
Schemes: A Laboratory Experimental Study of the Agglomeration Bonus
Discussant: Philippe Le Coent

Philippe LE COENT, LAMETA, Université Montpellier 1, LAMETA, France
Can collective conditionally improve agri-environmental contracts? Insights from experimental economics
Discussant: Nick Hanley

Raphaele PREGET, INRA- LAMETA, France
Nudges, Social Norms and Performance in Agri-Environmental Schemes
Discussant: Kent Messer

Kent MESSER, University of Delaware, USA
Behavioral Nudges in Competitive Environments: A Field Experiment Examining Defaults and Social
Comparisons in a Conservation Contract Auction
Discussant: Raphaele Preget

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 Dining Room*

Joe MAHER, Resources for the Future, USA
Protecting Forests: Is it the Policies or the Actors that Count?
Discussant: Sampo Pihlainen

Sampo PIHLAINEN, University of Helsinki, Finland
Economics of Boreal Scots Pine Stands under Changing Climate
Discussant: Aino Assmuth

Aino ASSMUTH, University of Helsinki, Finland
Continuous Cover Forestry vs. Clearcuts with Optimal Carbon Storage
Discussant: Joe Maher

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

Chair: Margrethe Aanesen   *Keynes Seminar Room 2*

Nick HANLEY, University of St Andrews, Scotland, UK
The Effects of Emotions on Preferences and Choices for Environmental Goods
Discussant: Jeremy De Valck

Jeremy DE VALCK, KU Leuven, and Geo-Instituut and Flemish Institute for Technological Research VITO, Belgium
Outdoor Recreation in Various Hypothetical Landscapes: Which site Characteristics really Matter?
Discussant: Margrethe Aanesen

Margrethe AANESEN, University of Tromso – Arctic University of Norway
Interviewer Effects in a Discrete Choice Experiment Implemented as a Valuation Workshop
Discussant: Nick Hanley

13:30-15:00 PARALLEL SESSION B3   -   Experiments in Policy

Chair: Anne Stenger   *Keynes Hall*

David HERES, Centro de Investigacion y Docencia Economicas (CIDE), Mexico
Policy Instrument Choice with Marginal Damages are Uncertain: Evidence from a Laboratory Experiment
Discussant: Prasanjit Banerjee

Prasanjit BANERJEE, University of Manchester, UK
Social rewards and the design of voluntary incentive mechanism for biodiversity protection on farmland
Discussant: Anne Stenger

Anne STENGER, INRA and BETA- University of Strasbourg, France
Are Incentives a Must for Dioversity Conservation? Experimental Results on Long-Lasting Cooperation
Discussant: David Heres

13:30-15:00 PARALLEL SESSION B4   -   Natural Resource Management

Chair: Olli Tahvonen   *Beves Room*

Antti-Juhani PEKKARINEN, University of Helsinki, Finland
Winter Pastures and Supplementary Feeding in Managing a Reindeer-Lichen System
Discussant: Anders Skonhoft

Anders SKONHOFT, Norwegian University of Science and Technology, Norway
The Silence of the Lambs. Payment for Carnivore Conservation and Sheep Farming
Discussant: Olli Tahvonen

Olli TAHVONEN, University of Helsinki, Finland
Optimality of Continuous Cover vs. Clearcut Regimes in Managing Forest Resources
Discussant: Antti-Juhani Pekkarinen
15:00 – 15:30 Coffee break   *Chetwynd Room*

15:30 – 17.00 PARALLEL SESSION C1-C4

15:30 – 17.00 PARALLEL SESSION C1 - Ecosystem Services   *Beves Room*

Chair: Christine Bertram

Moritz DRUPP, University of Kiel, Germany, London School of Economics and Political Science, UK and University of Tübingen, Germany
Estimating the insurance value of ecosystem resilience: Evidence from the Australian Goulburn-Broken Catchment
Discussant: Adam Kleczkowski

Adam KLECZOWSKI, School of Natural Sciences, University of Stirling, UK
Ecological-Economic Modelling of Interactions between Wild and Commercial Bees and Pesticide Use
Discussant: Christine Bertram

Christine BERTRAM, Kiel Institute, Germany
Biodiversity and Optimal Multi-Species Ecosystem Management
Discussant: Moritz Drupp

15:30 – 17.00 PARALLEL SESSION C2 - International Environmental Agreements

Chair: Greer Gosnell   *Keynes Seminar Room 2*

Hans-Peter WEIKARD, Wageningen University, The Netherlands
International Cooperation for Biodiversity Conservation when Spatial Structures Matter
Discussant: Julia Hoffmann

Julia HOFFMANN, University of Kiel, Germany
Bargaining over Resource Regulation: Total Allowable Catch Setting in the European Common Fisheries Policy
Discussant: Greer Gosnell

*Greer GOSNELL, London School of Economics, UK*Heterogeneity and Side Deals in Climate Negotiations: Evidence from a Bargaining
Experiment*Discussant: H*ans-Peter Weikard

15:30 – 17.00 PARALLEL SESSION C3 - Payments for Environmental Services

Chair: David Simpson   *Saltmarsh Dining Room*

Ernst-August NUPPENAU, University of Giessen, Germany
Ecological-Economic Valuation of Prestigious Species in Case of Human-Wildlife Conflicts: The Elephant Example
Discussant: Frank Wätzold

Frank WÄTZOLD, Brandenburg University of Technology Cottbus-Senftenberg, Germany
Land of Biodiversity Conservation - to Buy or Borrow?
Discussant: David Simpson

David SIMPSON, National Center for Environmental Economics, United States Environmental Protection Agency, USA
Developing "Reality Checks" on Ecosystem Service Values: Characterization and Bounding Results for a Broad Class of Models
Discussant: Ernst-August Nuppenau

15:30 – 17.00 PARALLEL SESSION C4 - Sustainability and Property

Chair: Martin Quaas *Keynes Hall*

Prasanjit BANERJEE, University of Manchester, UK
Does Bounded Self-interest Matter in Coasean Bargaining over Insecure Property?
Discussant: Asle Gauteplass

Asle GAUTEPLASS, Norwegian University of Technology and Science, Norway
Conflict and Cooperation in an Age Structured Fishery
Discussant: Martin Quaas

Martin QUAAS, University of Kiel, Germany
A Market Mechanism for Sustainable and Efficient Resource Use under Uncertainty
Discussant: Prasanjit Banerjee

17:00 - 18:30 UNEP SPONSORED EXPERT PANEL: Human Health and Ecosystems: Dynamics of Pathways

Chair: *Pushpam Kumar, UNEP* *Keynes Hall*

Panellists

Conor KRETSCH	Research Fellow - Centre for Environmental Management School of Geography, University of Nottingham, UK
Rebecca LOVELL	Research Fellow, European Centre for Environment and Human Health Medical School, University of Exeter, UK
Andrew MORSE	Professor of Climate Impacts School of Environmental Sciences, University of Liverpool, UK
Charles PERRINGS	Professor of Environmental Economics School of life sciences, Arizona State University, USA

18:30 – 19:30 BIOECON PARTNER MEETINGS

Scientific and Institutional Partners Meeting   *Saltmarsh Dining Room*

19:15-20:00   Pre-Dinner Drinks   ***Back Lawn***

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

Tuesday 15 September 2015

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

9:00 – 10:00 PLENARY SESSION 2   *Keynes Hall*

Chair: Ben Groom

<u>Keynote Address</u>

Prof. Jeff Vincent, Duke University, USA
Why Economists Shouldn't Care about Deforestation

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

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

10:30 – 12.30 PARALLEL SESSION D1 - Special UNEP Session on Infectious Diseases

Chair: Nick Hanley   *Keynes Hall*

Charles SIMS, Department of Economics University of Tennessee – Knoxville, USA
Taking One for the Team: Is Collective Action More Responsive to Ecological Change?

Ciara DANGERFIELD. Department of Plant Sciences University of Cambridge, UK
An Epidemiological-based Model for Disease Spread within the Real Options Framework: The impact on the Optimal Timing of Treatment

David FINNOFF, College of Business, University of Wyoming, USA
Managing Wildlife Faced with Pathogen Risks Involving Multi-Stable Outcomes

Richard HORAN/, Department of Agricultural, Food, and Resource Economics, Michigan State University, USA; Eli FENICHEL, Yale School of Forestry & Environmental Studies, USA
Optimal Management of Livestock and Wildlife Disease. When Livestock Trade Puts Wildlife at Risk

Morag MACPHERSON, University of Stirling, UK
The Optimal Rotation Length of a Production Forest in the Presence of Disease

Eli FENICHEL, Yale School of Forestry & Environmental Studies, USA
Where the Wild Things Go: The Impact of Time Reallocation on the Cost and Benefit of School Closures During an Epidemic

10:30 – 12.30   PARALLEL SESSION D2   -   Stated Preferences II: Choice and Behaviour

Chair: Vanja Westerberg   *Keynes Seminar Room 2*

Silvie DANIELS, University of Hasselt, Belgium
Economic Valuation of Natural Predators for the Biological Pest Control of *Cacopsylla Pyri* in Pear
Production, Belgium
Discussant: Sheng-Han-Erin Chang

Sheng-Han-Erin CHANG, Technical University Munich, Germany
Investigating Farmers' Willingness to Participate in the Chemical Fertilizer Reduction Scheme: A Choice
Experiment Study in Taiwan
Discussant: *Anastasio* Villanueva

Anastasio VILLANUEVA, IFAPA, Centre Alameda del Obispo, Spain
Handling Protest Responses when Estimating Willingness to Accept: Farmers' Preferences towards Agri-
Environmental Schemes
Discussant: Vanja Westerberg

Vanja WESTERBERG, Earthmind, IUCN Conservation Centre, Switzerland
Valuing Mediterranean Seascape and Land Use Changes with Explicit Consideration of Loss Aversion and
Increasing Price Sensitivity
Discussant: Silvie Daniels

10:30 – 12.30   PARALLEL SESSION D3 - Stated Preferences III: Behavioural and Methodological Issues

Chair: Tanvir Hussain   *Saltmarsh Dining Room*

Julian RODE, Helmholtz-Center for Environmental Research, Germany
Can Monetary Valuation Undermine Nature Conservation? Evidence from a Decision Experiment
Discussant: Elisabeth Gsottbauer

Elisabeth GSOTTBAUER, ETH Zurich, Switzerland
Social Framing and Cooperation: The Roles and Interaction of Preferences and Beliefs
Discussant: Katharine Simpson

Katherine SIMPSON. University of Stirling, UK
Information and Learning and the Subsequent Effects on Public Preferences for Managed Realignment in
Scotland
Discussant: Tanvir Hussain

Tanvir HUSSAIN, University of Freiburg, and Leuphana University of Lüneburg, Germany
Willingness to Pay for Environmental Goods under Uncertainty
Discussant: Julian Rode

10:30 – 12.30 PARALLEL SESSION D4 - Biodiversity, Environment and Development

Chair: Tanya O'Garra   *Beves Room*

Stefan BAUMGÄRTNER, Leuphana University of Lüneburg, and University of Freiburg, Germany
Farm Size, Environmental Risk and Risk Preferences: The Case of Namibian Commercial Cattle Farming
Discussant: Jetske Bouma

Jetske BOUMA, VU University, and Netherlands Environmental Assessment Agency, the Netherlands
Community Co-Management of Forest Biodiversity - A Framed Field Experiment Amongst the Tsimane', Bolivia
Discussant: Yady Barrero

Yady BARRERO, Universidad de Los Andes, Colombia
Gender Heterogeneity in User Groups and Fishing Extraction: Experimental Evidence for a Caribbean Colombian Marsh
Discussant: Tanya O'Garra

Tanya O'GARRA, Center for Research on Environmental Decisions, Earth Institute, Columbia University, USA
The Influence of Social and Psychological Interventions on Collective Action for Water Management: A Framed Field Experiment in India
Discussant: Stefan Baumgärtner

12:30 – 13:30   Lunch   *Dining Hall*

13:30 – 15.00 David Pearce Panel Session   *Keynes Hall*

10 years since his death we ask again: "Do we really value biodiversity?", the title of his last publication.

