International Conference on

Policy Mixes in Environmental and Conservation Policies

Abstracts

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Scientific Advisory Board

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Reader's Guide

The abstracts of the keynote speakers' presentations and those in the parallel sessions are structured in an alphabetical order by the first author's surname. In any PDF Reader you can search for specific authors, titles, keywords, etc. with the search function (e.g. Ctrl+F in Acrobat Reader). Furthermore, you also find hyperlinks in the content list on the first page or when you display the bookmarks of your pdf-reader.

Welcome

Dear colleagues, dear friends,

A warm welcome to the international conference on Policy Mixes in Environmental and Conservation Policies, and welcome to Saxony and to Leipzig. The focus of these days will be on novel approaches to instrument analysis and the design of policy mixes, covering applications to a wide range of environmental and conservation policies.

The topic will be dealt with in sessions covering interdisciplinary theoretical contributions as well as case studies from various sectors, such as forestry, agriculture, water resources management, climate, energy, biodiversity conservation, and ecosystem services governance. Integrative approaches bridging between science and society and combining knowledge from different disciplines for successful environmental and conservation policies are at the core of the conference's scope. We are glad to have promising contributions from international scholars and practitioners in all these fields.

The conference has been prepared by the EU FP 7 project POLICYMIX and a local organising committee at UFZ, Helmholtz Centre for Environmental Research, and is held in cooperation with the European Society for Ecological Economics (ESEE). Reviewing all the submissions would not have been possible without the help of the wider project team, the international and national advisory board members and associated scholars. We thank all contributors, reviewers, organisers, and the web and program designers very much. We are looking forward to an inspiring conference over the next three days and wish us all a rich and pleasant conference.

For POLICYMIX Coordination

David N. Barton Graciela M. Rusch Irene Ring

Abstracts of Plenary Sessions

Policy mix concepts and applications: Reflections on the emergence, and potential future directions, of market based instruments for conservation within a policy mix framework

Vic Adamovicz

University of Alberta, Canada

This presentation will examine the development of policy mixes within the context of biodiversity conservation and land use management. The emergence of various types of policy mixes will be examined, and some specific advantages, as well as potential adverse effects, will be explored. The presentation will include discussion of several cases which illustrate the implications of policy mix approaches. The discussion will also include some perspectives on future directions for policy mix research and conservation policy implementation.

There are multiple views of policy mixes. One perspective is that policy mix is the layering of market based instruments on existing conservation policy frameworks – improving the overall environmental and economics outcomes (cost-effectiveness). Another is that multiple land use, conservation goals, and/or social goals require multiple policies in a mixture – and that relying on single instruments for multiple goals will be ineffective. A third is that conservation policies may target specific ecosystem services that are correlated with other ecosystem services – requiring that interdependence between services be addressed through multiple policies and multiple approaches to policy otherwise adverse unintended consequences arise. These and other examples of policy mixes arise in conservation policy and may have been explicitly planned as mixtures of policies, or have simply emerged through time along a policy development path.

Early conceptual literature, including Tinbergen, suggested that multiple policies will be required where there are multiple goals. Similarly, more recent literature has cautioned against attempting to use single instruments (e.g. payments for ecosystem services) to address multiple goals. These frameworks provide one source of motivation for policy mixes that include market based instruments. On the other hand, recent experiences with market based instruments suggests that they can underperform because of transactions costs (at the operational level), motivational crowding, adverse unintended consequences on related ecosystem services, and other factors that reduce the cost-effectiveness of such instruments. What mechanisms can be employed to generate the beneficial aspects of policy mixes for conservation policy while avoiding the adverse outcomes?

This presentation will provide examples of cases that appear to have successfully mixed conservation policy tools with cases that appear to have had less success. These findings as well as emerging perspectives from behavioral and experimental economics will be employed to provide suggestions on a future research agenda for policy mix and a perspective on applications to conservation policy.

From panaceas to policy mixes – an overview of the POLICYMIX project

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The EU FP7 project POLICYMIX (2010-2014, http://policymix.nina.no) has assessed the role of economic instruments in a policy mix for biodiversity conservation and ecosystem service provision. POLICYMIX has evaluated a selection of existing and proposed economic instruments in seven case studies in Europe and Latin America. In particular, the project evaluates payment for ecosystem services (PES), agro-environmental measures (AEM), tradable development rights (TDR) and ecological fiscal transfers (EFT).

The POLICYMIX project shifts policy assessment away from a focus on 'the cost-effectiveness of individual instruments for conservation', towards understanding of how instruments interact with one another. Policy mix analysis acknowledges the real world complexity and produces broadly applicable findings across instruments and landscape contexts. The Brazilian and Costa Rican case studies provide important insights into enabling conditions of PES, TDR and EFT, the analysis of which is also relevant for EU Member States. The potential enabling role of the regulatory and the fiscal system in the European cases has been instructive for the Latin American cases.

We find that economic instruments are not an alternative to command-and-control or information instruments, but rather dependent on and complementary to them. Economic instruments need to be aligned with the existing policy mix, rather than replace it. In short, economic instruments need a regulatory home and a family of information instruments. A regulatory home is built on clear tenure and use rights, and furnished with enabling instruments such as availability of up-front finance, capacity-building and support for collective action organisations. This is in many ways received wisdom among practiced policy-makers, but is sometimes ignored by research on market-based solutions to conservation.

PES - a policymix within a policyscape

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Voluntary forest conservation and payments for ecosystem services (PES) can be seen as a mix of PES rules, interacting with a mix of other policies across the landscape mosaic. We present a conceptual model of a 'policyscape' as a spatially explicit policy mix, and an argument for why conceptualising national PES programmes as policy mixes in their own right is useful. Drawing on examples from Costa Rica, Finland and Norway, we discuss implications for PES policy design and analysis.

Remaining sensitive to the case specific nature of the exemplified voluntary forest conservation schemes, we seek to draw some general policy lessons relevant for policy mix analysis. Highlights of our findings include; PES plays different roles in the conservation policy mix at different stages of the forest transition; regulatory conservation is a precondition for the success of PES; forestry certification and forestry subsidy schemes are often precursors to national PES; PES mode of compensation is conditional on the property and use rights specified in the broader regime; perceived threat of regulation decreases perceived opportunity costs and increases the supply of voluntary conservation by forest owners; threat of regulation thereby increases the potential forest area that can be covered by a fixed PES budget ; the perceived distribution of conservation opportunity costs across landowners determines compensation demands as much as absolute levels of opportunity costs.

We discuss methodological lessons learned from applying Ostrom's (2005) Institutional Analysis and Development (IAD) framework to the comparison of PES programmes. We find that the IAD framework can be a useful tool in identifying indirect incentives for forest conservation stemming from 'rules-in-use' that go beyond PES specific payoff rules. IAD rules-in-use provides an approach to identify possible foci of interaction between PES and other instruments in a policy mix. The IAD framework can be biased towards a description of PES based on 'formal' rules-in-use and under-specifying 'informal' rules about how intermediates and administrations operate. In-depth on the ground case knowledge is important for identifying and interpreting the different types of rules.

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Changing policy mixes in practice: what does it take?

Lucy Emerton

Environment Management Group, Sri Lanka

In many countries, efforts to conserve nature still depend largely on command and control approaches. While clear legal and regulatory frameworks, appropriate controls and realistic penalties are undoubtedly key elements of the conditions that are required for effective, equitable and sustainable conservation, by themselves they are rarely sufficient. Problems of enforcement, coupled with difficulties in securing the funds and other resources that are required to enable implementation, often undermine the efficacy of “pure” command and control systems. At the same time, unless conservation is also perceived as making economic sense to the groups that manage and use biodiversity and ecosystems, they are unlikely to be either willing or able to comply with the rules and restrictions that have been set in place.

It is largely in response to these implementation challenges, as well as a growing recognition of the need to better factor equity and distributional concerns into on-the-ground conservation efforts, that something of a paradigm shift has occurred over recent years. A range of new measures and instruments have been thrown into the conservation policy mix, with rights-based approaches and market-based mechanisms having become particularly prominent. Yet there often remains something of a dissonance between these different approaches, with newer incentive-oriented instruments sitting rather uneasily alongside more traditional command and control measures - and, at the worst, actually conflicting with them.

A policymix approach offers an intuitively appealing framework with which to carry out the analysis and generate the information that is required to address and overcome some of these problems, so as to better harmonise and synchronise conservation measures By focusing on the interactions and synergies that arise when policies are combined, it allows decision-makers to identify “packages” of complementary or mutually reinforcing instruments that can work together to address particular conservation and development challenges. In situations where enforcement poses problems, time, money and expertise are scarce, or there is a particular urgency to act, this kind of thinking can play a key role in designing cost-effective, equitable and sustainable solutions to conservation problems.

Is the promise of policymix approaches borne out in reality, and how can the findings of such analyses be applied to make a useful contribution towards the design of more practical, relevant and effective packages of conservation instruments? We review experiences and lessons learned from integrating this kind of thinking into biodiversity and ecosystem planning, with a particular focus on supplementing and combining conventional command and control approaches with more novel market-based mechanisms. Insights and lessons learned are drawn from the real-world case of sustainable forest management in Mongolia.

The main conclusion concerns the need to integrate political economy concerns into policymix analysis. We argue that it is not just the interactions between different measures that need to be understood in order to identify and design successful packages of instruments, but also the institutional and decision-making contexts which offer barriers and entry points for their actual uptake and implementation on the ground. Another key lesson learned is that often the reorientation or better application of existing policies and measures that are currently serving to hinder or undermine conservation is as - or more - important as the introduction of new elements into the policy mix . Last but not least is the importance of an evidence-based approach which makes efforts to justify and demonstrate the gains from combining policy instruments to the decision-makers and other stakeholders who will be ultimately responsible for implementing them.

How to ensure that green is truly green? Policy mixes for integrating nature in green economy

Marianne Kettunen

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There is an increasing appreciation that nature, including biodiversity and healthy ecosystems, underpins both the functioning of economies and wellbeing of societies and individuals through the provision of ecosystem services (MA 2005, TEEB 2010, 2011, 2012a and b). Furthermore, there is also a growing recognition that the current model of economic growth is socially, environmentally, and economically unsustainable and that there is a need for a transition towards a green economy that promotes social equity, poverty eradication, and human well-being (UNEP 2011). Since well-functioning and resilient ecosystems are necessary for long-term socio-economic development, it follows that the efforts taken towards a transition to a green economy should be based on a sound understanding and appreciation of the role and value of nature.

There are a range of nature-based "building blocks" that can support the transition to a green economy (ten Brink et al. 2012). These include, for example, using the increased understanding on natural capital to avoid inappropriate trade-offs, investing in green environmental infrastructure, active management of environmental risks using nature-based solutions, and increasing eco-efficiency and ultimately decoupling economy from resource use and its negative impacts. The emphasis of these components in a transition to a green economy depends on the national, regional or local context, reflecting the current circumstances and windows of opportunity for progress. However, in all cases the uptake of different building blocks requires a combination of suitable policies and instruments, leading to the development of context-specific policy mixes. Furthermore, nature-based measures for green economy can - and even should - be adopted at different governance levels, recognising the roles and responsibilities of all relevant sectors and stakeholders. This further increases the need for policy mixes, sensitive to aspects related to both scales and equity.

The purpose of this key note talk is to highlight how integrating the value of nature - including values related to both economic prosperity and broader wellbeing – into policies and decision-making supports a transition to a green economy. In particular, it aims to demonstrate how well-designed policy mixes for conservation and sustainable use of biodiversity play a crucial role in ensuring a successful transition in practice.

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The mix of ambitious climate and energy policies

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A debate has – most notably as a result of the introduction of fixed caps within the framework of emissions trading – been raised about the need for using additional instruments of climate and energy policy. A common line of argument is that the targets set within the emissions trading scheme are going to be met with a high degree of certainty, and flexibility among the regulated stakeholders will lead to market-based discovery processes. Additional instruments would only generate additional costs and would therefore have to be rejected. However, the broader and empirical analysis shows that a policy mix will be necessary to achieve ambitious climate and energy policy targets even when emissions trading is a central pillar of these policies. To avoid arbitrary choices for the design of a policy mix, it should be carefully designed and based on the specific foundations:

1. For reasons of effectiveness, but also of dynamic efficiency, well-directed measures for increasing radical innovations (backstop technologies of ambitious climate protection strategies, such as many renewable energies or CCS technology) are necessary. Specific policies to address innovation can also contribute to other policy goals (lead markets, ecological modernisation etc).

2. A number of climate options are – in spite of their high (national) economic attractiveness – not implemented due to diverse barriers and preferences geared to other ends (above all, energy-saving measures). Complementary and targeted instruments will be needed do address these structural barriers (information, adjustments of provisions within rental law). However, these measures are also justified by complimentary policy targets, e.g. on energy efficiency to lower vulnerability of consumers and industries to high and volatile energy prices.

3. The necessity of decarbonising an existing energy or economic system which involves very capital-intensive or durable capital stock in important areas in a comparatively short time frame can necessitate the well-directed change of market design and/or the creation of new sub-markets, which in combination with carbon pricing would only then make possible the implementation of low-emission solutions in the specific context of competition (e.g. capacity or storage markets as an addition to current bulk energy markets based on energy amount).

4. Many of the (foreseeable) emission reduction options to be realised in ambitious climate policies entail high investments in infrastructure. Complementary instruments in conjunction with (necessary) infrastructural development thereby constitute a second, strategically essential approach to developing a robust climate policy.

5. Since emission trading schemes that are currently being implemented or are under development will (have to) remain incomplete in terms of the sectors and areas covered, at least in the years ahead, complementary measures are necessary to improve the effectiveness of the emissions trading scheme, e.g. with regard to combined heat and power or to combat leakage effects.

6. In the case of sectors for which the robust and consistent determination of emission data is not possible (agriculture, forestry, land use, and land use changes), regulatory or support instruments will have to be used while a cap-and-trade instrument like emissions trading inevitably requires reliable data to be available under very tight tolerance limits for data uncertainties.

7. Rents arising for sellers of emission allowances as a result of the introduction of cap-and-trade instruments can sometimes make well-directed interventions based on distribution policy necessary; they can also be implemented using complementary instruments.

In summary it can be concluded that against the background of the empirical findings that have been made available up to now and especially against the background of the (necessary) ambitiousness of future climate policy, effective climate protection can only be achieved through the interplay of different instruments. A balanced mix of an emission trading system, or other measures of carbon pricing, and other instruments is urgently needed. It is not expected that severe efficiency losses will result from the implementation of additional strategies and instruments to complement emissions trading.

Turning to market forces to accelerate the attainment of Europe's water objectives

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Decades back, the European Union's policy makers have recognised the potential granted by economic incentives and/or disincentives for driving individual and business behaviour toward achieving sustainable development objectives, including protection of healthy environment and efficient use of natural resources. Pursued through a number of statutory acts, the economic policy instruments (EPIs, also called market-based instruments MBIs) permeated environmental (including inland and marine water) legislation. Simultaneously, efforts have been made to detect and remove environmentally harmful subsidies. More recently, the firm commitment to low carbon, resource efficient and socially inclusive growth and economy has become a cornerstone of the EU 2020 Strategy, a part of which is a budgetary-neutral shift of the tax burden away from labour and capital to consumption, property and environment.

Integrated water resource management (IWRM) is a policy field where EPIs, or pledges for their deployment, are widespread, with varying success. The EU Water Policy Review has identified some but insufficient progress in application of the economic principles (e.g. cost recovery, water pricing) and encouraged, cautiously, use of market mechanism (e.g. water right trading scheme) where this represents a value-added improvement. The Review lamented 'insufficient use of economic instruments' (EC 2013, p. 8), limited application of 'incentive and transparent water pricing' (ibid, p. 10), contributing indirectly to increasing magnitude of economic effects of extreme events (such as droughts and floods) (ibid, p. 13). Besides, the Review concluded that 'not putting a price on a scarce resource like water can be regarded as an environmentally-harmful subsidy' (ibid, p.10).

The reasons for the apparent underperformance of EPIs in water management are manifold: First, there is a legal uncertainty (and disagreement) about what constitutes 'water service' according to the Water Framework Directive (WFD, 2000/60/EC), what are the resource and environmental costs and how to estimate them, and under which conditions the overriding public interests hold sway over environmental concerns. Second, the failed attempts to boost greater involvement of public sector in water supply and sanitation services in Italy and, more recently, the public outcry triggered by the proposed Directive on the award of concession contracts (the so-called Directive on concession, COM(2011) 897 final) have demonstrated once again the deeply-rooted divergences in views and beliefs associated with water (service provision).

This paper synthetizes the results of the FP7 EPI-WATER (www.epi-water.eu) project which set off to analyse the benefits, comparative strengths, downsides, and potential side effects of EPIs, applied in water management. EPI-Water has conducted an in-depth review of empirical evidence, experiences and lessons learned from the practical application of economic instruments for water management in Europe and beyond. The review examined 30 EPIs, covering a range of different instruments, which operate under different environmental and socio-economic conditions. Furthermore, EPI-Water conducted an ex ante assessment of five economic instruments (compensation payments for flood storage on agricultural land, nitrate tax, smart water pricing and insurance, water trading and payments for ecosystem services), the application of which was simulated to address four sets of issues (floods, droughts, water quality, or ecosystem services and biodiversity conservation) in five river basins (Tisza, Tagus/Segura, Seine-Normandie, Odense and Pinios). The comparative strengths, downsides, and potential side effects of the instruments were assessed.

Accounting for natural capital in the policy mix

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‘Natural capital’ has become a key term to describe the environmental resources and ecosystem services that human economy and society depend on. New approaches are therefore being developed in Europe and at global level to better understand, describe and measure how local, national or global natural capital assets are evolving. Environmental accounting approaches are foremost among these and help analysing the composition of natural capital and which components may be most fragile. They also enable a link-up to national accounting systems which gives crucial insight into the relative contribution of natural capital to our overall economy and well-being.

However, the final objective of improved accounting approaches cannot be only to better measure and track natural capital assets but to be able to manage these assets and resulting (ecosystem service) flows better. Here we are only at the beginning of understanding the most suitable policy approaches and what their respective effectiveness is but can draw on experience from policy analysis focused on sectoral policies or the protection of biodiversity.

The necessary analysis can be divided into three broad steps – on the assumption that we have a good understanding of what is the natural capital that we want to protect and enhanceFirst of all it is necessary to identify which policies have the biggest impact on the components of natural capital that are of critical interest, e.g. due to their importance or ecological fragility. The impacts in question can be direct effects, e.g. increased demand for certain resources due to industrial policy, or indirect, e.g. by providing an economic stimulus that changes economic drivers.

Secondly, it is important to understand which key policy levers exist which would directly or indirectly change the incentives for private or state actors to improve their approach for managing our natural capital.

Thirdly, it has become obvious from policy analysis and other fields that many economic activities and policy areas are interconnected and that often a suitable policy mix is required for changing the behaviour of economic actors for achieving a specific desired outcome. Hence it is necessary to research the most promising policy tools in their interaction as part of a policy mix, within and between different policy areas.

The paper briefly describes the concept of ‘natural capital’ that is being developed in the European Union and explains the policy process to develop a better accounting for natural capital. From that basis it provides a first discussion of how (fully developed) natural capital accounts could underpin the analysis and development of suitable policy mixes for a better management of natural capital following the three steps outlined above.

Aligning ecological fiscal transfers in national and state policy mixes

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The CBD strategic plan for biodiversity 2011-2020 calls for further development of positive incentives for biodiversity conservation and the mobilisation of financial resources for effectively implementing biodiversity targets, while duly taking into account the needs of sub-national governments, cities and other local authorities. In developing and transition countries, about 60% of sub-national public expenditure is financed by fiscal transfer schemes, under which public revenue is redistributed through transfers from higher to lower levels of government. Ecological fiscal reform and “getting the prices right” as important corner stones of a green economy and sustainable development also require appropriate conservation indicators, next to the traditionally used economic and social indicators, for redistributing tax monies to lower levels of government. Thus far, only Brazil and more recently Portugal have introduced protected areas as an indicator to redistribute tax revenues to local levels.

In this presentation, we analyse this innovative policy instrument, building on a review of existing experience as well as suggested future design options in the POLICYMIX case study countries Brazil, Portugal and Germany. We will discuss ecological fiscal transfers (EFT) in terms of their effectiveness, cost-effectiveness, social impacts and institutional requirements, and specify their functional role and alignment challenges in a wider policy mix for conservation. The alignment of ecological fiscal transfers in national and state policy mixes in these countries will be explored through questions such as: What is the policy mix of economic and regulatory instruments that must be in place for ecological fiscal transfers to work as a conservation incentive? Which conflicts and synergies do exist between EFT and other instruments in the policy mix? What are the future design challenges of ecological fiscal transfers? What are alignment challenges between ecological fiscal transfers and other instruments?

For this purpose, we draw on impact evaluation of existing EFT schemes in Brazil (Mato Grosso) and Portugal as well as ex ante scenario analysis of a suggested EFT scheme in Germany. Finally, we present case lessons learned on the effectiveness of EFT in a policy mix.

How can AEMs be more successful as instruments to promote biodiversity conservation?

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Agro-environmental measures (AEM) are designed to encourage landholders to adopt more environmentally friendly practices in the management of their land. Many different types of measures are included under the AEM umbrella, ranging from measures aiming at promoting improved farming practices, to measures oriented to promote biodiversity conservation in agro-forestry mosaics, and afforestation measures that do not have specific biodiversity conservation objectives. Different AEM are analysed for three case study countries, in particular AEM payments integrated into the EU Common Agricultural Policy (CAP) framework, for Portugal and Germany, and the adoption of integrated conservation and development projects (ICDPs) in agrarian reform settlements in Brazil, framed by the Brazilian federal Forest Code.

The Portuguese case focuses on the identification of the reasons for the lack of success of a conservation oriented AEM (applied to areas such as Natura 2000), including also an ex-ante analysis, with a spatial targeting exercise and a choice experiment to investigate how compensation levels and other contract features influence farmers' willingness to join. The German case focused particularly on an ex-post analysis of an existing, but unsuccessful, AEM for afforestation. A choice experiment and a follow-up questionnaire were used to investigate the compensation required by landowners for converting some of their land into forest and other relevant contract design features. The analysis in Brazil examined the effectiveness of a sequence of ICDPs and respective AEM promoted for deforestation mitigation, in Northwest Mato Grosso. The analysis sought to identify those measures that appeared to have been most effective at the individual household or lot level, and at the "policyscape" scale, using data from programme evaluations, sequential satellite imagery, farmer interviews and focus group discussions.