Chair: Tim Swanson

Participants: Nick Hanley, David Simpson, James Vause (UNEP WCMC), and others TBA

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

15:30 – 17:00 PARALLEL SESSIONS E1-E4

15:30 – 17:00 PARALLEL SESSION E1 - Forests II: Ecosystem Services

Chair: Edwin Van der Werf   *Beves Room*

Edwin VAN DER WERF, Wageningen University, The Netherlands
The Potential or REDD+ for Carbon Sequestration in Tropical Forests: Supply Curves for Carbon Storage for East-Kalimantan
Discussant: Teevrat Garg

Teevrat GARG, Charles H. Dyson School of Applied Economics & Management, Cornell University, USA
Public Health Effects of Ecosystem Degradation: Evidence from Deforestation in Indonesia
Discussant: *Mordechai Shechter*

Mordechai SHECHTER, University of Haifa, Israel.
Israeli Mediterranean Ecosystem Services Assessment
Discussant: *Edwin Van Der Werf*

15:30 – 17:00 PARALLEL SESSION E2   -   Biodiversity and Land use

Chair: Tim Swanson   *Saltmarsh Dining Room*

Jim SALZMAN, Duke University, USA
Payments for Ecosystem Services: Past, Present and Future
Discussant: Chloé Mulier

Chloé MULIER, SUPAGRO/LAMETA, France
A Tale of Two Biodiversities
Discussant: Tim Swanson

Tim SWANSON, Graduate Institute of International and Development Studies, Switzerland
Food Security and Land Use: Conservation Policy in a Technology Driven World
Discussant: Jim Salzman

15:30 – 17:00 PARALLEL SESSION E3   -   Experiments in Conservation Payments and PES

Chair: Arild Angelsen   *Keynes Hall*

Laura VILLALOBOS, University of Gothenburg, Sweden
Deforestation Spillovers from Costa Rican Protected Areas
Discussant: Salvatore Di Falco

Salvatore DI FALCO, University of Geneva, Switzerland
Embezzlement of Conservation Funds: The (Relative) Importance of Transparency
Discussant: Arild Angelsen

Arild ANGELSEN, School of Economics and Business, Norwegian University of Life Sciences, Norway
PES and Crowding-Out Effects: A Framed Forest Experiment in Tanzania
Discussant: Laura Villalobos

15:30 – 17:00 PARALLEL SESSION E4 - Infectious Diseases and Invasive Species

Chair: Pierre Courtois   *Keynes Seminar room 2*

Flavio TOXVAERD, University of Cambridge and CEPR, UK
The Optimal Control of Infectious Diseases via Prevention and Treatment
Discussant: David Shanafelt

David SHANAFELT, School of Life Sciences, Arizona State University, USA
Foot and Mouth Disease: The Role of International Trade and the Risk of Disease Outbreak
Discussant: Pierre Courtois

Pierre COURTOIS, LAMETA, University of Montpellier, France
Managing Biological Invasions: How to Set Priorities?
Discussant: Flavio Toxvaerd

17:00 CONCLUSION OF BIOECON XVII

Keynote Speakers

DAAN VAN SOEST

Daan van Soest is professor of environmental economics at Tilburg University (Department of Economics and CentER), and Academic Director of the Tilburg Sustainability Center. In 1998 he received his PhD from the University of Groningen, the Netherlands, on the basis of a thesis on the economics of tropical deforestation. Since then he has worked on topics as diverse as renewable natural resource use, instrument choice and environmental policy design, the economics of biodiversity conservation, and the economics of energy use. His research is both theoretical and empirical in nature, and he also uses economic experiments to gain insight into the behavioral aspects of (un)sustainable resource use. He publishes his work in specialized field journals in environmental economics as well as in general interest economics journals. Since 2007 he serves as associate editor of the journal Environmental and Resource Economics, and since 2012 as co-editor of Resource and Energy Economics.

JEFF VINCENT

Jeffrey R. Vincent is the Clarence F. Korstian Professor of Forest Economics and Management in the Nicholas School of the Environment at the Duke University, chair of the Nicholas School's Division of Environmental Sciences and Policy, and co-lead of the Duke Tropical Conservation Initiative. He is also a fellow at the Beijer Institute of Ecological Economics, a fellow and resource person with the South Asian Network for Development and Environmental Economics (SANDEE), and a resource person with the Economy and Environment Program for Southeast Asia (EEPSEA). Prior to joining Duke, Vincent held positions in the Graduate School of International Relations & Pacific Studies at the University of California, San Diego; Harvard Institute for International Development; and the Department of Forestry at Michigan State University. Vincent's research focuses on the economics of natural resources and the environment in developing countries, with a primary focus on tropical forestry issues in Asia. He has also worked on the economics of HIV/AIDS and pediatric surgery in developing countries. He received the 2006 Cozzarelli Prize for the best article in applied biological, agricultural, and environmental sciences in the Proceedings of the U.S. National Academy of Sciences and the 2003 McKinsey Award for the most significant article in the Harvard Business Review. He has a Ph.D. from Yale University, an M.S. from Michigan State University, and an A.B. from Harvard University.

PARALLEL SESSION A1 - Agri Environmental Payments: Contract Design & Participation

Cost-Effectiveness of Alternative Payment and Auction Designs for Biodiversity Conservation in Agriculture

Jussi LANKOSKI, OECD

Empirical evidence shows that biodiversity conservation policies implemented in agriculture sector in many OECD countries have not been environmentally effective nor cost-effective. There are several new policy mechanisms available to improve both environmental effectiveness and the cost-effectiveness, including spatially differentiated payments and conservation auctions. In this paper a theoretical framework is developed for describing farmers' participation in government payment programme for enhancing semi-natural wildlife habitats on farmland. Payment types analysed include uniform payment, three types of conservation auctions with environmental targeting, uniform payment with environmental targeting and two types of differentiated payments with environmental targeting. Quantitative results show that uniform payment performs less efficiently than other payment types, and that auctions with environmental targeting are the most cost-effective option from analysed payment types. If farmers have knowledge of the environmental value of their offer, the cost-effectiveness of auction is reduced because farmers tend to increase their bids to benefit from this information rent (overcompensating income forgone). Adding environmental targeting to the uniform payment policy greatly improves the cost-effectiveness of uniform payment.

The Cost-Effective Length of Contracts for Payments to Compensate Land Owners for Biodiversity Conservation Measures

Frank WÄTZOLD, Brandenburg University of Technology Cottbus-Senftenberg, Germany
Martin Drechsler, Karin Johst

Payments to compensate land owners for land use measures which are beneficial to biodiversity conservation but costly to them have become a prominent policy instrument. A key question in the design of such payment schemes is for how long the land owners shall commit themselves to carry out biodiversity-enhancing land use measures, i.e. the length of contracts. From an ecological perspective, longer contracts seem better as they ensure that an area stays a suitable habitat for a longer time. However, with longer contracts land owners are likely to demand a higher annual compensation payment if they give up for a longer time their right to manage their land in a way they prefer. We analyse with a conceptual ecological-economic model how the cost-effectiveness of short versus long contract lengths depends on different ecological and economic parameters.

Cooperation and Risk Sharing in Public-Private Partnerships for the Management in Invasive Species

Rosa MATO AMBOAGE, University of York, UK
Julia Touza, Jon Pitchford

Developing incentives for private management efforts for preventing and controlling infectious diseases is a difficult challenge due to its public good nature. Furthermore, since budgets are limited, and the outcomes of prevention efforts are uncertain, resource managers tend to allocate funds to the most immediate and

visible problems, often prioritizing post-incursion actions However, there is increasing evidence that focusing on prevention, including early detention and rapid action, is the most cost-effective approach to mitigating the impacts of invasive species. In this paper, we focus on cost-sharing agreements as one of the instruments available for invasive species management, which corrects for the coordination of private biosecurity efforts and encourages early action. We develop a theoretical contract theory framework to understand whether government funds can spread the risk across signatory private agents, and whether agents have incentives to cooperate in biosecurity actions with each other if the compensation mechanism depends not only in one's actions but on everyone else's efforts. We find that when the responsibility of biosecurity actions is shared across private agents, funding from the public sector can be used to encourage cooperation, higher private investments in biosecurity, and private agents face lower risk.

Modelling the Participation Decision in Agri-Environmental Schemes

Geraldine MURPHY, Teagasc Rural Economy and Development Programme, Ireland
Cathal O'Donoghue, Stephen Hynes, Eithne Murphy

Understanding what influences farmers' decisions to participate in a voluntary agri-environmental scheme (AES) is essential for gauging scheme success. The Rural Environment Protection Scheme (REPS) was a voluntary AES that was available to all Irish farmers from 1994 to 2009. This paper models the participation decision of Irish farmers in REPS using a 15-year panel dataset. The approach taken is novel: actual values for gross outputs, direct costs and working hours are compared to simulated counterfactual values using a conditional logit framework. Model results show that Irish farmers behave rationally by maximising utility from both consumption and leisure but that their preferences differ by region and over time. In addition, the participation functions of viable and non-viable farmers are dissimilar in a number of ways. Policy makers may therefore need to target both groups of farmers using separate schemes in the future.

PARALLEL SESSION A2 - Payments for Environmental Services: Impact Analysis

How Protected Areas Reduce Deforestation? An Exploration of the Economic and Political Mechanisms for Madagascar's Rainforests (2001-12)

Sebastien DESBUREAUX, Université d'Auvergne-CERDI, Clermont-Ferrand, France
Sigrid Aubert, Laura Brimont, Alain Karsenty, Alexio Clovis Lohanivo, Manohisoa Rakotondrabe,
Andrianjakarivo Henintsoa Razafindraibe and Jules Razafiarijoana

Madagascar's notoriously high level of biodiversity is currently threaten by deforestation. Protected Areas (hereafter "PAs") remain until now the central instrument to protect it whilst little is known about their environmental effectiveness in the country. With a matching approach in a quasi-natural experiment setting, we demonstrate for the entire island's rainforest that PAs' additionality has been limited from 2001 to 2012. PAs have made it possible for deforestation to be stabilized in a trend and has restricted the upsurge of deforestation resulting from the country's late political instability. Nonetheless, post-matching analyzes reveal that PAs have only contained some of the causes of deforestation. Effectively stopping the latter will require further ambitious policies to trigger the necessary agricultural transition for the country.

Value of Planted Mangroves as Nursery and Habitat for Artisanal and Commercial Fishery
Saudamini DAS, Institute of Economic Growth, India

Restoration of degraded and depleted mangrove habitats and planting of mangroves over coastal mud flats is a worldwide phenomenon, but there is less rigorous research evaluating the relative flow of Ecosystem Services from these regenerated ecosystems. In India, the state of Gujarat has planted thousands of hectares of mangroves over the coastal mudflats and the mangrove cover today is nearly double the mangroves the state was endowed with historically in 1930s. This study used satellite imagery to assess the mangrove cover and the Difference-in-Difference technique and panel regression estimates to evaluate the regenerated forest's contribution to fishery sector. The results show the planted mangroves to have increased the inshore and offshore fish catch significantly, but young 6-7 year old planted strands' contribution is found 1/4th of the contribution of mature strands. The nursery ground and habitat function service of planted mangroves is valued as INR40.5 million annually to fishery sector of Gujarat state in spite of many limiting features like single species, stunted, lack of fresh water etc.

Creating New, Local Ecopayments Institutions in Mexico: A Framed Field Experiment on Trust, Sanctions & Local Coordination

Luz RODRIGUEZ, Duke University, USA
Alexander Pfaff and Elizabeth Shapiro

States pay landowners in the largest PES (payment for ecosystem services) programs, yet there is significant potential for local organization. For instance, downstream actors may offer incentives upstream to improve water quality, with locals playing all the key roles. Mexico's forest agency (CONAFOR) started to support local PES mechanisms in 2008, alongside its program of direct payments. The Fondos Concurrentes (Matching Funds) program solicits applications from teams – initiated by a suite of diverse local partners – that include upstream and downstream actors. We model the creation of such institutions, where multiple groups interact, and explore whether sanctions help or hurt coordination. We use a novel upstream-downstream group assurance game with free-riding at each end and a PES framing (payments flow upstream, services down) of the actors' contributions. After a field pilot, we recruited 240 downstream and 240 upstream Fondos participants in Xalapa (in the state of Veracruz), Merida (in Yucatan), and Cancun (in Quintana Roo). We find that initial trust-game behaviors not only align with site participants' perceptions but also have predictive power for the baseline contributions within the assurance game (baseline giving was significant, despite a zero equilibrium, perhaps due to our sample). For upstream service providers who can be sanctioned, unlike in 'motivation crowding' the threat and the use of sanctions over time both raise contributions, relative to baseline. Downstream users contribute less initially when sanctions on upstream are available, yet the contributions then rise over time, in line with upstream-downstream complementarity.

Creating Protected Areas on Public Lands: Is there Room for Additional Conservation?

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Cristian M. Echeverria, Danisa E. Moya

Establishing protected areas (PAs) has been the most common conservation measure around the world. The Chilean PA system is second in Latin America and seventh worldwide in terms of % of national coverage. Answering the question whether PAs "work" is complicated because their impacts are not

directly measurable. Most evaluations rely on indirect estimates based on comparisons between protected and unprotected areas, and such methods can be biased when protection is not randomly assigned. This present research estimates, using matching methods, the causal impact of Chilean PAs as measured by deforestation avoided. Using conventional approaches, results indicate 17% greater deforestation without protection. Correcting for selection bias, matching results show only a 5% avoided deforestation. These results indicate how conventional methods tend to overestimate protection impacts and illustrate how improvements to select appropriate unprotected lands to compare with PSA outcomes can be made. Using only public lands to construct counterfactual scenarios leads to estimates of no additional conservation benefits. A potential explanation, in the Chilean context, is that public lands similar to PAs are already well managed, so converting these lands to PAs provides few additional benefits. These results raise important questions, as to the relative costs of different public land management strategies, and whether there are any particular types of public lands where conversion to PAs would have greater impact. These results also suggest that conversion of private land to PAs may offer greater additional conservation benefits, although costlier for governments and society as a whole. Our analysis indicates that the Chilean government would do well strategically to commit to keep natural forests on public lands alongside the PA network.

PARALLEL SESSION A3 - Experiments and Behaviour in Conservation

Sharing the Gains and Sharing the Pains in Forest Management

Maria LOUREIRO, University of Santiago de Compostela, Spain

One of the most common models in economics, to analyze individuals' decisions, is the Public Good Games (PGG). In this study we conducted a modified PGG with a sample of users of a common pool resource (CPR). Individuals have an endowment of money and have to decide the amount to be allocated into a common fund to preserve and manage the CPR. A key difference from previous studies is the inclusion of a sanction, to be shared out across the group. Our goal is to analyze the factors that motivate the sharing of the contribution to the CPR, as well as factors affecting the willingness to share the sanction. In addition, we test the compliance of the principles of collective action (PCA), proposed by Ostrom (1990), and their implications in the management of PGG. We have found that in line with previous literature, individuals are willing to share an important amount of the endowment with their neighbors. In the case of the sanction, however, users prefer that the common fund pays their amount of respective penalties. However, these PCA help to promote cooperation particularly when common owners face costly economic incentives.

Quality Information and Procurement Auction Outcomes: Evidence from a Payment for Ecosystem Services Laboratory Experiment

Marc CONTE, Fordham University, USA
Robert M. Griffin

Conservation auctions are used to procure ecosystem services from private landowners. Bids in these auctions are comprised of both conservation actions and offered prices, though most existing studies of auction performance have assumed that parcel characteristics are exogenously endowed. The choice of conservation action, and uncertainty among participants about the level of ecosystem services provided by different actions, provide an opportunity for auction facilitators to affect auction outcomes through the amount of information provided to participants about the quality of their conservation action. An induced-value laboratory auction experiment is used to explore the impact of access to quality information on the outcome of single-round, multi-attribute conservation procurement auctions. The results indicate that providing participants with information about the quality of their potential conservation actions can increase auction efficiency from 3:4 to 5:0 percentage points, depending on model specification, as

measured by the amount of total quality provided for each dollar spent on conservation. This finding differs from recent results in the literature, which have demonstrated a negative relationship between information and efficiency. The novel result stems from inclusion of quality as a choice variable in this study; access to more information results in higher quality submissions, and this effect dominates losses inefficiency due to information rent-seeking.

Time Preference Risk Preferences and Behavioral Response to Health Services of a Park Land Ecosystem: An Experimental Economics Approach

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Ruth F. Hunter, Jianjun Tang, George Hutchinson, Sue Chilton, David Holmes, Frank Kee

Research suggests that individual time preference may be associated with health-related behaviors, such as using the services of natural ecosystems for physical activity. For example, those who maintain regular physical activity may place a higher value on long-term health benefits, whereas individuals with inactive lifestyles may discount future benefits more heavily. Empirical evidence of this type in physical activity is scant.

Framing Conservation Tillage: The Role of Economic, Altruistic and Environmental Values

Benjamin GRAMIG, Purdue University, USA
Amelia C. Andrews, Rosalee A. Clawson, and Leigh Raymond

By defining the essence of a policy problem, a frame shapes how individuals think about an issue. In this research, we investigate framing effects among knowledge domain experts, an understudied yet increasingly important set of individuals in the policymaking process. Because experts have extensive and highly structured knowledge on a particular topic, they are likely to actively process issue frames to which they are exposed. Consequently, we hypothesize that frames consistent with experts' values will be particularly influential, whereas frames inconsistent with their values will lead to contrast effects. We test our hypotheses on a unique set of experts by examining professional farmers' attitudes toward no-till agriculture. Farmers and other landowners are required to change their management or use of land in order to be eligible to supply ecosystem services to markets or to meet regulatory obligations. Using an experimental design that includes profit, community and environmental stewardship frames, we find evidence that environmental values interact with frames to influence farmers' interest in no-till, especially when farmers are exposed to a novel frame.

PARALLEL SESSION A4 - Field Experiments in Conservation Payments

The Effects of Peer Group Information and Group Size on Spatial Coordination in Agri-Environment Schemes: A Laboratory Experimental Study of the Agglomeration Bonus

Nick HANLEY, University of St Andrews, Scotland, UK
Simanti Banerjee

In this paper we use controlled laboratory experiments to study the role of peer group behavior in influencing landowner behavior in the context of agri-environmental schemes with an Agglomeration Bonus format. Prior research has indicated that strategic uncertainty within the economic environment of the Agglomeration Bonus (resembling a coordination game with multiple payoff ranked Nash Equilibria) can

lead to coordination failure and limited spatial coordination on the preferred land use (that can generate the greatest ecosystem benefits). High levels of strategic uncertainty can be a result of large community sizes where landowners' actions are interdependent yet where limited information is available concerning behavior of the peer group. Our experiment reduces participants' strategic uncertainty by increasing the amount of information available to them. In control sessions, groups of 12 individuals (arranged on a circular local network on which every individual has 2 strategic neighbors) participate in an Agglomeration Bonus game and receive payoffs and information about their neighbors' actions. In the treatment sessions, in addition to this information, subjects are also informed about the choices of all members of their entire peer group. We combine this information treatment with a group size reduction from 12 to 8 to further decrease game strategic uncertainty and create an environment where socially desirable efficient coordination is more likely. Our results indicate that more information in smaller groups significantly improves the likelihood of making the efficient choice. However, repeated interaction leads to a reduction in the likelihood of choosing the efficient action unless both neighbors make the same choice. Analysis of group level spatial patterns indicate no significant treatment effect with increasing instances of coordination failure over time. Thus even if increases in information and reductions in group size increase the likelihood of efficient choices, this setup does not ensure that these choices are by adjacent individuals which is necessary for environmental successes. Hence, additional mechanisms are needed to incentivize spatially contiguous efficient land use choices in the long run.

Can collective conditionally improve agri-environmental contracts? Insights from experimental economics

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Raphaële Préget, Sophie Thoyer

Traditional agri-environmental contracts, action-based voluntary and individual, have not succeeded in meeting the environmental targets set in the European Common Agricultural Policy, despite the large amounts dedicated to their implementation. One of the main reasons for this unsatisfying outcome is the limited and scattered adoption of contracts and the existence of threshold environmental effects. We use a threshold public good experiment to test an agri-environmental contract with a collective conditionality, a new form of contract in which farmers are paid only if the environment production threshold is collectively attained, a sort of collective result-based contract. Our experimental results show that conditional agri-environmental contracts are more efficient than the traditional ones and improve the environmental outcome. We also highlight that early stages of implementation of such mechanism is fundamental for its success and that risk aversion can limit its effectiveness, suggesting the importance of accompanying its introduction with facilitation activities. We conclude that this new form of contracts should be considered in the design of future agri-environmental policies.

Nudges, Social Norms and Performance in Agri-Environmental Schemes

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L. Kuhfussa, S. Thoyer, N. Hanley, P. Le Coent and M. Désolé

Agri-environmental schemes (AES) suffer from the "end of the contract problem", in the sense that many of the land management practices adopted under the scheme may not persist in the absence of payments. A first objective of this paper is therefore to investigate farmers' actual land management intentions at the end of AES contracts and to identify the drivers of their decisions to maintain or not environmental practices beyond the duration of the contract. The second objective is to investigate the effect of social norms, and framing of these norms, on the likely permanence of land management practices adopted under AES. Our results are based on the stated intentions of 395 farmers who participated to the French

AES called "territorialized agro-environmental contracts MAET" between 2007 and 2013. They show that almost half of the farmers of our sample are willing to maintain the contracted practices after the end of their contract, and that information about what other farmers intend to do – the social norm - influences their own decisions. However, the framing of this information has no significant effect on stated intentions. These results lead to recommendations for "nudging" farmers, by conveying information to them on other farmers' decisions concerning pro-environmental land management practices.