Experience with AEM in Portugal and Germany has not overall been favourable, while in Brazil, although the scheme seems to have been relatively successful at the individual plot level, the overall Amazon land use trends of widespread deforestation and biodiversity loss were not reverted. In all cases, the factors that appear most important include participatory design and continuous technical support to disentangle the complexity of multiple land use incentives and practices. This is particularly true in a policy environment in which changes are introduced erratically over time, and discontinuities in funding prevail, provoking uncertainty and unwillingness to adopt permanent measures. The ex ante analysis contributed to identify further aspects that can make AEM more cost effective and attractive to farmers and better integrated into the conservation policy mix.

From theory to practice: Institutional challenges for policy mix analyses in biodiversity and ecosystem governance

Arild Vatn

Norwegian University of Life Sciences, Norway

Institutions are the conventions, norms and legal rules that form the social basis for human action and interaction. As such, they both form the context in which policies are formulated and they are the 'material' that the policies change to next alter actions and interactions. The first step in a policy process is to define the goals. The next is to change the institutional context. The former issue is beyond the focus of policy mix, as it takes the goals as given. At the same time, the potential need for mixes reflects the complexity of the goals/interest configurations, as well as the complexity of existing institutions and the complexity of natural dynamics. From this perspective analyzing policy mixes are about understanding why such mixes appear, to what degree they offer better solutions than single instruments and to what extent complexity necessitates 'learning by doing' as a policy strategy.

- Fundamentally, formulating policies are about changing resource regimes – the rights that define access to/use of resources and the rules for interaction between the actors given these rights. From institutional theory one may emphasize several dimensions that need to be acknowledged in this respectWhose interests gets priority – i.e., how rights are distributed, potentially changed
- How the policy – especially the (mix of) instruments influence human motivation
- How costly it is to institute and operate the policy – i.e., transaction costs

These factors are linked. They also influence strongly the acceptance or legitimacy of a policy package. The presentation will be devoted to explain the most important relationships here and link that to how mixes of policies may be necessary to ensure the realization of defined goals.

The final step will be to illustrate the theoretical points by a few examples:

- First I will use results from own research on REDD+ to illustrate the issue of how a complexity of interests may demand a mix of policies sensitive to different uses
- Next I will use results from the same research to show how mixes of instruments may be necessary to facilitate a change in action. Changing uses/refraining from some use of in this case forest resources is a profound process demanding changes far beyond compensation in the form of payments.
- Then I will look at the difference in motivational structures across different actors involved – e.g., 'sellers', 'buyers' and 'intermediaries'.
- Thereafter I will link the issue of motivation with that of rights looking at experiences with payments in Costa Rica and Scandinavia – policy mix and own research

Finally, I will illustrate how transaction costs vary with different resource regimes, pointing towards not only needs for mixes, but also understand how mixes influence costs and the distribution of these.

Round table – Communicating and acting on policy mix research and analysis: What does it take to leverage effective, equitable and sustainable packages of instruments for environment and conservation in the real world?

Chair: Lucy Emerton (Environment Management Group, Sri Lanka)

Participants:

David N. Barton (Norwegian Institute for Nature Research, NINA, Norway)

Marianne Kettunen (Institute for European Environmental Policy, IEEP, Denmark)

Jussi Lankoski (Organisation for Economic Co-operation and Development, OECD, France)

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Ralf Döring (Thünen Institute of Sea Fisheries, TI, Germany)

The roundtable draws together and reflects on the deliberations and insights that have emerged during the course of the conference. The focus is on discussing the extent to which the considerable advances in research methodologies and information that have been generated over recent years have influenced the way in which environment and conservation policies are actually formulated and implemented in practice. The intention is to identify lessons learned and ways forward in better closing this knowledge-policy-practice loop in the future.

Experts from a variety of technical and organisational backgrounds will offer perspectives on what they consider to be the most critical constraints to, and enabling conditions for, the implementation of policy mixes that successfully deliver on environmental and conservation goals. They will share their own experiences of communicating and acting on policy research and analysis. The roundtable will also provide a forum for conference participants to contribute their thinking and ideas on this topic.

In order to ground the discussion, both panel members and conference participants are encouraged to provide real-world examples of the successes, constraints and challenges that they have faced when attempting to design, deliver or use research to inform the development of environment and conservation policies.

Discussions will include consideration of:

- How can “policy mix” (as compared to “policy instrument”) research add value to the design of conservation policies?
- To what extent does the availability of a solid information and evidence base improve the quality of the trade-offs between effectiveness, equity and sustainability considerations when instruments are selected and combined?
- What kind of research is needed to identify the necessary and sufficient conditions for a particular combination of instruments or mix of policies to be interpreted as being “successful”?
- How do we effectively communicate research findings to decision-makers, and “make the case” for particular policy mixes or combinations of instruments?
- What needs to be done to improve the accessibility, acceptability and credibility of research findings for environment and conservation planners, managers and policy-makers?

Abstracts of Parallel Sessions

Policy frameworks affecting European mountain areas and forests

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International awareness of mountain forests and their relevance for the global ecosystem has been gradually increasing in the past decades, especially since the Rio Earth Summit in 1992. Forests constitute a key component of this image and cover a large segment of the mountain landscape, which in turn contributes to the natural and human-made diversity of mountain areas, particularly in terms of species, productivity, ownership, socio-economic trends and environmental conditions. The broad range of functions and services provided for by mountains are in turn affected by several policy-making instruments, from the micro to macro- level. This mix of policy instrument is having a direct impact on how mountains are managed.

Considering the policy mix affecting the European mountain landscape provides the perfect opportunity to explore and evaluate the impact from different policy frameworks on the environment and the provision of key ecosystem services. With this aim in mind, this study set out to consider the policy frameworks that currently have an impact on how forests and mountains are managed. This was achieved through a review of relevant policy frameworks at the EU-level. The analysis of the policy framework was based on the ARANGE Forest Policy Database. The database was compiled for this purpose and is foreseen to provide an important tool for future research aimed at mountain forests and ecosystem services. The database provides a detailed list of relevant policy documents mainly from the EU-level. These have been divided according to pre-selected types of ecosystem services (timber production, nature conservation, carbon sequestration and protection against gravitation hazards), types of policy documents and the institutions that issued the policy document, etc. This has enabled the analysis of policies having an impact on forests and ecosystem services in mountain areas.

The results from this study points out the differences in the actions taken by different sectors as regard to mountain areas and forests, which indicates a purely sectoral rather than integrated development. Moreover, most policy measures do not specifically address mountain areas, but rather try to address the needs of specific groups or areas. For mountain areas, the key is however to recognise the great diversity, and the very specific challenges, that characterises mountains, namely, competing demands in terms of environmental concerns (e.g. nature conservation, water supply), economic interests (e.g. tourism and timber production) and social interests (e.g. recreation). Together, the present set of European policy instruments and measures creates a context in which it will be difficult to find a balance between these competing and contradictory challenges. In the absence of an integrated and flexible policy framework for mountain areas (as well as the lack common forest policy) there is currently no platform through which these interests can be coordinated effectively. The result is policy fragmentation and incoherence at the EU-level. Also the existing platforms and instruments do not provide an effective way or solution, and there is no institution at the EU-level that can effectively coordinate or facilitate a discussion on key challenges for mountain regions and the forest sector. Instead each policy area and/ or sector focuses on what is important to them, rather than taking a holistic perspective on mountain regions and forests.

Path dependent policyscapes: an agent-based modeling approach to the evaluation of policymixes for biodiversity conservation

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A policyscape can be defined as the spatial configuration of a policy mix (Barton *et al.*, 2013). Spatial locations of mixes of conservation instruments such as protected areas and PES have emerged over time as a result of heterogeneous landscape characteristics, policy targeting, and random shocks to landuse demand (Barton and Adamowicz, 2013). The paper explores the potential of agent-based models (ABMs) to simulate the emergent and path-dependent characteristics of the resulting policyscape over time. Modeling spatially explicit emergent properties quickly becomes intractable in analytical optimization models. In contrast, ABMs have a comparative advantage in modeling local spatial interactions (Epstein, 2006). ABMs are models where individuals or agents are described as unique and autonomous entities that interact with each other and their environment locally (Railsback and Grimm, 2012).

In this paper we implement a simple ABM of the spatial allocation of two negative deforestation incentives (Figure 2) absolute protected areas (PA) and payments for protection of forest (PES). The paper explores the potential of the ABM to describe emergent and path-dependent spatial allocations of PA and PES locations. A number of modeling features are discussed using a simple ABM:

- extending a simple von Thunen land-rents model, where rents decline with distance to market (Randall and Castle, 1985), to also include rents' dependence on land use suitability (site index).
- implementing Pannell's (2008) public-private benefits framework for instrument allocation (Figure 2), as behavioural rules for a public agent allocating PAs, and a private agent adopting PES based on the ratio of public to private net benefits
- evaluating the targeting of policy instrument location to a random allocation of biodiversity and ecosystem services characteristics of forests (Figure 1), versus a landscape where land productivity (site index) is correlated with the presence of endemic species (biodiversity).
- using forest and cleared-land benefit functions to explore the effects of export demand shocks on forest clearing and demand contractions on forest regeneration.
- evaluating the spatial allocation of land-rents - with and without international import/export markets for timber and agriculture - by making the slope of forest and cleared-land benefit functions conditional on the total supply of forest cover and cleared land (Figure 3).

We conclude with a research agenda for 'agent-based policyscape analysis'.

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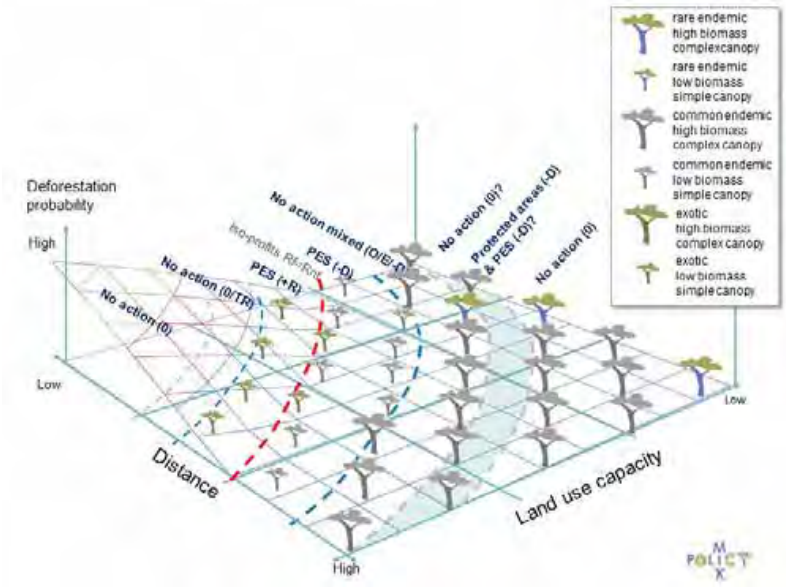
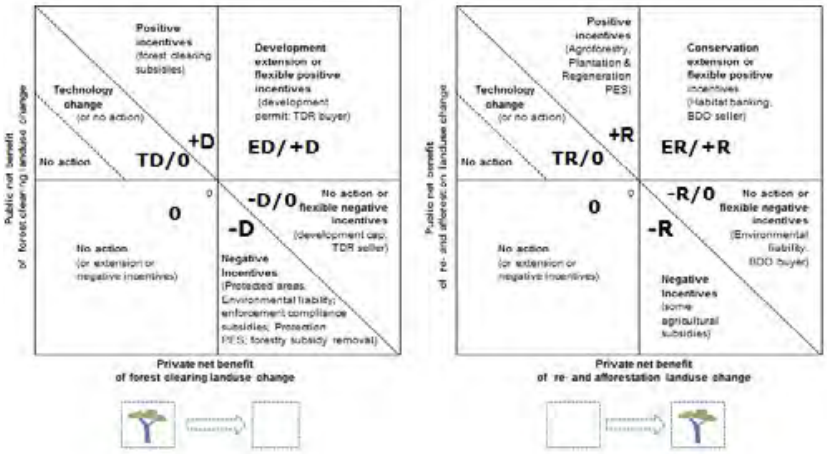
Figure 1. Conceptual forest landscape in regeneration forest transition stage 3-4 with predictions of positive and negative conservation incentives based on a revised public-private benefits framework