Behavioral Nudges in Competitive Environments: A Field Experiment Examining Defaults and Social Comparisons in a Conservation Contract Auction

Kent MESSER, University of Delaware, USA
Paul Ferraro, William Allen

Governments and nongovernmental organizations are increasingly applying insights from behavioral economics to influence human behaviors. Governments in both the US and the UK have established Behavioral Insight Teams (also known as "nudge squads"), and the U.S. Department of Agriculture recently created the Center for Behavioral and Experimental Agri-environmental Research (CBEAR). Empirical studies have supported claims that behavioral economics-based interventions can cost-effectively change short-term behavior. That evidence, however, comes exclusively from the context of consumer (individual) choices rather than producer choices—in other words, utility-maximizing agents rather than profit-maximizing agents. An open question is whether behavioral nudges affect agents that are profit-maximizers in competitive environments. Some studies (e.g., List, 2006) have found evidence suggesting that well-functioning competitive markets can mitigate various forms of anomalous behavior.

This study explores this question through a field experiment in which farmers from Texas, Delaware, and Maryland compete in an auction of conservation contracts that require them to adopt practices that reduce nutrient run-off. The competition consisted of bids submitted as the percentage cost-share offered by the farmers toward the total cost to implement the practice. The farmers were informed that up to $40,000 was available to implement nutrient management practices on their lands. They were randomized into four treatment arms in a 2x2 design that varied by (1) the presence or absence of social priming and (2) a default cost-share status quo of 0% or 100%. We find that bids under the 100%-cost-share status-quo default were substantially higher than (and statistically different from) bids under the 0% cost-share status-quo default. The social priming information did not significantly affect the value of bids made, but did influence the likelihood of placing a bid, especially the low desirability priming, which lowered the likelihood of placing a bid. These result shows that behavioral nudges can be effective in competitive environments that involve profit-maximizing agents.

PARALLEL SESSION B1 - Forests I

Protecting Forests: Is it the Policies or the Actors that Count?

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This study assesses the effectiveness of forest conservation policies in reducing carbon emissions from deforestation. To date, the effectiveness of protected areas has been assessed using cross-sectional methods. In this essay, new quasi-experimental models using panel data on annual deforestation are used to reveal new insights into the importance of government oversight of protected areas with findings that counter economists' prior notions of the avoided deforestation of new parks. I extend the analysis to estimate avoided carbon emissions, a key policy metric that varies considerably from deforestation trends.

Economics of Boreal Scots Pine Stands under Changing Climate

Sampo PIHLAINEN, University of Helsinki, Finland
Olli Tahvonen, Annikki Mäkelä

We optimize the joint production of timber and carbon storage of Scots pine (Pinus sylvestris L.) stands in a changing climate. In our economic-ecological model, a detailed process-based forest growth model is combined with economic description of stand management. Optimization is carried out with an effective general pattern search algorithm. The growth model includes a direct link between climate change and tree growth. In the course of climate change, the rotation periods must be allowed to change. Consequently, the optimization problem becomes complex. The optimized variables for each rotation in the changing climate are the timing, type, intensity and number of harvests, as well as the initial stand density. The results are presented for all relevant Nordic sites and using various levels of carbon subsidy. Our results suggest that the optimal rotation length decreases with changing climate, if thinnings are not allowed. With optimal thinnings the optimal forest rotations first lengthen and then shorten, thinnings become heavier and the optimal number of thinnings increase. Timber production and carbon storage both increase remarkably with climate change, especially at poor sites. Optimally adapted stand management yields significantly higher bare land values compared to benchmark management.

Continuous Cover Forestry vs. Clearcuts with Optimal Carbon Storage

Aino ASSMUTH, University of Helsinki, Finland
Olli Tahvonen

This study applies a novel forest economic model to analyze the effect of Pigouvian carbon subsidies on the economically optimal choice between clearcuts and continuous cover forestry. Unlike previous studies, we determine the optimal management system endogenously, by optimization. We show analytically that subsidized carbon sequestration postpones thinning and increases optimal stand volume along the rotation. A very high carbon price makes it optimal to postpone thinning until the stand volume has surpassed the growth-maximizing level. In this case, the scarce resource is not wood but the remaining capacity for carbon sequestration, and the goal of thinning is to maintain optimal stand growth and carbon subsidies. Carbon subsidization favors continuous cover management by increasing the present value of revenues from thinning and by decreasing clearcut net revenues, and disfavors it by increasing bare land value. Numerical results show that carbon prices within a realistic range may switch the optimal management system from clearcuts to continuous cover management. The optimal choice between the two regimes is found to be sensitive to the level of timber product decay and subsequent cuts to the subsidy payments. We also show that a higher interest rate can lead to a higher stand volume and a longer optimal rotation, which contrasts the results of the classical Faustmann model. Additionally, we show that carbon pricing is likely to increase wood supply.

The Effects of Emotions on Preferences and Choices for Environmental Goods

Nick HANLEY, University of St Andrews, Scotland, UK
Christopher Boyce, Mikolaj Czajkowski, Charles Noussair, Michael Townsend and Steve Tucker

This paper tests whether changes in "incidental emotions" lead to changes in economic choices. Incidental emotions are experienced at the time of an economic decision but are not part of the payoff from a particular choice. As such, the standard economic model predicts that incidental emotions should not affect behavior, yet many papers in the behavioral science and psychology literatures find evidence of such effects. In this paper, we used a standard procedure to induce different incidental emotional states in respondents, and then carried out a choice experiment on changes to an environmental good (beach quality). We estimated preferences for this environmental good and willingness to pay for changes in this good, and tested whether these were dependent on the particular emotional state induced. We also tested whether choices became more or less random when emotional states were induced, based on the notion of randomness in a standard random utility model. Contrary to our a-priori hypothesis we found no significant evidence of treatment effects, implying that economists need not worry about the effects of variations in incidental emotions on preferences and the randomness of choice, even when there is measured (induced) variation in these emotions.

Outdoor Recreation in Various Hypothetical Landscapes: Which site Characteristics really Matter?

Jeremy DE VALCK, KU Leuven, and Geo-Instituut and Flemish Institute for Technological Research VITO, Belgium

In this paper, we introduce a methodology to better understand the role played by different site characteristics in influencing the choice of outdoor recreation destinations. Contrary to prior studies, we do not restrict the scope of this analysis to specific natural sites but intend to encompass various landscapes. Our experiment looks into a large diversity of landscapes (e.g. rural and natural) described using photomontages. We use a discrete choice experiment (DCE) that propose respondents to choose among hypothetical destinations described in terms of eight site characteristics. We study the trade-offs made by different profiles of respondents among those site characteristics, which lead to different destination choices. An important innovative aspect of this research is that the DCE attributes are spatially-explicit so that we are also able to represent the observed recreational patterns in the form of maps, using Geographic Information Systems (GIS). We conclude the paper by pointing to the implications of this research for land management policy-making.

Interviewer Effects in a Discrete Choice Experiment Implemented as a Valuation Workshop

Margrethe AANESEN, University of Tromso – Arctic University of Norway
Erlend D. Sandorf, Claire Armstrong

Human beings benefit from nature's ecosystem services. Many of these services have no price that can contribute to limit the consumption of them. One tool for deriving such prices is to derive Willingness-to-pay (WTP) estimates. Such estimates are often based on surveys where people are asked, directly or indirectly, about their WTP for benefitting from specific services provided by nature (stated preferences surveys). There are a few studies showing that personal characteristics of the interviewer in such surveys

significantly affect the respondents' answers, whereas no research so far has been able to find significant interactions between personal characteristics of the interviewer and respondent. The present study reports from an experiment where we implemented identical valuation workshops, first with a middle aged female moderator, and next with a young male moderator. The results show significant differences in the responses across the two datasets, also when we correct for differences in sample characteristics. The differences in responses are further reinforced when we take into account personal characteristics of the respondents, but these effects are not statistically significant. Our results support earlier results that "non-good attributes", such as the characteristics of the interviewer, affect the stated preferences in f2f surveys. This may be an additional argument for conducting internet, or non-f2f surveys. The novelty of the experiment is that it takes place within a discrete choice experiment setting, whereas all previous comparable studies have used contingent valuation surveys.

PARALLEL SESSION B3 - Experiments in Policy

Policy Instrument Choice with Marginal Damages are Uncertain: Evidence from a Laboratory Experiment

David HERES, Centro de Investigacion y Docencia Economicas (CIDE), Mexico
C.-Y. Cynthia Lin

Economic theory predicts that, when regulating environmental externalities, quantity instruments such as tradable permits and price instruments such as taxes will produce identical outcomes when transaction costs are negligible and marginal abatement costs are known with certainty by the regulator, even when marginal damages are uncertain from the perspective of the regulator. Even though uncertainty over marginal damages may not matter in theory, it may be important in practice since such uncertainty may lead to behavioral failures on the part of market participants that cause price and quantity instruments to lead to different outcomes. We conduct a laboratory experiment to evaluate the equivalence of price and quantity instruments when marginal damages are uncertain but marginal abatement costs are known with certainty. In terms of aggregate emissions, the quantity-equivalence of quantity and price instruments cannot be rejected when marginal damages are known with certainty. However, when marginal damages are uncertain, the implementation of an optimal tax leads to more emissions compared to those achieved with a tradable permit system capped at the optimal amount of emissions. The results from the analysis of individual decisions and permit prices provide evidence for behavioral failures from endowment effects and risk attitudes proposed by prospect theory, which cause price and quantity instruments to lead to different outcomes.

Social rewards and the design of voluntary incentive mechanism for biodiversity protection on farmland

Prasanjit BANERJEE, University of Manchester, UK
Ada Wossink

We examine how endogenous social preferences—in particular, reputational concern conditional on social norm (i.e., average opinion regarding biodiversity protection on private land)—could affect standard economic incentive mechanism design to encourage biodiversity protection on private land. Behavioural economists have argued that protecting nature without compensation may increase a farmer's social reward, whereas when he protects biodiversity on her farmland only for the monetary reward, this social reward decreases – the classic crowding out effect. People, however, vary in social preferences and some farmers may engage in conservation activities merely to 'buy' a good social reputation rather than for the sake of the public good as such. The policy maker's dilemma is that of asymmetric information; he does not know the specific motivation to engage in the conservation activity of the individual farmer. We investigate an optimal voluntary incentive mechanism design that specifies a menu of monetary-transfer-to-effort that

gets the best out of both types of farmers. Our results show that (a) social reward can induce the 'early birds' who used to be green even before other farmers undertake voluntary biodiversity protection on their land; and that (b) a decision maker can protect biodiversity on farmland at a lower cost by allowing farmers who are merely interested in social reputation to purchase a 'socially responsibility reward'.

Are Incentives a Must for Biodiversity Conservation? Experimental Results on Long-Lasting Cooperation

Anne STENGER, INRA and BETA- University of Strasbourg, France
Mathieu Lefebvre

Permanence effect, sustained behaviour, persistence in effort or long-lasting cooperation are all concepts addressing the same question of cooperative behaviours in the long run and especially after the removal of incentives to contribute to a public good game. This question is central to efficient biodiversity conservation in payments for environmental services. This paper looks at the permanence effect of incentives by comparing non-monetary (NMI) and monetary incentives (MI) to contribute in public-good game experiments. We study if the type of incentives (monetary/non-monetary; rewards/punishments) affects long-lasting cooperation. The four incentives schemes we use show that both monetary and nonmonetary punishments and rewards significantly increase contributions compared to the baseline but monetary sanctions lead to the highest contributions while nonmonetary sanctions lead to the lowest contributions. The four treatments have long-lasting effects since contributions do not go back to baseline levels directly after the withdrawal of the incentives but rewards appear to have much stronger persistent effects than sanctions. Nonmonetary and monetary rewards have the same efficiency on contributions and produce some kind of delayed reciprocity since those who have been highly rewarded are those who contribute more once the rewards have been removed. These findings underline the importance to look both at the type of incentives and to better understand the changes in behavior in institutional arrangements between individuals when permanence is sought.

PARALLEL SESSION B4   -   Natural Resource Management

Winter Pastures and Supplementary Feeding in Managing a Reindeer-Lichen System

Antti-Juhani PEKKARINEN, University of Helsinki, Finland
Jouko Kumpula, Olli Tahvonen

In our study we use an age- and sex-structured reindeer-lichen model to examine the role of different types of winter pastures, pasture rotation, and supplementary feeding on economically optimal reindeer management. The model includes 17 age classes of females, 13 classes of males and a detailed description of winter energy resource utilization by the reindeer population. Reproduction is specified by a modified harmonic mean mating system. The diet choice made by reindeer between ground and arboreal lichens and supplementary food follows the principles of the optimal foraging theory. Energy intake during winter defines an individual's overwinter weight decrease and its consequences on mortality, reproduction, and the birth weight of calves. If pasture rotation is not in use, ground lichens are also consumed from spring to autumn in addition to winter. Lichen growth depends on habitat type and lichen biomass after consumption. Arboreal lichen consumption is affected by the availability of old forests and arboreal lichen biomass. The decision variables are the animals chosen for slaughter from the age and sex classes and the amount of supplementary food given. Results show that the availability of arboreal lichens, growth rate of ground lichens, and pasture rotation all affect the optimal steady-state population level. Supplementary feeding is used during the recovery process from very low lichen densities in the case of zero interest rate

but not in the optimal long-run steady state. With higher (3–5%) interest rates intensive supplementary feeding may become optimal also in the long-term steady state, which leads to the depletion of lichens. Government subsidies paid for breeding animals may promote reindeer herders to base management on supplementary feeding and lower pasture conditions.

The Silence of the Lambs. Payment for Carnivore Conservation and Sheep Farming

Anders SKONHOFT, Norwegian University of Science and Technology, Norway

During the last few decades the number of big carnivores (wolf, bear, lynx and wolverines) has increased significantly in Scandinavia. As a result, the conflict with livestock farmers has deepened due to more predation and animal loss. This conflict is modeled using sheep farming as an example, and where the farmers are given compensation for the predation loss. The compensation scheme is composed of a fixed per animal loss value (ex post), but also a compensation just for the presence of the carnivores (*ex ante*). In the first part of the paper, the stocking decision of a group of farmers acting as a single agent, without and with compensation, is analyzed. In a next step, the Directorate for Natural Resource Management (DNRM), managing the carnivores and compensation scheme, is introduced. The strategic interaction between the sheep farmers and DNRM is modelled as a Stackelberg game with DNRM as the leader. We find that it does no pay for DNRM to use ex post, but only ex ante compensation. The solution of this game is compared to the social planner solution where it is shown that the carnivore becomes too small and the sheep stock too large in the Stackelberg solution. However, we find the efficiency loss to be small.

Optimality of Continuous Cover vs. Clearcut Regimes in Managing Forest Resources

Olli TAHVONEN, University of Helsinki, Finland
Janne Rämö

Models on continuous cover forestry are complicated and are typically incompatible with optimal rotation models. This dichotomy makes the choice between clearcuts and maintaining forest cover vague. We present a model without such a priori commitments. It includes detailed variable and fixed harvesting costs and allows for completely flexible optimization of harvest timing. The model is applied to Norway spruce and solved as a dynamic mixed integer problem. The artificial regeneration–thinning–clearcut regime is optimal if site productivity is high and interest rate and regeneration costs are low, but (with some exceptions) only if natural regeneration is fully utilized. The optimal rotation regime does not exist when the continuous cover solution is globally optimal, and when it exists the rotation period lengthens with interest rate. When clearcuts are optimal, given bare land as an initial state, a continuous cover regime may be optimal when the stand is initially heterogeneous.

Estimating the insurance value of ecosystem resilience: Evidence from the Australian Goulburn-Broken Catchment

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Stefan Baumgärtner

We estimate the economic insurance value of ecosystem resilience for the Goulburn-Broken Catchment farmland in South-East Australia, which is threatened by salinization due to rising groundwater tables. We find that although the system is close to a regime shift, ecosystem resilience provides a sizeable economic insurance value. With a baseline estimation of 1.4 million 1991 Australian Dollars, this is an additional value component of resilience amounting to a third of the expected value of resilience that Walker et al. (2010) have estimated previously. We also analyse the time profile of the insurance value. This suggests that while the overall net present insurance value is substantial, monthly insurance values towards the end of the time horizon are negative due to a higher flip probability and thus call for complementary financial insurance.

Ecological-Economic Modelling of Interactions between Wild and Commercial Bees and Pesticide Use

Adam KLECZOWSKI, School of Natural Sciences, University of Stirling, UK
Ciaran Ellis, Dave Goulson, Nick Hanley

The decline in extent of wild pollinators in recent years has been partly associated with changing farm practices and in particular with increasing pesticide use. In this paper we combine ecological modelling with economic analysis of a single farm output under the assumption that both pollination and pest control are essential inputs. We show that the drive to increase farm output can lead to a local decline in the wild bee population. Commercial bees are often considered an alternative to wild pollinators, but we show that their introduction can lead to further decline and finally local extinction of wild bees. The transitions between different outcomes are characterised by threshold behaviour and are potentially difficult to predict and detect in advance. Small changes in economic parameters (input prices) and ecological parameters (wild bees carrying capacity and effect of pesticides on bees) can move the economic-ecological system beyond the extinction threshold. We also show that increasing the pesticide price or decreasing the commercial bee price might lead to re-establishment of wild bees following their local extinction. Thus, we demonstrate the importance of combining ecological modelling with economics to study the provision of ecosystem services and to inform sustainable management of ecosystem service providers.

Biodiversity and Optimal Multi-Species Ecosystem Management

Christine BERTRAM, Kiel Institute, Germany

We analyze optimal multi-species management in a dynamic bio-economic model taking into account both harvesting profit and biodiversity value. Within an analytical model, we show that extinction is never optimal when a global biodiversity value is taken into account. Moreover, a stronger preference for species diversity leads to a more even distribution of stock sizes in the optimal steady state, and a higher value of biodiversity increases steady state stock sizes for all species when species are ecologically independent or symbiotic. For a predator-prey ecosystem, the effects may be positive or negative depending on relative prices and the strength of species interaction. The analytical results are illustrated and extended using an age-structured three-species predator-prey model for the Baltic cod, sprat, and herring fisheries. In this

quantitative application, we find that using stock biomass or stock numbers as abundance indicators in the biodiversity index may lead to opposite results.

PARALLEL SESSION C2 - International Environmental Agreements

International Cooperation for Biodiversity Conservation when Spatial Stuctures Matter

Hans-Peter WEIKARD, Wageningen University, The Netherlands
Irene Alvarado-Quesada

This paper considers a self-enforcing International Environmental Agreement (IEA) for biodiversity conservation with a spatial structure. We develop a general framework that allows the analysis of asymmetry with respect to the distance between and location of countries on coalition stability. We do so by presenting a circular structure to study cooperation among countries that are identical in costs and benefits of conservation and in the size of their biodiversity endowment (though they host different species). Results are robust for different spatial patterns: stable coalitions have a maximum size of 2, and the best global payoff is obtained when these coalitions are composed of neighbouring countries. We find evidence of "conservation leakage": conservation efforts of coalitions are thwarted by singletons who do not join the biodiversity agreement. This makes any coalition of size 3 or larger unstable, regardless of the possibility of transfers. Concerning spatial structures, we find that global payoffs associated with coalitions of two members are the highest not only when the distance between members is smallest, but also the closer singletons are located, as they benefit from positive spillovers.

Bargaining over Resource Regulation: Total Allowable Catch Setting in the European Common Fisheries Policy
Julia HOFFMANN, University of Kiel, Germany

A problem in TAC setting is that often the interests of the different stakeholders are unequally represented in the decision-making process putting economic interests in a better bargaining position than conservation interests. This imbalance can lead to ineffective TAC management. In order to analyze the distribution of bargaining power between different interests groups the TAC decision making is modeled as a cooperative two-player-game with one player representing fishermen and fishing industry's interests and the other player representing conservation interests. Nash's bargaining solution of this game is used to derive an equation to estimate the bargaining powers. Panel data of TACs for European stocks are used for the estimation. The results show that the player representing interests of the fishermen and the fishing industry has the stronger bargaining position compared to the player representing conservation interests. The only exception are stocks that are shed by European Union member states but not managed by the Common Fisheries Policy. For those stocks, the player representing conservation interests has the stronger bargaining position leading to a more effective TAC management. The analysis also shows that scientific recommendations have a greater influence in the bargaining when the underlying data is of good quality. The conclusion is that effective TAC management requires both, a sound scientific assessment and a stronger inclusion of scientific advice.

Heterogeneity and Side Deals in Climate Negotiations: Evidence from a Bargaining

ExperimentGreer GOSNELL, Grantham Research Institute, LSE, UK
Alessandro Tavoni

Given the continual rise in global CO2 emissions, the current state of affairs in international climate negotiations provides little reason for optimism. The UNFCCC approach to seeking universal participation has thus been called into question, both by policy makers and by academics who have established pessimistic theoretical predictions concerning the ability of international environmental agreements to improve upon nation states' policy decisions in the absence of such an agreement. Focusing on variations of the public goods game, game theorists have predicted that self-enforcing agreements are likely to comprise only a handful of countries committing to unambitious emissions abatement targets. Here we focus instead on the dynamics of the negotiation process by studying experimental behavior in a Nash bargaining game involving a six-player group of subjects representing heterogeneous countries. Throughout repeated rounds of negotiation, subjects bargain over the allocation of a fixed amount of (profit-generating) emissions. Each subject is potentially pivotal in determining whether the global emissions reduction target is reached, and there are significant losses associated with prolonged failure to reach an agreement. The treatments focus on wealth (and responsibility) asymmetry, as well as on the potential of preliminary side agreements among homogeneous subsets of players to ease coordination of demands in keeping with the target.

PARALLEL SESSION C3 - Payments for Environmental Services

Ecological-Economic Valuation of Prestigious Species in Case of Human-Wildlife Conflicts: The Elephant Example

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In land use conflicts between humans and nature, in particular in case of prestigious species (here elephants as example), typically valuation is done from a human perspective, i.e. anthropocentric. It is based on human utility, willingness to pay, etc.; yet in a biased way, because a user states preferences without knowing "costs of nature" in provision. I.e. we have no mean of recognizing nature wealth per se. We depart and include an energy loss minimization as a complementary optimization of nature (as surrogate for wealth) and aim at detection of "values" from behaviour. The value detection is combined with a system analysis on human-animal-energy-acquisition and the corresponding – conflict is spelt out. In a system analysis on conflict we equate biomass (energy) demand of humans with that of species at highest trophic level (as said elephants). Then adjustments look at reaching equilibrium; this is made letting shadow prices change. In this regard we emulate a joint welfare analysis as if demands equate; we assume two different demand functions for land: humans and animals. The allocation is considered "optimal" and delivers us "values".