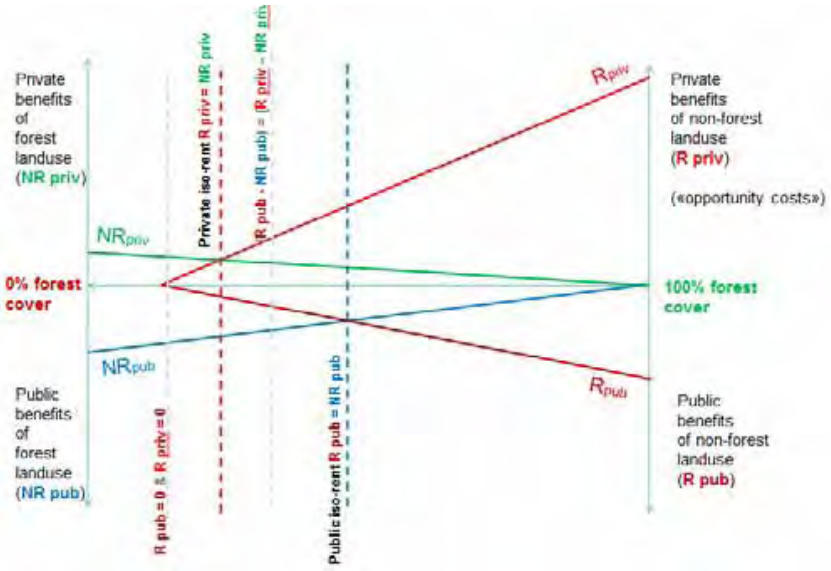
Source: Barton and Adamowicz (2013)

Figure 2. Conservation policy instruments depend on varying public-private benefits of landuse change at different forest transition stages.



Source: adapted from Pannell (2008)

Figure 3. Relative public-private net benefits to forestry and non-forest of landuse change sectors changes in different stages of the forest transition



Source: Barton and Adamowicz (2013)

The potential of Tradable Development Rights (TDR) to improve effectiveness and reduce the costs of biodiversity conservation: study case in Sao Paulo, Brazil

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Until today, direct regulation has been the most important type of policy for biodiversity conservation in Brazil. This has resulted in conflicts with rural sector about compliance costs and has led to limited effect on nature conservation. The main command-and-control (C&C) instrument for forest conservation is the Forest Code, which was newly amended in 2012. It requires that all private properties set aside parts of their properties for conservation, called Forest Reserve. This law has passed through many alterations and has been poorly enforced, resulting in a current very low compliance.

However, the recent change in the law has made it less strict, and a higher level of enforcement and compliance is expected. In order to reduce the economic impact of the Forest Reserve on landowners some flexible mechanisms are being discussed and proposed. One of them is the compensation of Forest Reserve requirements in another farm, as a form of tradable development rights (TDR). The landowners who have deforested more than allowed by law can compensate their deficit in another farm which has more natural vegetation than required.

The aim of implementing TDRs is to reduce the opportunity costs of conservation but it also opens to the possibility of improving gains in conservation if the instrument targets priority areas for conservation. In this paper we evaluated the possible effects of the TDR on the conservation outcomes considering both the opportunity costs and ecological effectiveness and compared this to a pure command-and-control (C&C) approach, i.e. compliance to the Forest Code on own property.

Using the conservation planning software Marxan with Zones we conducted an ex-ante policy evaluation by simulating different scenarios that combine policies and market constraints for the forest reserve market, and evaluating their cost-effectiveness. We focused our study in the state of Sao Paulo, the most industrialized and most populated in Brazil, which faces many ecological challenges.

Our results showed a clear potential of the TDR to both reduce compliance costs and improve ecological effectiveness depending on different market restrictions on allocation of forest reserves.

Developing analytical framework for regulation of green infrastructure

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Green Infrastructure (GI) is an emerging policy response aiming to govern the pressure from the intensive human use and habitat fragmentation on ecosystems and services they provision. Green Infrastructure, as a policy response, is not a single instrument, but a mix of various instruments aiming to support the overall policy goal to maintain and restore ecosystem services.

In this paper, we aim to build an analytical framework to assess existing and developing new regulation for GI policy. We start the building of our framework from the notion of that GI is a resource, which may be used over time in various ways for multiple purposes (Frischmann). While acknowledging the advantages of this approach, we recognize its limitations including the inability to address the issue of active conservation measures. We structure our analysis using a typology of instruments, including economic, command-and-control, planning, and voluntary instruments. We identify types of instruments from each category and the advantages and disadvantages of those instruments for enhancing the provision of wide variety of ecosystem services, enhancing the active conservation measures and landscape scale management will be assessed. We aim to make conclusions on conditions under which each instrument is likely to be effective. The factors affecting the suitability of the instrument are bio-physical, economic, and institutional. The bio-physical factors focuses on the characteristics of the resource and services it provides, including the renewal rate of the recourse, the scale of services provided, and the specific conditions required for producing the services. Economic factors include the degree and rate of rivalry among recourse uses, nature of services and goods derived from the recourse (excludability, non-market/market good, private or public good), and the nature of the recourse user (human, non-human, future generation). Finally institutional factors include the institutions needed for and affecting the successful use of the instrument.

While the overall aim of this paper is to create an analytical framework for assessing the suitability of policy instruments for green infrastructure policy, it also serves the purpose of identifying the potential gaps in current regulatory frameworks as well as needs for developing the instruments or creating new ones to better achieve the targets of GI policy. The hypothesis is that often the existing instruments provide little incentive to enhance the landscape level management as they are targeted for a single service, single land owners, or single land use, leaving those services that depend on a broader landscape level management unaddressed.

Law enforcement and economic incentives for conservation in the Brazilian Amazon: modeling spatial complementarities

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Annual forest loss in the Brazilian Amazon was down to less than 5 thousand square kilometers in 2012, from almost 30 thousand in 2004. Overwhelming empirical evidence suggests that changes in the Brazilian law enforcement practice and the related governance system account for a large share of the overall success in curbing deforestation rates. At the same time, Brazil's government is discussing and experimenting with alternative approaches to compensate farmers for conservation actions through economic incentives, such as payments for environmental services (PES), at various administrative levels. A mixed carrot and sticks approach to conserve the world's largest continuous tropical rainforest poses various challenges to policy design. First, the lion's share of historical deforestation has been illegal, i.e. full compensation of opportunity costs by incentive schemes could result in perverse incentives for traditionally compliant land users. Partial compensation, however, is likely to be ineffective if not reinforced by a complementary disincentive or regulatory threat. Second, both incentives and regulatory disincentives tend to become less effective wherever liability for illegal deforestation cannot readily be established on the basis of formal land use rights. Conflicting and poorly delimited tenure claims are still common in a large part of the region. In this paper we develop a spatially explicit model that simulates deforestation decisions in response to policy incentives and disincentives at the regional scale. The model builds on elements of optimal enforcement theory and introduces the notion of imperfect PES contract enforcement in the context of avoided deforestation. We implement the simulations using official deforestation statistics and data collected from field-based forest law enforcement operations in the Amazon region. We show that a large-scale integration of PES with the existing regulatory enforcement strategy involves a tradeoff between the overall efficiency and equity effects of the policy mix. Introducing PES as a complementary policy measure increases policy implementation costs, but tends to reduce welfare losses for those hit hardest by law enforcement. Yet, this tradeoff is heterogeneous in space and depends on spatially variable deforestation patterns and enforcement costs. Moreover, we find that enforcement effectiveness can become a key determinant of efficiency in the overall policy mix, depending on how conditionality of the PES component is imposed.

Neoliberal devolution, post-politics and biodiversity conservation: Big Society in England

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Local and consensual governance modes are currently considered globally as panaceas to halting biodiversity loss. As laudable as local and conflict free decision making may be, advantages and disadvantages have to be considered under the lens of wider political-economic changes. In 2010, the Coalition government in England launched the Big Society project, a policy initiative that aims to devolve power to local communities and increase participation beyond-the-state in all policy areas, including biodiversity conservation. By investigating changes in biodiversity conservation-related policies implemented in England, we try to relate the state- enabled nature neoliberalization and governance rescaling to a de-politicization of public life that foregrounds technomanagerial and local-scale solutions to environmental problems, while foreclosing their political dimension. We discovered that the Big Society project actually represents a deepening of neoliberal conservation policies that is directly related to the rescaling of biodiversity governance. As novel instruments are built around privatization, nature commodification and competition, consensual decision making at the local scale de-politicizes conservation and becomes the vehicle for embedding these changes. Using critiques of the post-political condition, we conclude by arguing that Big Society and similar projects around the world entail a confinement of localities and communities to the neoliberal trajectory, effectively reducing the democratic potential of devolving power to the 'nano' level.

Incentivizing agro-forestry agreements: Institutional-economic conditions and motivational drivers

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Uptake of agro-forestry agreements in Europe is very limited. The main objective of this study is to estimate farmer demand for agro-forestry agreements in rural areas in the Netherlands and Germany under different institutional-economic conditions using a choice experiment, and assess the sensitivity of farmers to financial incentives to convert part of their land into forest. Besides focusing on landowner and contract characteristics, we also test the role of motivational drivers in explaining farmers' willingness to conclude agro-forestry agreements. To this end, we fix financial compensation levels in hypothetical contractual agreements relatively low compared to opportunity costs, but comparable to what farmers currently already receive for nature conservation measures. We find substantial demand for agro-forestry agreements. More so in Germany than in the Netherlands, among others because of the higher opportunity costs in the Netherlands and the relatively low level of compensation German farmers currently receive. We find evidence that a positive disposition towards the environment (measured through their participation in existing agri-environmental schemes) and wildlife protection (measured through attitudinal questions in the survey) plays a significant role in their decision to participate in agro-forestry schemes. However, financial considerations dominate. Dutch and German farmers furthermore value institutional-economic conditions for participation significantly different. Both prefer to enter into shorter rather than longer term contractual agreements, but farmers in the Netherlands particularly value the possibility to return to farming at the end of the contract period, while German farmers feel especially a need for technical advice.

The policy mix's influence on inventor networks in renewable energies[1]

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The increasing share of electricity produced by renewable energy technologies is to some extent driven by heavy subsidies, especially in Germany. The aim of these subsidies is a sustainable transition, which culminates in the German Energiewende. To achieve this transition, the processes of invention, innovation and diffusion of these technologies are supported by different kinds of policies. There are three categories of policy instruments which address the development and diffusion of renewable energy technologies. Demand side instruments support the diffusion of technologies and create a (niche) market. Supply side instruments directly support inventors and researchers to engage in innovative activities. Related to that, systemic instruments provide a framework and create an underlying network structure fostering research cooperation and knowledge exchange between actors. Together, these instruments from the innovation, environmental and climate policy fields foster a sustainable transition towards a clean energy production. We derive our understanding of this policy mix from the conceptualization of Rogge/Reichardt (2013) and operationalize the instrument mix, which is a central part of a consistent and coherent policy mix.

The aim of the present study is to understand how these different economic instruments in the instrument mix influence changes within the photovoltaic (PV) and wind power technology innovation systems. The key elements of innovation systems are knowledge and knowledge exchange. The accomplished technological change and the desired sustainable transition are induced by the cumulative process of knowledge creation and innovation, in which novelty is created by combining knowledge from a diverse set of actors. Cooperation and the resulting networks of knowledge transfer and learning constitute one important driver of innovation and technological change (Dosi 1988, Powell et al. 1996, Ahuja 2000). These networks can be studied using social network analysis, by mapping the different actors and their relations in the context of innovation and knowledge transfer (see Cantner/Graf 2011 for an overview of innovation networks).

We observe the underlying structure and properties of the networks formed by inventive activity at the meso level. Based on patent data, inventor networks are constructed in which inventors are linked through common patents. To account for the influence of the instrument mix, a set of supply and demand side, as well as systemic instruments, is used in an econometric approach to analyze the influence of the different kinds of instruments on the growth and the structure of the networks over time. We use the growth of installed capacity of PV and wind power as a proxy for the demand side instruments, and the funding for research projects as supply side and systemic instruments. Systemic instruments consist of funded projects, which have the specific target to foster cooperation between the actors. In a regression framework we estimate the influence of the instrument mix on the changes in the network structure from 1985 until 2008.

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Results indicate that an increase in supply side funding has a negative effect on the network size and the connectivity among the actors in the network, while an increase in the share of funding of collaborative research projects increases network size as well as connectivity among the actors in the network. The specific demand side instruments show negative effects, indicating that demand inducing policies have an adverse effect on inventive activity.

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Ecological fiscal transfers for biodiversity conservation in Brazil: options for a federal-state arrangement

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Effective biodiversity governance has to address the spatial aspects of biodiversity conservation in relation to governmental levels. As biodiversity conservation usually involves costs at decentralized levels of government, whereas benefits reach up to national and global levels, ecological fiscal transfers (EFT) are a suitable policy instrument to account for these spillover benefits on the side of public actors.

Brazil and Portugal - countries that have so far adopted ecological fiscal transfers - target exclusively local governments. This is exemplified by the Brazilian case, where many states have adopted EFTs as a compensation mechanism for municipalities, an arrangement known as ICMS-Ecológico. The ICMS-Ecológico takes ecological indicators into account – protected area coverage being the most common – to share revenues of a state-collected VAT-like tax with local governments.

However, as other federal countries, Brazil has a three-tier federal system of governance - federal government, states and municipalities - and no EFT has been implemented to address the relations between the two upper levels. This is of special concern when it comes to biodiversity conservation and regulatory arrangements of many ecosystem services, as relevant public functions are usually assigned to state and/or federal level in Brazil.

This research explores the rationale supporting a federal-state EFT in Brazil, including an overview on the allocation of ecological public functions, considerations on the financing of these functions and an insight of biodiversity-relevant regulatory policies in place. Options for establishing a federal-state EFT are than be discussed, comparing the alternatives of a) establishing a new scheme or b) implementing changes on existing transfer schemes. In addition, the interface between such an EFT scheme and the existing biodiversity-relevant regulatory framework is discussed; arguing for possible incentive effects this instrument could promote on the implementation of command-and-control policies already in place (eg. protected areas policy and forest protection policy).

Socioeconomic impacts of forest conservation and reforestation PES contracts in Hojancha Costa Rica

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Although when the Costa Rican PES program was launched in 1996, it was not intended to help reduce poverty, the program has been subject to increasing pressure of having positive socioeconomic outcomes. This shift toward measuring the program's effectiveness based on social indicators, coincide with the growing recognition at the international level that conservation is also about people. Furthermore, the social dimension of the program is mandatory by Costa Rican law due to its high dependency on public funds. In this study we analysed the socioeconomic impacts of two payments modalities (conservation and reforestation) in Hohancha, Costa Rica. The study is based on a household survey conducted in 2011. It included a total of 207 landowners, 31 participating in forest protection, 32 with reforestation contracts and 138 respondents that served as control group. Socioeconomic impacts were measured through three indicators: household consumption level, changes in living conditions between 1998 and 2011 reported by the respondent; and, off-farm income in 1998 and 2011. Results show that by participating in the program, households are not made better-off but are not negatively affected either. An interesting finding is that income from non-agricultural sources increased more during the study period (1998- 2011) among non-PES participants than among PES households.

The challenges for implementing the Nagoya Protocol in a multi-level governance context: lessons from the Belgian case

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The 2010 Nagoya Protocol on Access and Benefit-sharing (ABS) is the latest protocol to the Convention on Biological Diversity (CBD). Its core objective is to further the implementation of the third objective of the CBD, *i.e.* the fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge.

The implementation of the Protocol can lead to two fundamentally different policy processes. The first type of process is based on a market-oriented self-regulatory approach, which emphasizes the self- regulating capacity of the concerned economic actors and assumes this is the most effective and efficient mechanism to achieve the objectives of the Protocol and the CBD. The second type of process is based on a normative institutionalist approach, which focuses on the norms and formal rules of institutions that support, frame, shape and constrain the actions of the players acting within them. This second approach relies on the positive institutionalization of the core principles of the ABS regime within national legislation and public policies, beyond the minimal measures for the coordination of the bilateral contracting between economic actors. While the former approach only relies on best efforts of private actors to achieve the social and environmental objectives of the CBD, the latter, by institutionalizing ABS, guarantees that the objectives of the CBD are preserved during the implementation. In other words, for the objectives of the CBD to be ensured through the implementation of the Protocol, an institutionalist approach to implementation is to be preferred.

But the implementation of the Nagoya Protocol is a multi-level governance process: a continuous interaction between different policy-levels, between different departments within these levels and between different governmental and non-governmental actors will be necessary for the implementation to be effective. This multi-level context is likely to impact the choice between a self-regulatory approach and a normative institutionalist approach. This paper thus uses the case of the Nagoya Protocol in Belgium to depict how multi-level implementation favors some governance patterns at the expense of others. It shows that the multi-level governance context characterizing the Nagoya Protocol has a natural tendency towards a market-oriented self-regulatory approach, risking falling short of achieving the objectives of the Protocol.

Institutional design as a driver of transaction costs in forestry carbon schemes in developing countries

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Reducing carbon emissions in the forestry sector based on a functioning carbon market is often seen as a cost-effective measure to tackle climate change impacts. However, transaction costs incurred by transactors are typically unknown, not quantified and therefore usually neglected in their institutional design. In this study, we distinguish between three types of transaction costs: search, design and negotiation costs and measure these based on combination of desk study and a global survey for CDM and non-CDM related forestry carbon schemes implemented in Latin- America, Africa, and Asia, with cost reported both in monetary terms and in terms of people and time. Most importantly, we focus on identifying key factors that drive the magnitude of these transaction costs, i.e. the characteristics of the transaction, the transactors and institutional design. We find significant differences between CDM (mandatory, regulated) and non-CDM (voluntary, non-regulated) projects. Besides the characteristics of the carbon market, our results show furthermore that transaction costs depend on institutional design features such as the origin of the project funding, whether the project is self-financed, the sale of carbon credits, and whether project developers and project participants know each other and have collaborated with each other in the past. In addition, factors relating to the transaction and other project characteristics also play a role in explaining transaction costs, such as the project's duration, payment mode and frequency, and its location. These results provide important indications and recommendations for minimizing transaction costs in designing carbon markets.

Institutional arrangements for agro-environmental policy implementation in agrarian reform settlements in NW Mato Grosso, Brazil

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This case study specifically examines the institutional impacts of Integrated Conservation and Development projects (ICDPs) promoted for forest conservation in Northwest Mato Grosso (NW MT). The study evaluates institutional variables and small farmer perspectives about land use on family farms in agrarian reform settlements, on lots of between 50-100 hectares. The study is based on a sample of farmers in three municipalities (Juína, Juruena, Cotriguaçú) with varying exposure to ICDPs between 1995 and 2012. We assessed ICDP impacts on the perceived feasibility and legitimacy of land use regulation, assessed through on farm surveys, interviews and a participatory workshop. In particular, we assessed land tenure, compliance with land use regulation, views on the national Brazilian Forest Code, and perceptions on environmental governance.

Results indicated that the national Brazilian Forest Code had considerably less influence on settlers' land use decision making than did other criteria. In contrast, ICDPs increased the relevance and legitimacy of land use registration and licensing instruments administered by the state of Mato Grosso. As the latter also owe their origin to the Forest Code, these instruments were found to be potentially synergetic. However, the feasibility of participation in the state regulatory system was embedded within ICDP-induced institutional arrangements, which incorporated concern for livelihood security, support for cooperative organization and material infrastructure, and attention towards reducing farmer transaction costs.

Results also indicated the emergence of community-based arrangements for natural resource management in situations where ICDPs incentivized productive activities in the context of the formal regulatory environment, rather than constraining or deferring land use. The social legitimacy and relevance of Vale do Amanhecer's environmental license was assured through its emanation occurring simultaneously with the promotion of livelihood opportunities. The latter were further supported by the formal certification, tax relief and supply chain stimuli for Brazil nut production and processing activities. The community's commitment toward management of its collective forest reserve emerged in response to such provisions for production and marketing infrastructure. In particular, sustained ICDP presence was observed to produce institutional synergies. A 6-year combination and sequence of interventions established formal environmental regulatory compliance in coordination with local collective action around an alternative commodity chain.

The new October 2012 Brazilian forest code significantly changes forest management rules for small farms in settlements. In the settlements under consideration in this case study, between 80 and 100% of forest restoration liabilities were removed under the new law. As such, the environmental registration system for rural land use, or Cadastro Ambiental Rural (CAR), may have limited potential as a stand alone instrument for forest conservation in settlements, especially where the majority of previously

permitted land use change has already occurred. While new forest code rules may simplify the process of attaining legal compliance, significant forest and biodiversity conservation challenges remain in settlements: how to incentivize forest restoration and farm agrobiodiversity, and continued land tenure insecurity (as land reform beneficiaries continue to be denied permanent title). By coordinating local cooperative organization with regulatory and market instruments, local or landscape scale incentive programs may be best positioned to attend to such land use policy challenges.