Land of Biodiversity Conservation - to Buy or Borrow?

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Oliver Schöttker, Karin Johst, Martin Drechsler

The conservation of endangered species and habitats frequently requires a certain type of land use which, however, leads to opportunity costs compared to profit-maximising land-use. In such a setting biodiversity conservation organisations have two main options: (1) The 'buy alternative' where they buy the area of

interest and either carry out the necessary land-use measures themselves or hire firms to do so, or (2) the 'borrow alternative' where they 'borrow' the land for conservation from private landowners who agree to carry out biodiversity-enhancing land-use measures over a certain period while the conservation organisation compensates them for their opportunity costs. Comparing both alternatives raises the question of budget efficiency, i.e. which alternative will lead to a higher level of biodiversity conservation for available financial resources? In this paper we present a conceptual ecological-economic model, and then apply the model to analyse how changes in ecological and economic parameters influence the relative efficiency performance of the two alternatives.

Developing "Reality Checks" on Ecosystem Service Values: Characterization and Bounding Results for a Broad Class of Models

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Despite the volume of work that is being done on ecosystem services, it is often not clear how to identify credible estimates of their value. In this paper I suggest some standards by which we might gauge the plausibility of estimates of ecosystem services values. I highlight a previously unnoted commonality among many types of ecosystem services: they may be regarded as "treatments" performed on a finite set of objects. I show how a number of types of ecosystem services may be interpreted in this framework, work examples for pollution treatment, flood control, and pollination, and note a number of other potential applications. The interpretation of ecosystem services as treatments leads to three implications:
• I call the first the "If-a-little-goes-a-long-way, you-don't-need-a-lot" effect: the more effective an ecological asset is in providing initial treatment – and hence, the more valuable it is initially – the less treatment remains to be performed, and hence, the less valuable the asset will be on the margin when it is more abundant.
• We can derive an upper bound on the marginal value of the value of the nth unit of the ecological asset providing an ecosystem service regardless of how effectively it provides treatment.
• There is a sort of Catch-22: The conditions under which abundantly available ecological assets would provide the most valuable services are also those under which substitute sources of such services might be most attractive.
These implications do not imply that ecological assets providing some services in some places are not valuable. To the contrary, they could be very valuable. My results show, however, that the conservation incentives generated by ecosystem services may be limited. The very conditions under which incentives are strongest to conserve some ecological assets are also those under which incentives for conserving large quantities of them may be weakest.
These results may have many practical applications. These include conducting "reality checks" on valuation studies, conducting preliminary scoping studies to determine when more detailed analyses might be justified, identifying "sufficient statistics" to conduct valuations, informing empirical approaches, guiding benefit transfer exercises, and suggesting ancillary approaches to inform ecosystem service valuation.

PARALLEL SESSION C4 - Sustainability and Property

Does Bounded Self-interest Matter in Coasean Bargaining over Insecure Property?

Prasanjit BANERJEE, University of Manchester, UK
Sakib Mahmud, Jason F. Shogren

We examine whether behavioural economics can provide additional insight into observed behaviour within a classic environmental policy context—the Coase theorem. We investigate whether property owners go beyond their self-interested motive in capital investment and distributing the wealth from production in a Coasean bargaining set up. Our controlled lab experiment considers the trade-off between expected private and social gains from private investment to improve protected assets, given secure property rights and transaction costs. Our results suggest making property rights more secure given positive transaction costs lead to over-capitalization and an unwillingness to bargain. Bargainers in a face-to-face bargaining seem to be concerned about fairness only when private gain is insecure.

Conflict and Cooperation in an Age Structured Fishery

Asle GAUTEPLASS, Norwegian University of Technology and Science, Norway
Anders Skonhoft

The literature on 'fish wars', where non-cooperative exploitation one, or several interacting, fish stock(s) is well established by now, but age and stage structured models do not seem to have been handled within this literature. In this paper we study a game where two fishing fleets compete for the same fish stock, which is divided into several age categories. The situation modelled here may be representative for many transnational fisheries, such as the North Atlantic cod fishery. The outcome of the game is compared to the optimal cooperative solution, regarding both the steady state solution and the dynamic approach path. We analyze the game under different assumptions with respect to gear selectivity, with respect to alternative model specifications, and also with respect to the information available to each fleet, both about the underlying ecological interaction and the actions of the other agent. The results differ in several respects from what is found in biomass models, and are supported by a numerical example.

A Market Mechanism for Sustainable and Efficient Resource Use under Uncertainty

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Ralph Winkler

Sustainability and efficiency are potentially conflicting social objectives in natural resource management. We propose a market mechanism to allocate use rights over a stochastic resource to private managers. The mechanism endogenously determines the maximal tenure length guaranteeing that the sustainability goal is obeyed for sure over the entire period. In addition, the mechanism achieves efficiency, i.e. it maximizes the expected present value of resource rents that accrue to society. Potential applications include improved fishing agreements between developing countries and distant-water fishing fleets.

PARALLEL SESSION D2 - Stated Preferences II: Choice and Behaviour

Economic Valuation of Natural Predators for the Biological Pest Control of *Cacopsylla Pyri* in Pear Production, Belgium

Silvie DANIELS, University of Hasselt, Belgium

In this paper we introduce a methodological framework for the valuation of non-marketable species based on the ecological role of species in the agroecosystem to provide support for objective policy making outweighing the costs and benefits of biodiversity conservation. The framework integrates (i) a dynamicecological model simulating interactions between species with (ii) an economic model integrating not only private costs but also external costs of a loss of species diversity. The model both (i) quantifies the contribution of biodiversity to the decrease in private and external costs in agroecosystems through the use of a production function technique, and (ii) attributes an objective monetary value to increased species diversity through the changes in the provisioning of a marketable good. The aim of the methodological framework is to provide quantifiable and objective measurements for the justification of biodiversity conservation through the delivery of verifiably comparable monetary standards which can be employed when considering trade-offs in policy making. The framework is applied for the presence of natural predators in pear production in Flanders (Belgium) and the results reveal an objective value of three non-marketable species which provide biological pest control for the pest insect pear psylla (*Cacopsylla pyri*).

Investigating Farmers' Willingness to Participate in the Chemical Fertilizer Reduction Scheme: A Choice Experiment Study in Taiwan

Sheng-Han-Erin CHANG, Technical University Munich, Germany
Alois Heissenhuber, David Wuepper and Johannes Sauer

Chemical fertilizer has successfully led to a significant increase in food production in previous decades. However, this pursuit of high yields often leads to excessive application of chemical fertilizer, negatively impacting the environment. Agri-environmental schemes (AES) are a widely used instrument in many countries to provide farmer incentives to reduce negative environmental impacts. The success of the Agri-environmental scheme in each country will depend highly on the farmers' participation. According to the Environmental Sustainability Index in 2005, world fertilizer consumption per hectare of arable land in many countries was reported over the average of 152.6 kg/ha. Taiwan's fertilizer consumption was 1,525 kg/ha, the second highest in the world. In this paper, we use Taiwan as a case study to investigate the preferences of rice farmers regarding the policy incentives of the chemical fertilizer reduction scheme based on choice experiments. The survey was conducted in different rice regions in Taiwan and the data was analysed using both mixed logit and latent class models. The choice experiment results indicate that the preferences for the amount of enrolled land, incentive payments, contract length and the eco-label are significant determinants of policy design. Farmers would be willing to accept small incentive payments for their participation in exchange for receiving an eco-label.

Handling Protest Responses when Estimating Willingness to Accept: Farmers' Preferences towards Agri-Environmental Schemes

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K. Glenk, M. Rodríguez-Entrena

The identification and treatment of protest responses in stated preference surveys has long been subject to debate in the literature. The most common treatment is to omit protest responses identified through debriefing questions from the analysis. All major studies investigated the role of protest responses in willingness to pay (WTP) contexts. This paper analyses protest responses in stated preference surveys using a willingness to accept (WTA) format, drawing on choice experiment data on preferences of providers of ecosystem services towards incentive-based environmental schemes. The paper addresses two main objectives. First, we identify a range of possible reasons for protest responses to emerge in a WTA context through a review of literature on WTA for participation in land-based incentive schemes and a discussion on how protest responses in WTA contexts differ from those in WTP formats. Second, the paper analyses the impact of omitting protest responses in a WTA context on welfare estimates based on a random parameter logit model in willingness to accept (WTA) space. We find that the inclusion/exclusion of protesters and/or serial non-participants in the analysis strongly impacts on welfare estimates. We also find that there is a wide variety of reasons for non-participation that may indicate protest depending on a study's context. Based on the findings, the paper makes recommendations aimed at preventing and identifying protest responses in future applications of stated preference surveys using a WTA format.

Valuing Mediterranean Seascape and Landuse Changes with Explicit Consideration of Loss Aversion and Increasing Price Sensitivity

Vanja WESTERBERG, Earthmind, IUCN Conservation Centre, Switzerland
Jette Bredahl Jacobsen, Robert Lifran

This disparity between WTP for a good and the WTA compensation to forgo the same good is one of the most widely documented phenomena in environmental economics. We find that tourists lodging along the French Mediterranean coast display a WTA/WTP ratio of 1.94 with respect to the installation of an offshore wind farm, reef-associated recreational activities and green tourism. With respect to wind farm installation, the ratio imply that the disutility of seeing an offshore wind farm in the near view shed, is 94 % higher than the utility associated with removing the wind farm, once it is in place. We investigate the extent to which the income effect, in alignment with standard Hicksian theory may help explain observed discrepancies. Prospect theory offers an alternative explanation to observed WTP-WTA asymmetry. According to this theory the perception of the current endowment is a central aspect of the respondents' valuation (Khaneman and Tversky 1979). We show that nationality has a bearing on asymmetries, potentially rooted in differences in perceived endowments. Consistent with previous research we also show that experience with wind turbines, serve to lessen loss aversion. Lastly, we find evidence of increasing sensitivities both in regard to paying more and paying less on overnight expenditure.

PARALLEL SESSION D3 - Stated Preferences III: Behavioural and Methodological Issues

Can Monetary Valuation Undermine Nature Conservation? Evidence from a Decision Experiment

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Marc Le Menestrel, Gert Cornelissen

Nature conservation scientists and practitioners have voiced the concern that a conservation discourse based on economic arguments and monetary valuation may undermine conservation efforts by eroding ("crowding out") the influence of other arguments for nature conservation. This paper presents the results of a decision experiment in which nature conservation is framed using an economic, a non-economic, or a combined discourse before participants take hypothetical decisions on the construction of hydropower dams in the Bolivian Amazon. We find that an economic discourse with monetary valuation framing leads to significantly fewer pro-conservation decisions, that is, decisions against dam construction. This is the case when a cost-benefit analysis inclusive of environmental costs reveals that the dam is economically viable (i.e., there remains a trade-off between economics and conservation), but also when such a costs-benefit analysis indicates that the dam is not viable (i.e., no trade-off). The results suggest that an economic discourse with monetary valuation framing can indeed undermine nature conservation efforts. They also suggest that the effect can be avoided, however, by presenting non-economic arguments side by side with an economic rationale.

Social Framing and Cooperation: The Roles and Interaction of Preferences and Beliefs

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Elizabeth Bernold, Kurt A. Ackermann, Ryan O. Murphy

Evidence suggests that there are substantial and systematic differences in cooperation rates under varying framing conditions in social dilemmas. Several explanations of these differences have been presented. Some (e.g. McCusker and Carnevale (1995), van Dijk and Wilke (2000)) argue that social frames mainly cause subjects' preferences to change, while others (e.g. Dufwenberg et al (2011), Ellingsen et al (2012)) argue that frame-specific terminology, such as the name of the game, mainly affects subjects' beliefs about others' behavior, which in turn affects their own behavior. This paper advances the discussion concerning the role of frames in social dilemmas by simultaneously identifying the effects framing has on both preferences and beliefs with the same players and within the same experiment. The current experiment employs a design in which the same interaction was labeled differently, such that the interaction was referred to as a Community Game, a Wall Street Game, an Environment Game, or simply as a Game in the control condition. In all four experimental conditions, we measured the subjects' (i) social preferences, (ii) cooperative behavior and beliefs in a one-shot public goods game with the strategy method, (iii) cooperative behavior and beliefs in a ten-round iterated public goods game with random group rematching, and (iv) donation decisions to a naturally occurring public good. Overall, our results show that preferences, as well as beliefs, are both significant predictors of cooperation decisions, and that framing has significant effects on these two predictors' relative weights and also on aggregate cooperation rates. However, the impact of framing on cooperative behavior is complicated, and our results indicate that the magnitude and direction of framing effects may depend on diverse and subtle context-dependent mechanisms that are not yet fully understood.

Information and Learning and the Subsequent Effects on Public Preferences for Managed Realignment in Scotland

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Nick Hanley, Jacob LaRiviere, Mikołaj Czajkowski

Coastal planners are increasingly recognising the need for more environmentally and economically sustainable flood defences, such as managed realignment. These soft defences are often negatively viewed by the general public and public perceptions of new schemes are a crucial aspect of the planning process. This study undertakes a contingent valuation survey to assess public willingness to pay (WTP) for a managed realignment scheme on the Tay Estuary, Scotland. Embedded within the survey was a field experiment to test the role of prior, new information and learning on WTP estimates. Results indicate that whilst respondents did learn new information provided to them, this learning did not have an effect on the WTP estimate. Neither did respondents prior information or varying the levels of information respondents received. WTP was highest for those respondents who felt most at risk from flooding and felt current flood defences were not adequate enough to protect their home, suggesting personal relevance was a stronger motivation behind WTP responses. Further, it is possible to state that additional information regarding ecosystem service provision was redundant in forming the WTP estimates.

Willingness to Pay for Environmental Goods under Uncertainty

Tanvir HUSSAIN, University of Freiburg, and Leuphana University of L uneburg, Germany
Stefan Baumgartner, Wenting Chen

We develop a microeconomic approach for valuing the benefits from a public environmental good under uncertainty and the possibility of insurance. Most environmental goods (and ecosystem services) are non-market-traded, and benefits from such goods are typically enjoyed under conditions of uncertainty. Uncertainty can arise from the environmental side (e.g. ecosystem or climate), or from the economics side (e.g. income). In this paper, we consider (binary) uncertainty in the provision of an environmental good. We use a constant-elasticity-of-substitution (CES) utility function, where utility depends on a market-traded consumption good and an environmental good which is exogenously provided in a fixed quantity. The CES function is nested in a constant relative-risk-aversion form. As a benefit measure, we derive the marginal willingness to pay (WTP) for changes in (i) the probability of loss, (ii) the size of loss, and (iii) the current level of the environmental good. We also study the effect of risk aversion on willingness to pay.

PARALLEL SESSION D4 - Biodiversity, Environment and Development

Farm Size, Environmental Risk and Risk Preferences: The Case of Namibian Commercial Cattle Farming

Stefan BAUMGÄRTNER, Leuphana University of Lüneburg, and University of Freiburg, Germany
John-Oliver Engler

Utilizing a data set of 399 Namibian commercial cattle farmers, we investigate the relations between inter-annual variability in rainfall (environmental risk), risk preferences and farm size. We test several hypothesis from the literature regarding self-selection according to risk preferences and optimal farm management. We demonstrate that the Pareto distribution { which separates the distribution into two parts { is a statistically plausible description of the empirical farm size distribution when `farm size' is operationalized

by herd size, but not by rangeland area. A group comparison based on the two parts of the Pareto distribution shows that larger farms are on average exposed to significantly lower environmental risk than smaller farms. Regarding risk preferences, we do not find any significant differences in mean risk attitude between the two branches. Concerning the overall appearance of the size distribution, we find that a risk-loving attitude comes with more inequality in the distribution of herd sizes among farms. Moreover, our analysis provides evidence for the role of the stocking rate as key parameter in farm management when large environmental risk is present.

Community Co-Management of Forest Biodiversity - A Framed Field Experiment Amongst the Tsimane', Bolivia

Jetske BOUMA, VU University, and Netherlands Environmental Assessment Agency, the Netherlands
Victoria Reyes-Garcíad, Tomas Huanca, Ester Conde, Susana Arazola

Indigenous co-management of forest biodiversity requires that communities are willing to a) self-enforce restricted resource use and b) cooperate with the relevant authorities. We experimentally assess the willingness to self-enforce restricted resource use by playing a resource extraction game in four Tsimane' indigenous communities in Bolivia. All four are located in indigenous territory, but in two communities the territory overlaps with a protected area, resulting in different rules and authorities. Communities also differ in terms of market access. We focus on the role of trust in participant willingness to self-restrict resource use and collaborate with the authorities, expecting participants from communities in the protected area to be less willing to collaborate, and expecting market integration to affect trust and cooperation in different ways. We find a) that, contrary to game behaviour in the industrialised world, extractions decrease across rounds; b) that participants that trust the authorities extract less and c) that participants that trust non-Tsimane' extract significantly less across rounds. We interpret the findings using the economic and anthropological literature, arguing that the significant impact of trust on game behaviour seems related to the observation that people with higher levels of generalized trust interact more easily in non-personal transactions, like the situation presented in the game (and like co-management). The finding suggest that there is scope for community co-management of forest biodiversity.

Gender Heterogeneity in User Groups and Fishing Extraction: Experimental Evidence for a Caribbean Colombian Marsh

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Jorge Maldonado

User's social dynamics and their interaction influence decisions on the extraction of common pool resources (CPR's). This paper analyses the relationship between the composition of gender mixed groups and CPR use from an experimental perspective. An extension of the conventional theoretical model is presented to include gender-related types of users and group composition. The empirical exercise is based on data from an experimental economic game in a Colombian fishing community in the Caribbean; the CPR game includes groups of five people, and there can be only-male groups, only-female groups or mixed group (with female majority or with male majority). Results show that the players of mixed groups with female majority extract in average less of the CPR than the other groups. Indeed, inside this mixed group is the man who extracts the lower level. Those ideas might suggest that women participation in mixed groups is convenient for the sustainable use of natural resource because they motivate extract fewer resources.

The Influence of Social and Psychological Interventions on Collective Action for Water Management: A Framed Field Experiment in India

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Katherine Alfredo and Claudia R. Schneider

Rural households in resource-poor regions typically rely on communal water sources for their drinking water. However, a persistent lack of investment in the 'human' dimension means that communities often fail to collectively manage their communal water sources, resulting in abandoned water points and treatment systems across the developing world. Using a public goods game framed in terms of communal management of water treatment systems, this study investigated the potential for a range of social and psychological interventions to increase cooperation vis a vis communal water sources in nine rural villages in the district of Yavatmal, India. Results show that interventions involving public disclosure of behaviour had the very significant effect of decreasing contributions. This is contrary to findings in lab-based studies, confirming that culture and context play a large part in determining cooperation behaviour. On the other hand, communication with mandatory negotiation was found to increase cooperation, albeit intermittently. Findings from this study might be applied to a range of social dilemmas, such as the management of watersheds, forests, fishing grounds and other socio-ecological systems. In terms of policy, these results highlight the importance of accounting for cultural and contextual factors in the development of solutions to social dilemmas.

PARALLEL SESSION E1 - Forests II: Deforestation

The Potential or REDD+ for Carbon Sequestration in Tropical Forests: Supply Curves for Carbon Storage for East-Kalimantan

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Yonky Indrajaya, Ekko van Ierland, Frits Mohren and Hans-Peter Weikard

We study the potential of tropical multi-age multi-species forests for sequestering carbon in response to the financial incentives from REDD+. This paper is the first to develop a Hartman model with selective cutting in this setting that takes additionality of carbon sequestration explicitly into account. The use of reduced impact logging techniques (RIL) allows a forest owner to apply for carbon credits whereas the use of conventional logging techniques (CL) does not. We apply the model using data for East Kalimantan. RIL leads to less damages on the residual stand than CL and has lower variable but higher fixed costs. We present forest carbon supply curves that show that at low carbon prices, carbon storage can increase by 17%. Depending on the interpretation of our steady state model, it can be optimal not to harvest either already at modest carbon prices or only when carbon prices are quite high. We also find that awarding carbon credits for carbon stored in end-use wood products may be harmful for forest owners.

Public Health Effects of Ecosystem Degradation: Evidence from Deforestation in Indonesia

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Despite growing concern about the effect of declining environmental quality on human health, little effort has been made to quantify the effect of ecosystem degradation on the incidence and burden of infectious diseases. Using village-level administrative panel data and district-level satellite data on forest cover, I find that deforestation from 2001-2008 in Indonesia can explain over one million additional malaria infections. The evidence is consistent with an ecological response and the effect of deforestation on malaria cannot be

explained by post-deforestation land use change, anti-malarial programs or migration. The effect is specific to malaria, with deforestation having no discernible effect on other diseases with disease ecologies different from that of malaria. Back of the envelope calculations suggest that the local health benefits from avoided deforestation are equal to or greater than the global carbon benefits, underscoring a large, yet previously ignored and unquantified cost of deforestation with major implications for the design of payments for ecosystem services.

Economic Valuation of the Climate Regulation Ecosystem Service within Israel's Exclusive Economic Zone

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Alvaro ISRAEL, Israel Oceanographic and Limnological Research.
Mordechai SHECHTER, Dept. of Economics, University of Haifa.

As the scope of the ecosystem services approach expands, research on marine ecosystem services remains relatively limited, often due to lack of data and understanding of the processes that underlie such ecosystems. This study presents an economic valuation of the climate regulation ecosystem service in the Israeli Exclusive Economic Zone (EEZ), through the use of ARIES (ARtificial Intelligence for Ecosystem Services), an open-source modelling platform. The results indicate a relatively limited supply of this ecosystem service, mainly due to the nutrient-poor nature of the eastern Mediterranean that supports only limited productivity within the EEZ. Based on different primary productivity models and carbon prices, the estimated value of climate regulation within the Israeli EEZ ranges between €0.12 and €2.26 million/year. Examination of previous studies, which equated oceanic primary productivity (an ecosystem function) with climate regulation (an ecosystem service), points to a recurring physical and economic overestimation of this ecosystem service.