Policy mix for palm oil expansion in the Northern Brazil: between social inclusion and elite capture

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The energy grid in Brazil is heavily based on renewables and hydroelectric power and biofuel play a key role. Such a model has been shaped up in the last decades through a combination of policies to support institutional arrangement, technology building, and market development. The limited focus on social dimension in the expansion of renewables (e.g., social conflicts, land concentration, working conditions), however, has created demands to the design of a policies which place the social dimension in the center. The national biodiesel program is an example of this trend, in which a set of policies was created in order to foster the inclusion of small farmers in the production chain. The recent expansion of oil palm in the Amazon, however, raises some questions regarding the effective results of the social inclusion strategy in this initiative. In 2010, the Palm Oil Zone was launched in the Northeast Amazon where social and environmental conditions were identified as the most appropriate for this production system. In the following two years, a series of policies and institutional arrangements were developed in order to create incentives to farmers, corporations, researchers, banks and state agencies to engage in partnerships. As a result, the cultivated area of oil palm increased ten-fold between 2011-13, leading to a fast territorial transformation in the region. In this paper we address the policy mix based on four pillars – environmental/territorial, economic, political, and social - that supported this process and analyze the social outcomes regarding job generation, food security and land security. We conclude that the efforts to facilitate the expansion of oil palm has mainly benefited large farmers, and corporations. While a few small farmers have been benefited economically, many have lost their land due to a land grabbing process, lost their autonomy to develop their mixed production system, and became overloaded with their responsibility to supply seeds to large corporations.

Mainstreaming water trading in water policy

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Water trading has been proposed and actively promoted by the EU as one of the innovative alternatives to reduce water scarcity and to enhance drought resilience in the European Union (i.e. the Blueprint to Safeguard Europe's Waters prompts the development of guidance on water markets for 2014). Nevertheless, experiences in water trading outside the EU show that these schemes emerged and were originally deployed as instruments for economic development rather that as instruments for water conservation. Environmental constraints (Australia and Chile), only appeared in an advanced stage as part of an effort to manage water problems that might have been caused by water trading itself. Based on that, we aim to explore the potential for water trading in the European Union and to analyse its ability to deliver the expected environmental outcomes in terms of increased market output within the same environmental constraints or, alternatively, to preserve current outputs with lower pressures over the water environment.

At first instance, we explore the opportunities to reallocate water resources within and between districts in the Tagus and Segura interconnected river basins. This analysis is replicated for different constraints, such as environmental flows, different assumptions about transport costs, accounting for water physical returns, etc. Once the opportunities to trade with water have been identified, the relevant question becomes whether the transaction costs is low enough to obtain meaningful water trades, within the range of available opportunities. This is why we explore the alternatives to reduce the transaction cost by improving the technical and institutional conditions under which water trading is allowed. We basically conclude that within the range of current environmental constraints and under prevailing institutional conditions, gains at stake in allowing water trading, even in areas with high water scarcity and widespread water inefficiency, are low.

One way to increase these potential gains consists in reducing transaction costs. Along this same line we explore two sets of complementary strategies to enhance the potential environmental outcomes of fostering water trading. The first one consists in sequencing water policy reform basically by the gradual introduction of trading. The second one consists in packaging trading with other economic policy instruments such as a water price reform, designed to enhance water security in the long term, and a drought insurance scheme intended to reduce groundwater overexploitation in dry periods. Synergies between the three instruments as shown in the paper can be used both to improve the institutional set up, and to reduce transaction costs, as well as to deepen water trading through enhancing its potential to reduce water scarcity.

The empirical analysis is based on the microeconomic models develop for the study of water scarcity and droughts in the Segura and the Tagus interconnected river basins in Spain.

New developments in the EU Common Fisheries Policy – how to integrate the preservation of ecosystem services in fisheries management

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Already in the treaty of Rome the European Union (at that time the European Community) decided to introduce a common policy for fisheries. However, due to the relative unimportance of fisheries at that time no regulations on fisheries management were adopted. This changed in the 1970ies with the introduction of the Economic Exclusive Zone (EEZ, 200 nautical miles) and new member states with large EEZs (e.g. UK, Denmark, Spain, Portugal). The EU Common Fisheries Policy (CFP) was then introduced in1982 with the first basic regulation. Since then the CFP was often criticized for not fulfilling the objective of a sustainable exploitation of marine living resources and for creating huge negative effects on ecosystem services of the marine ecosystems.

With the adoption of a new basic regulation for the CFP in 2013 (the CFP must be revised every 10 years) the preservation of ecosystem services will play a larger role than in the past. The CFP is in the meantime part of the overall EU Maritime Policy and shall form the basis of measures in fisheries to also fulfill the FFH-/Bird Protection Directives (NATURA 2000 network) and the Marine Strategy Framework Directive (MSFD). Several of the new instruments in the CFP will have to prove that, including the ban of discards (overboard throwing of bycatch of e.g. non-target species), the direct introduction of protected areas for preservation of nursery or spawning grounds or the move to maximum sustainable yield as management goal of fish stocks.

In the paper I will firstly give a short overview on the new basic regulation with a focus on the new instruments to preserve ecosystem services. In the second part I will discuss if these instruments can fulfill the objectives of the EU Maritime Policy (via Natura 2000 or MSFD) and what experiences we have in fisheries management with such kind of regulations (this is analyzed at the moment in the EU project SOCIOEC). As we have now the first proposals for management measures in Natura 2000 sites and to fulfill MSFD objectives I will, thirdly, describe the process of implementing the new measures in Europe via the CFP. In a fourth section I will then formulate conclusions for improvements of future fisheries management measures.

Ecological fiscal transfers in Germany – from theory to possible outcomes

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This paper analyzes the theoretical foundations of ecological fiscal transfers, institutional settings for an implementation in Germany and discusses possible outcomes from an economic perspective.

Externalities are generally assumed to lead to a suboptimal level of supply of the relevant goods and services. In nature conservation, positive externalities are likely to occur due it its characteristics of a public good. Moreover, there are spatial spillovers of conservation benefits and ecosystem services provided by protected areas. Especially those services with a long spatial range such as biodiversity conservation, climate or water regulation benefit parties beyond those involved in conservation efforts. Costs and benefits are hence unequally distributed and lead to a suboptimal level of supply. Compensating mechanisms addressing nature conservation measures would increase social welfare.

In Germany, nature conservation is both a public function and a constitutional, national objective. The federal states (*Länder*) have a central role in financing and implementing nature conservation. Compensation of private land owners bearing land-use restrictions is already in place and subject to scientific studies. However, economic instruments compensating public actors for benefits of nature conservation are a relatively new field for both research and politics.

The intergovernmental fiscal transfer system (FTS) in Germany allocates budget between federal, state and municipal levels. Generally, all states should have the same budget per capita available for their public functions. But it has been shown that densely populated city states have above average fiscal needs per capita for cultural and social public functions, while sparsely populated states have a higher fiscal need per capita for infrastructure. These above average fiscal needs have already led to corresponding modifications of the FTS, designating a higher share of fiscal transfers for the most densely and most sparsely populated states. Comparable considerations also apply to ecological public functions such as nature conservation and ecosystem services provision. However, these have not yet been accounted for in the current FTS. For Germany, this paper will demonstrate that the expanse of designated protected areas and population density is negatively correlated and that sparsely populated states spend an above average share of their budget for ecological public functions. Integrating ecological indicators into the German FTS could be a measure to compensate for an above average share of the states' area for nature conservation.

Given the preferences of the states that have designated protected areas above average, it can be assumed that an additional, non-earmarked budget would at least partly be spent on nature conservation. Especially, if by the instrumental design protected areas become a source of income, those states with marginal cost below marginal benefit would be expected to increase the expanse of protected areas or invest in better quality of existing areas. Given that opportunity costs of conservation are relatively low in sparsely populated states the introduction of ecological fiscal transfers benefiting these states would lead to cost savings in nature conservation. An appropriate instrumental design can hence lead to overall efficiency gains. Interactions with other instruments would still have to be considered.

Optimal policy mix to address nutrient runoff and GHG emissions in agriculture

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The purpose of this paper is to analyse the characteristics of policy instrument mix for addressing simultaneously nutrient runoff and greenhouse gas (GHG) emissions from agriculture. The analysis is based on the heterogeneous land quality model with the following aspects: (i) nutrient runoff depends on fertilizer application and chosen tillage method (conventional tillage and no-till), (ii) sources of GHG emissions are fertilizer application, autonomous soil emissions and life cycle analysis (LCA) emissions associated with alternative tillage methods, (iii) emissions and yields vary over three soil textural classes (clay, silt and organic soils) and over land qualities, (iv) green set-aside can be adopted as a mean to sequester soil carbon and, (v) the entry and exit of land between agriculture and forestry (afforestation of arable land) is allowed as a land use option that decreases nutrient runoff and sequesters soil carbon relative to crop production.

Our theoretical framework suggests that to establish the socially optimal fertilizer intensity, choice of cultivation technology and land allocation, the climate policy design requires policy mix consisting of emission taxes levied on both fertilizer use and autonomous soil emissions and soil carbon sequestration payments to promote long-term green set-aside and afforestation. This policy mix provides full incentives for farmers to adjust production intensity, tillage choice and land allocation to the socially optimal level.

Our empirical results show that nitrogen and particulate phosphorus runoff are considerably higher from conventional tillage than from no-till. However, no-till increases dissolved phosphorus runoff relative to conventional tillage. Optimal policy requires a combination of a tax on fertiliser application and a tax on fertiliser independent soil emissions both of which are differentiated in terms of soil type, soil quality and tillage method. No-till is socially preferable tillage method to lower production costs and total nutrient runoff. On high quality soils crop production with no-till is adopted while on low quality soils afforestation gives the highest returns.

The optimal fertiliser tax rates increase when more emissions types are accounted for. If only CO_2 emissions are accounted for, the tax rate is small, only 3% but it increases to 19% with all CO_2-equivalent emissions. When also nutrient runoff is included the tax rate increases to 60 %. Finally, the tax rates for no-till are lower than for conventional tillage, because no-till causes so much lower nutrient runoff damage.

Payments for environmental services within cash transfer programs: the “PSA-H-mix” in Yucatan, Mexico

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The Mexican program of Payments for Hydrological Services (PSA-H) aims at forest conservation. Although referred as a PES, it is considered by some observers as a hybrid of market-like mechanisms, state regulations and public subsidies (McAfee and Shapiro, 2008). In addition, it is seldom applied as an isolated instrument but rather as a component of an existing policy-mix. This article therefore seeks to demonstrate the PSA-H’s role within other Mexican programs. In this light and based on *ejidal* and household surveys conducted in the state of Yucatan, this paper first identifies the various policy mixes and discusses the different factors influencing their existence, in particular the diverging PSA-H enrolment years.

Policy-mixes can be defined at the community and individual levels. Most PSA-Hs are implemented at community level and interact with other conservation and reforestation programs. However, as the payments are redistributed among the member of the communities, they are part of household’s portfolio including other agricultural subsidies and conditional cash transfer programs. The paper thus explores the policy-mix nesting level and its impact both at individual and community level.

Biodiversity offsetting frameworks: overview and critical analysis of opportunities and risks

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Biodiversity offset is an expanding innovative tool with specific measures. First developed in the 1950's to respond to pressures caused by the implementation of infrastructure projects on the environment, this tool aims to complete traditional policy instruments such as taxes, quotas or standards for securing biodiversity preservation outcomes (ten Kate et al., 2004). Compensation shall be mobilized to internalize the negative externalities caused by infrastructure projects. This tool is part of a global mitigation process where biodiversity offset is used as last resort to achieve no net loss. Currently, offsetting is mostly used in a confused or unclear way.

How to define biodiversity offset in comparison with other forms of environmental stewardship? Which governance modes are underlying biodiversity offset? What are the opportunities and risks involved in the process of mitigation?

The objective of this paper is to clarify offset practices and to analyze the strengths and weaknesses of compensation from ecological and economic perspectives. We identified three offsetting schemes and built a comparative analysis highlighting their opportunities and risks.

By analyzing the differences in biodiversity offsetting frameworks, heterogeneity of measures quickly appears and requires specifying modes of governance. The key characteristics lead to distinguish three main types of compensation: in-kind, financial and banking biodiversity offset (UICN, 2011). In-Kind Compensation (IKC) aims at restoring, from the ecological point of view, the functions provided by ecosystems through four key features: restoration, rehabilitation, creation and/or preservation implemented to offset degradation of affected sites (Morandeau et al., 2012). IKC has specificities such as local scale (in-site compensation), proceedings (in-kind actions), ecological valuation (Habitat Ecological Analysis, Uniform Mitigation Assessment Methodology and Simplified Assessment Method (Bas et al., 2013)) and local authority actors. Financial Compensation (FC) is the second modality of compensation offered to master works. In this case, building owner chooses to pay a sum destined to actions for the environment as a whole. If this form of compensation is offered and chosen by the building owner, he hires experts (consultants, researchers...) to make monetary valuation of impacts (value-to-cost and value-to-value). Biodiversity Banks (BB) have established intermediate structures to help building owners to offset before developing their project by purchasing biodiversity units. This form of compensation is more innovative thanks to the number of assessments (ecological and economic) and their complexity, the multitude of actors, the ability to minimize the gap between the time of destruction and the offset measures, the integration in a global process and territory planning.

After having characterized biodiversity offsetting schemes from an institutional point of view, we analyzed the opportunities and risks of these schemes in a comparative way, using case studies. Our cross-analysis underlines a number of ecological and economic advantages that can result from the use of offsets for different stakeholders – such as the integration of biodiversity conservation into the investment plans of companies, the lifetime of the measures, the improvement of assessment methods building, some flexibility in applying measures, market share gains, etc. We also identified several limits to offsetting such as achievability of compensation theory, the importance of economic actors' interests, the lack of knowledge capitalization, etc.

Policy mix for sustainable waste water management - the case of the German Waste Water Charge

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Germany has a long-standing tradition of combining command-and-control approaches and economic incentives for waste water management regulation. Way before the European Water Framework Directive (WFD) implementing the requirement of (full) cost coverage including environmental and resource costs (ERC) the German Waste Water Charge has been introduced 1976 (levied since 1981) additional to the standard approach of command-and-control policies based on best available techniques for wastewater treatment plants. The charge is tied to the amount of pollutants discharged into surface, coastal or groundwater, regardless of whether or not this amount surpasses the existing legal threshold value. The introduction of a market-based instrument in the 80s was particularly motivated by the tremendous financial challenges of modernising the German waste water treatment infrastructure in the past. By leaving polluters the decision to either pay the levy or to invest in more effective treatment technology – a decision that will be made in regard to the polluter's specific abatement costs –, the levy reduces the overall economic modernisation costs in this area (efficiency). Moreover, the Waste Water Charges Act is considered to have contributed substantially to today's largely satisfying chemical quality of surface water bodies in Germany (effectiveness).

However, the concrete design of the policy mix has been widely criticised for being inadequate and not to guarantee the efficiency gains to be expected theoretically. Rather, the levy limited itself to a simple instrument of supporting command-and-control allowances instead of being a powerful allocation means in order to promote static cost-effectiveness as well as incentives for continuous innovation. On the other hand the charge has been animadverted by municipalities and industries being obliged to pay for discharging because of the expected burden and reputedly missing allocative effects.

Theoretically, New Institutional Environmental Economics provide fresh arguments for an intelligent policy mix combining market-based and command-and-control measures in waste water regulation. Structuring investment decisions on the basis of cost criteria only runs the risk of creating pollution hot spots and fails in hazard control; traditional threshold approaches using BAT provide a useful complement as they might guarantee an ecological minimum subsistence level.

While the environmental success of this two-track waste water regulation in Germany is widely acknowledged nowadays for the past, the concrete design of the interplay and its efficiency performance as well as the charge's future perspectives are, up to now, a matter of intense and controversial debate. However, with the adoption of EU WFD in 2000, the framework conditions for this debate have significantly changed. As Art. 9 WFD takes up the notion of efficiency in the context of water resources management and requires the consideration of the polluter pays principle as well as the principle of recovering the costs of water services including ERC any resistance against an efficiency-oriented reform of the German waste water charge faces an increasing necessity for justification. Nevertheless, in the discussion on an upcoming revision of the German Waste Water Charges Act the implications of Art. 9 WFD have only gained very little attention. Against this background the paper reconsiders the theoretical case for a policy mix using charges for waste water regulation, outlines the lessons learnt from the German case and analyses the implications of Art. 9 WFD for choosing or reframing an existing policy mix in the field of waste water regulation compassing future perspectives for waste water charges interacting with standards.

Water scarcity in Southern Europe: Taking advantage of synergies and interactions between economic policy instruments to build water security

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Freshwater is a finite and vulnerable resource that is essential for sustaining life, development and the environment (ICWE 1992). However, population growth and the improvement of living standards brought about by development have generated during the last decades an unprecedented increase in water demand, exceeding the limits of water supply for the first time in history in many regions worldwide. The response to this challenge has mostly consisted in expanding water works to make an even larger amount of resources available, thus ignoring water supply constraints. In addition, this water demand crisis has been followed by a supply-driven one (a decline in the quality and quantity of available freshwater), which is perceived by many experts as one of the top five global risks (OECD, 2013).

Water authorities have tried to address this two-fold challenge through the control of water demand. Accordingly, the very simple rules used to manage water in times of abundance have also been improved and finally morphed into increasingly complex water management plans (EC, 2008). However, water demand cannot be as easily harnessed as water supply can. Economic incentives have recurrently proved their capacity to exploit loopholes in the system. As a result, the effectiveness of command-and-control tools is often threatened by non-compliance of water users, hence demanding a high level of (expensive) enforcement.

Noteworthy, command-and-control policies are applied through legislation and do not use economic incentives. Actually, economics has been largely ignored in water policy until very recently. Therefore, with the exception of (often dogmatic) water markets, there are not many examples on how economic instruments may perform in combination with conventional supply and command-and-control policies, let alone on the performance of several economic instruments at the same time. However, a comprehensive assessment framework is needed indeed to detect the relevant synergies that may exist among the different economic instruments that are demanded to address the (polycentric and multi-level) perverse economic incentives in place.

Following this need we have developed an assessment framework to measure the potential of three particular economic instruments (namely, water use right markets, drought insurance for irrigated agriculture and water pricing) to address the problem of recurrent scarcity and droughts in Southern Europe. We have found that although one particular instrument might seem to be better suited for a particular objective, if properly designed, each instrument can generate positive spillover (e.g., drought insurance directly reduces agricultural overexploitation during drought events, but it may also help stabilize agricultural income and to regain control over groundwater bodies on which urban users also rely). In addition, these synergies are too often two-way ones (e.g., water pricing would allow better functioning water markets, while water trading would reduce the cost of water security – and thus water prices). These ideas are illustrated with evidence drawn from the case study on designing economic policy instruments to cope with water scarcity and droughts in the Segura river Basin in Southeastern Spain.

The basic lesson to be drawn from our analysis is that rather than being panaceas to solve the problems of water management, economic instruments are integral parts of adaptation strategies that need to be designed and implemented in combination with others so as to exploit their self-reinforcing advantage.

The role of different aspects of governance and agricultural expansion in tropical South America: Jevons paradox or sustainable intensification?

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The process of global deforestation calls for urgent attention. The main direct cause of tropical deforestation remains agricultural expansion followed by wood extraction, while the main indirect causes include economic growth, population growth and technological change. As world population is expected to reach 9 billion by 2050, emphasis is being placed on agricultural intensification to address the food security issue without further impacting on forests.

In this article we build on previous research and address two important questions: how does the interaction between the quality of governance and agricultural intensification impact on spatial expansion of agriculture? Which aspects of governance are more likely to ensure that agricultural intensification allows sparing land for nature? We complement the use of traditional governance indicators provided by the World Bank, with a proxy of environmental governance based on the proportion of terrestrial area under environmental protection. Addressing these questions is important in order to determine whether agricultural intensification will reduce pressures on deforestation or whether it may actually strengthen the incentives to further convert land to agriculture, signalling the existence of a Jevons paradox.

We combine data from the FAO, the World Bank, the World Database on Protected Areas and the Yale Centre for Environmental Law and Policy for 6 Southern American countries (Bolivia, Brazil, Colombia, Paraguay, Peru and Venezuela) to construct panel data, and study the major determinants of agricultural land expansion over the period 1970-2006.

Previous results indicated that the effect of agricultural intensification on agricultural expansion is conditional on the “quality” of public governance. In particular, agricultural intensification would lead to an expansion of agricultural area for high values of the traditional governance indicators. Good traditional governance may reduce the “fixed costs” associated with land conversion to agriculture and lead to agricultural expansion, indicating the existence of a Jevons paradox. However, when using proxies for the quality of environmental governance, the results are markedly different. When the environmental governance indicator is high, intensification leads to a spatial contraction of agriculture, signalling a sustainable intensification process. Additional results include the effect of service on external debt, population and per-capita GDP, all of which are ultimately positively correlated with agricultural expansion.

Encouraging biodiversity conservation by north Australian pastoralists through a mix of financial incentives and legal liability provisions

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Tropical savannas cover around one quarter of the Australian continent and span across three states. Savanna landscapes support an abundance of endemic plants and animals, which are adapted to the harsh climatic conditions. The ecological condition of Australia's tropical savannas has widely declined since European settlement, in large part due to cattle grazing. Tropical savannas endure a combination of relative under-representation in the formal conservation estate and low participation of cattle producers in on-farm conservation.

Cattle grazing is the predominant land use of Australia's tropical savannas. Cattle grazing enterprises tend to be large. They can be >10,000 km2 in size and carry tens of thousands head of cattle. Nowhere is conservation action more critical than on farms that cover vast tracks of land with high

ecosystem values because one farmer's land use decisions can have implications for biodiversity conditions at the regional scale.

This paper reports the results of empirical research conducted with north Australian beef producers ('pastoralists'). The first line of investigation explored what pastoralists thought were 'reasonable and practical' conservation measures to adopt under their environmental duty of care, which provided a legal liability provision. The second line of investigation used discrete choice modeling to estimate the financial incentives and contract conditions that would be required to entice pastoralists to participate in voluntary biodiversity conservation.

On the basis of empirical evidence the paper proposes that a combination of financial incentives (voluntary biodiversity conservation contracts), statutory provisions (environmental duty of care legislation) and land administrative rules (lease renewal conditions) can ensure that private landholders contribute sufficiently to safeguard the biodiversity of Australia's tropical savannas.