PARALLEL SESSION E2 - Biodiversity and Land use

Payments for Ecosystem Services: Past, Present and Future

Jim SALZMAN, Duke University, USA
Genevieve Bennett, Nathaniel Carroll, Allie Goldstein, Michael Jenkins

Market forces could prove the environment's best friend – if only greens could learn to love them" read The Economist's April 21st, 2005 cover story.[i] This high-profile recognition of Payment for Ecosystem Services (PES) represented a coming of age for what had been an obscure idea just a decade earlier. Ecosystem services have gone mainstream – whether as "natural capital," "nature's fortune," or simply "investing in nature."[ii] Virtually anywhere one looks, interest in PES has been on the rise around the globe, and is still rising, as the chart below of PES journal cites shows.[iii] Most descriptions of PES' potential have relied on captivating stories, most notably the Catskills watershed's role in ensuring clean drinking water for New York City.[iv] And, by many measures, the rise of PES has been impressive. There are hundreds of PES programs around the globe, in both developed and developing countries, with annual transactions well over ten billion dollars. It has become a central component of China's nationwide environmental protection strategy.

These stories and figures, promising as they are, risk masking as much as they reveal, for they tell us little about the broader development of PES. In fact, This paper the chart below demonstrates, the very term PES may mislead because it spans a wide range of very different mechanisms – voluntary, regulatory-driven, and market-based – across the domains of water, biodiversity, and carbon. Not surprisingly, when examined closely, each strand of PES tells a different story, sometimes dramatically so.

A Tale of Two Biodiversities

Chloé Mulier, LAMETA, France
Pierre Courtois, Charles Figuières

This paper analyses simple biodiversity protection plans regarding to how well they perform from the perspective of biodiversity, using for that matter alternatively Weitzman's and Rao's criterions, two biodiversity indices stemming from different disciplines. Both indices rest on pieces of information about (1) species survival probability, (2) some measure of distinctiveness between species. And each index has its own way to combine these data. Because we modelize interdependent probabilities, we arrive at what we call in situ versions of those criterions, which eventually are functions of protection efforts only. We show that choosing a particular in situ criterion has policy implications, for they sometimes deliver diverging protection recommendations. And we disentangle the role played by the data in their ranking logics, which helps us to highlight their major characteristics and differences as measurement of biodiversity.

Food Security and Land Use: Conservation Policy in a Technology Driven World

Tim SWANSON, Graduate Institute of International and Development Studies, Switzerland
Bruno Lanz, Simon Dietz

We study how uncertainty in the evolution of agricultural technology interacts with growth at the global level. We employ a quantitative growth model that distinguishes agriculture from other economic activities, in that it is required to sustain existing population and demands land as an input. Both population and technological progress are endogenously determined using Barro-Becker and Aghion-Hewitt representations, respectively, and the model is structurally estimated to 1960–2010 data on world GDP, population, cropland and technological progress. Introducing random shocks to agricultural total factor productivity (TFP), we show that uncertainty optimally requires more land to be converted towards agricultural use as a hedge against production shortages. When a 10 percent decline in agricultural TFP materializes, population decline by 80 million by 2030.

PARALLEL SESSION E3 - Experiments in Conservation Payments and PES

Deforestation Spillovers from Costa Rican Protected Areas

Laura VILLALOBOS, University of Gothenburg, Germany
Juan Robalino, Alexander Pfaff

Spillovers can significantly reduce or enhance the effects of land-use policies, yet there exists little rigorous evidence concerning their magnitudes. We examine how national parks within Costa Rica affect the clearing of forest nearby. We confirm that average deforestation spillover impacts are not significant within 0-5km and 5-10km rings around parks. However, we argue that this is the result of the presence of blending heterogeneous impacts with different magnitudes within these rings. Unlike prior analyses, we distinguish impacts in nearby forested locations by their distances to roads and park entrances. We find large and statistically significant leakage effects close to roads in areas without tourism (far from Park entrances). No leakage effects are found far from roads and in areas affected by tourism (close to Park entrances). Low transport costs and low returns to forest generate adequate conditions to the presence of leakage from land conservation policies.

Embezzlement of Conservation Funds: The (Relative) Importance of Transparency

Salvatore DI FALCO, University of Geneva, Switzerland
Brice Magdalou, David Masclet, Marc Willinger, Marie-Claire Villeval

Embezzlement of funds is one of the most pervasive forms of corruption. This paper uses a lab experiment in Tanzania to 1) measure embezzlement and 2) understand the potential role of transparency in curbing misappropriation. We find large extent of embezzlement and that a transparency policy is ineffective when the number of players is large. A total of 1080 students were recruited at two University campuses of the University of Dar Es Salaam (540) and at the Sokoine University (540). These are the two biggest Universities in Tanzania providing education on a wide range of subjects (including, agriculture, business, economics, planning etc.). We organized in total ten sessions. Students participated voluntarily in response to advertising for a paid decision experiment. Upon arriving at the experiment subjects were seated in a large aula and received the instructions in both Swahili and English. The instructions were also read aloud. A Questions and Answers sessions and a short quiz were undertaken to ensure that the tasks were understood. After this general session, subjects were randomly assigned to different rooms. In the room students were given with some time to read again the instructions. Each room represented a role. Subjects were asked to fill a small questionnaire to collect some basic socio economic data. A very simple risk experiment à la Binswanger was also played to elicit individual risk preferences. Self-assessment of impatience and risk preferences were also collected. Participants were split randomly in 3 or 4 separate rooms (depending on the experiment) before knowing the role assigned to subjects in each room. Each room represented a role. The experiment was run during standard term time by paper and pencil and lasted about 1.5 hours. The average earning during the experiment was TS 11330 (while the average wage in the private sector was TS 78 000 per month - about USD 45). Instructions were presented in a very neutral language. For instance: person A has to decide how many TS to transfer to person C. If person A sends money to person C, the transfer has to be done through an intermediary. The role of person B is to transfer the money to person C. Person B is not allowed to transfer his/her own TS to person C.

PES and Crowding-Out Effects: A Framed Forest Experiment in Tanzania

Arild ANGELSEN, School of Economics and Business, Norwegian University of Life Sciences, Norway
Øyvind Nystad Handberg

Does small payments crowd out intrinsic motivations for natural resource conservation? The paper presents findings from framed field experiments (FFE) conducted in Tanzania. The pay-off structure represents a common-pool resource situation (public goods game with negative contributions), where participants' payoffs depend on the number of trees harvested. The experiments have field context in sample, task, commodity and setting. Four levels of individual PES are tested in a between-group design: no (0%), low (20%), medium (60%) and full (100%) PES. Low PES possibly has a weak negative effect on harvest rates (c. 16% lower harvest rates than no PES), while medium and full PES give a strong negative reduction in harvest rates (c. -43% and -75%). The results do not support the "crowding out of intrinsic motivation hypothesis". If any, a "crowding in" effect is present, as no and low PES are theoretical equivalents for a selfish payoff-maximizers. Further, we observe lower than theoretically predicted harvest rates at low PES levels, while the opposite is true at high levels.

PARALLEL SESSION E4 - Infectious Diseases and Invasive Species

The Optimal Control of Infectious Diseases via Prevention and Treatment

Flavio TOXVAERD, University of Cambridge and CEPR, UK
Robert Rowthorn

This paper characterizes the optimal control of a recurrent infectious disease through the use of prevention and treatment. We …find that under centralized decision making, treatment induces positive destabilizing feedback effects, while prevention induces negative stabilizing feedback effects. While optimal treatment pushes prevalence towards the extremes, optimal prevention pushes it towards interior solutions. As a result, the dynamic system may admit multiple steady states and the optimal policy may be history dependent. We …find that steady state prevalence levels in decentralized equilibrium must be equal to or higher than the socially optimal levels. The differences between the equilibrium outcome and the social optimum derive from the existence of a pure externality effect and a separate risk effect due to individuals being small. Last, we derive two separate corrective subsidy schemes that decentralize the socially optimal outcome, namely subsidies to prevention and treatment and a tax on the infected.

Foot and Mouth Disease: The Role of International Trade and the Risk of Disease Outbreak

David SHANAFELT, School of Life Sciences, Arizona State University, USA
Mallory M. Hee, A. Marm Kilpatrick, Charles Perrings

The growth in world trade has brought significant to benefits to human wellbeing, but has also greatly increased the dispersal of pests and pathogens across the globe. Indeed, trade has been the vehicle of spread for several emerging zoonoses and re-occurring livestock diseases. In this paper, we focus on the risk of foot and mouth disease (FMD) associated with the international trade of livestock. While it is recognized that trade has implications for the spread of foot and mouth disease, there are relatively few attempts to quantify the associated risks. Here, we estimate a model of foot and mouth disease risk that incorporates the effects of international trade of live animals and controls for the biosecurity measures undertaken by importing and exporting countries, as well as the presence of wild FMD reservoirs. We find that the disease risks of trade depend on the structure and volume of trade in risk materials, the biosecurity measures undertaken by trading partners, and the interaction between the two. We also show that the incentive to mitigate risk through border protection and biosecurity measures is positively correlated with the value at risk. By identifying the likelihood that importing from/exporting to particular regional groupings of countries may lead to foot and mouth disease outbreaks, we are able to identify the optimal targeting of disease risk mitigation activities.

Managing Biological Invasions: How to Set Priorities?

Pierre COURTOIS, LAMETA, University of Montpellier, France
Charles Figuieres, Chloe Mullier, Joakim Weill

The number of biological invasions increases and so are the impacts these species cause to the environment and the economy. Because resources are limited, the funds available for the management of biological invasions need to be allocated in the most efficient way. Applying a cost/benefit approach incorporating species utility, distinctiveness, robustness of species and their interactions, this paper provides with an operational optimal method for setting management priorities under a limited budget constraint.

Logistical Details

1. The Conference Venue

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. If you intend to attend the full conference we advise you to arrive in Cambridge on the 13th as the main Conference proceedings start at 8:45 a.m. on the 14th of Sep. Directions of how to get to Cambridge and to Kings College are provided at the end of this document. 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. Please note the following details regarding the scheduling of the event:

2. Sunday 13th 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 13th 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 6 pm on the 13th 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.

3. Monday 14th – Tuesday 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 attached)**. 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.

4. Scientific programme

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.

5. 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.

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.

6. Internet access, printing and other office services support.

Details on how to access Wi-Fi within Kings College are provided in 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.

7. Travel and local area information

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

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.

The UK's Royal Economic Society is one of the oldest and most prestigious economic associations in the world. It is a learned society, founded in 1890 to promote the study of economic science. Now celebrating its 125th year, the Society publishes *The Economic Journal* and *The Econometrics Journal*; holds its Annual Conference, a major international gathering of academic economists; engages with the media and with the policy communities; and supports education, training and career development of economists. The Royal economic Society has kindly supported the experimental economic sessions of the conference that form a workshop on experimental economic methods in conservation policy.

Saturna Capital, manager of the Amana, Saturna Sustainable, Sextant, and Idaho Tax-Exempt funds, uses years of investment experience to aid investors in navigating today's volatile markets. Founded i or you you you and in the is is you n 1989, Saturna helps individuals and institutions build wealth, earn income, and preserve capital.

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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