Social criteria for assessing conservation policy instruments

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There is increasing recognition that social impacts are important factors to consider in the assessment of conservation policy instruments. The Convention on Biological Diversity's (CBD) Programme of Work on Protected Areas, for example, calls on Parties to assess the social and economic impacts of establishing and maintaining protected areas particularly for local communities and indigenous peoples (https://www.cbd.int/programmes/pa/pow-goals-alone.pdf).

But the assessment of social impact is conceptually and practically challenging. While a number of frameworks for assessment have been developed, they raise significant issues of interpretation and judgement. In addition to practical challenges of determining which stakeholder groups and which social variables are of the most concern, and establishing attribution, there is a fundamental challenge of determining whether the overall outcomes are fair. This is complicated by the potential for tradeoffs between achieving the social goals and environmental goals of the policy instrument. Ultimately a judgement is needed as to whether these observed or predicted changes are acceptable. This has several implications for the assessment of a conservation policy mix.

First it requires going beyond the fairness of outcomes to consider also the fairness of process, or procedural justice in the process of decision-making and in the design and implementation of the policy instrument. Second, it requires criteria for determining fairness of both process and outcomes, but there is no single set of criteria that can be applied in all situations. In examining distribution of costs and benefits of a policy instrument between different groups, equal shares of costs or benefits to individuals may be considered appropriate in some situations, but in others where there are marked differences in income or wealth, the criterion of allocation according to need may provide a better basis for assessment. Third it raises the question of whose fairness criteria should be applied, those of external researchers of those of the affected population? This in turn has implications for the type of research methods that need to be employed.

This paper will review how these issues have been addressed in assessments of the social impacts of conservation policy instruments. With examples from the Policymix case studies and other research, it will draw lessons on how social criteria can be applied in assessment.

Social implications of benefit-sharing arrangements in conservation policies: the case of Indonesia

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Payments for Ecosystem Services (PES), Reducing Emissions from Deforestation and Forest Degradation (REDD) and Access and Benefit-Sharing (ABS) are prominent environmental policy instruments. All three conservation-oriented instruments promise to combine incentives for more sustainable natural resource management practices and poverty reduction through valuation of ecosystem services and benefit sharing mechanisms. However, PES, REDD and ABS have been developed and implemented under different circumstances related to time, context and actors. So far, adequate frameworks assessing the social impacts of such benefit-sharing arrangements are lacking. In this article we develop an analytic framework to evaluate the social implications of Indonesian benefit-sharing arrangements by looking at the institutional design of the policies, their interplay and the form of benefit-sharing they imply. First, when analysing the institutional design we look at the rules, institutions and actors (see Corbera et al. 2009) that develop and implement conservation- oriented benefit-sharing arrangements, in particular through PES, REDD and ABS policies, and investigate how these have changed over time in Indonesia. We argue that the institutional design and especially the underlying property rights systems have significant influence on the social inclusiveness of benefit-sharing mechanisms in Indonesia. Here, forests are owned and governed by the state and managed by companies through a concession system whereas local communities have only limited access and rights. Second, interplay describes the interaction of PES, REDD and ABS policies and their interactions with other related programmes and policies. We assess for example whether in parallel existing PES, REDD and ABS policies account for reciprocal effects regarding design and implementation and whether there are institutional overlaps within these policies. PES, ABS and REDD policies have been proposed and developed by different institutions and actors. ABS and REDD policies are backed up by different international conventions (Convention on Biodiversity and United Nations Framework Convention on Climate Change) whereas PES policies are usually national initiatives. We argue that the interactions of the policies are rather counterproductive. Third, benefit- sharing is a further important factor that influences the social impacts of PES, REDD and ABS policies. Benefit-sharing can be understood as an “Agreement between stakeholders, such as private sector, local communities, government bodies and non-profit intermediaries concerned about the equitable distribution of benefits related to the commercialization of forests” (see FAO 2003). Based on a review of existing theoretical literature on benefit-sharing and environmental policies in Indonesia we develop a typology of conservation-oriented benefit-sharing instruments in Indonesia that can be applied to PES, REDD and ABS policies and considers the social implications of the different benefit-sharing mechanisms.

The parameters of policy portfolios: Verticality and horizontality in design spaces and their consequences for policy mix formulation

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The multi-dimensional nature of mixes has been ignored in the policy instrument choice and policy design literature, resulting in a lack of clarity and difficulties associating different kinds of actors and evaluation criteria with mixes (Leutz 1999) and the continual use of outdated or inappropriate design maxims in their construction which significantly enhance the potential for over and under- designing. Even with only three main portfolio dimensions – goals, policies and levels - the design situation is more complex and nuanced than is normally depicted in the existing policy design literature.

The aim of this article is to develop the main elements of a theoretical and methodological taxonomy which can help to clarify the different types of policy portfolios which are currently often ignored or improperly juxtaposed in the literature on the subject. This is done in an effort to provide the basis not only for better designs but also for improved considerations of the formulation processes and actors involved in such complex policy-making efforts. The discussion thus contributes to efforts currently being made to assess the success or optimality of complex policy mixes (Mandell 2008) and advances the project of revitalizing policy design studies urged by Howlett and Lejano (2013).

Thus, this paper distinguishes between mix types and their impact on policy formulation. It defines key types of mixes based on the complexity of design variables such as the number of goals, the number of policies and the number of levels of government and sector involved in the design of a policy bundle. The taxonomy is then used to assess the validity and applicability of oft-cited but under- theorized and under-examined portfolio design principles and precepts.

The paper argues that complex policy mixes inherently involve interactions between the different instruments of which they are composed, either in the form of conflicts or synergies. These can be defined as horizontal - between different types of instruments, policies or governments - and vertical - between different levels of goals, policies and levels of government. These two dimensions each contain a number of elements and a large number of possible permutations. However it is possible to refine significant mix types and design spaces to eight basic types: four relatively simple instrument mixes and four more complex policy mixes.

Mitigating the conflicts and encouraging synergies within these mixes through effective policy design first requires recognizing these different design spaces and their implications for what is being designed and by whom (Howlett 2013). The typology of outcomes set out in this paper suggests an increasingly complex environment for policy formulation as the complexity of portfolio parameters increases, ranging from relatively simple single instrument mixes to the multi-level, multi-goal and multi-policy bundles of higher numbered types.

When does a new policy mix replace an older one? The development of the oil sands reclamation regime in Alberta, Canada

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When, why and how do policy mixes change? Much of the contemporary interest in policy mixes is focused on first, distinguishing simple policies from more complex policy mixes and, second, developing criteria to assess the likely performance of particular mixes. These are important and necessary analytical tasks. However, the next step is understand the reasons why policy mixes change and to determine whether the change is an improvement. These are not simple tasks. Even the identification of change in a policy mix is challenging, given that much of the existing literature focuses on the adoption or deletion of single instruments or on the kind of wholesale shift in policy goals that Peter Hall described as a change in policy paradigms.

In this paper, we analyse the development of a complex policy mix out of a “simple goal, single instrument” policy regime in the case of reclamation and remediation of the Alberta oil sands. Using an innovative framework that combines static analysis of the elements of a policy mix drawn from the policy design literature with dynamic analysis of how those elements change over time based on the work of the historical institutionalists, we identify three distinct periods of policy development. We demonstrate the importance of the processes of layering and conversion in increasing the complexity of policy mixes but also draw attention to mechanisms that adjust the relationships between elements to enable complex policy mixes to continue to function for decades. The case of the Alberta reclamation regime also provides at least one example of the wholesale replacement of a policy mix deemed to be overly complex and unwieldy with a new mix, together with evidence that layering, conversion and adjustment begin in the new mix almost immediately.

A particular feature of the Alberta oil sands reclamation case is the effect of introducing environmental assessment processes and ecological ideas into an older policy mix based on the goal of returning reclaimed land to “productive” status. In addition, however, the case illustrates the underlying logic of policy mixes, that is, designing policies with a sufficiently complex mix of elements to address increasingly complex policy problems, and the challenges that complexity presents to policy makers in a case of very intense environmental impacts on a massive scale.

PES, law compliance and poverty: trade-offs and potential for policy mixes

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PES initiatives or programmes are more and more considered for fostering conservation, both in developed and in developing countries. Their interactions with other instruments and policies need to be assessed both theoretically and empirically. In this paper, the interactions between PES, incentives instruments, and legal regulations prohibiting specific environmental destructions, will be analysed. In principle, the two instruments cannot be used simultaneously on the same territories. Doing so would lead to pay people to comply with the law, and could undermine legal regulations: people could become reluctant to "comply with regulations for free", meaning adopting utilitarian (cost-benefits calculus) relationships with law compliance. In practice, law prohibiting, for instance, forest clearing is not removed in territories where PES initiatives for protecting forests are developed, since changes in the legislative framework convey other stakes and obstacles difficult to overcome.

The issue cannot be discussed only from a theoretical standpoint, disregarding the social conditions of stakeholders. In developing countries, when the law prohibits forest access to a growing population of very poor farmers who manage soil fertility through shifting cultivation practices (slash-and-burn) and cannot access the assets allowing for alternative, legal restrictions as such are ineffective and, possibly, illegitimate, as it is the case in Madagascar. On the other hand, for the wealthiest farmers, paying for simply complying with the law raises economic and ethical issues (windfall profits offered). Social policies reserving the benefit of PES for the poorest fringe of the population for giving them the capacity to comply with restrictive environmental laws might be considered in public policy mixes.

Beyond the issue of poverty, there is also an issue about whether payments should be conceived as a compensation (of an opportunity cost) or a reward for past practices. In Mexico, the initial idea was to use PES in complement to protected areas, which were already effective. The NGOs speaking in the name of the "civil society" defended the viewpoint that PES should reward local populations for past efforts of conservation of protected areas and natural forests. From an economic standpoint, this could be interpreted as a payment for "business-as-usual" practices, against the principle of efficiency expected from economic instruments. But, once implemented as a reward, the impact of the PES seems going beyond the individual costs-benefit calculus based on the opportunity cost: social pressures on individuals for law compliance in order to secure the collective payments, extension of forest protection to non-PES-contracted forests as a consequence of uncertain information about the area concerned by the PES contracts.

Such considerations invite revisiting the traditional doctrinal standpoints related either to the policy principle of not paying someone merely for law compliance, or to the efficiency principle (additionality) associated with economic instruments, and to determine whether there are social and environmental benefits at managing exceptions to these principles.

The paper will be based on first hand surveys in Madagascar, where conservation objectives are pursued through the setting of REDD+ projects with PES-like initiatives, and in Mexico, where a national PES program focusing on water quality and availability is on-going.

Creative destruction or mere niche creation in policy mixes for low energy innovation? Empirical insights from Finland and the UK

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Recently, there has been increasing interest in the innovation studies literature in questions surrounding policy mixes. While it has for long been acknowledged that the stimulation of innovation through policies includes a number of different types of policy instruments, the issue of how such instruments might interact and form (in)coherent policy mixes has only relatively recently been discovered as being of interest to this community. We argue that an area in which coherent policy mixes are particularly important is the emerging field of sustainability transitions. This literature has received increasing interest in the context of innovation studies but goes beyond mere innovations, examining change at the level of socio-technical systems from the perspective of improvements in environmental sustainability. Transitions in the form of systemic changes in current structures for consumption and production are viewed as of paramount importance to reduce the overall environmental impacts of human activities. Transitions imply not only the development of disruptive innovations but also of policies and policy frameworks aiming for systemic change. In practice, this kind of redesign of policies is challenging, because it presents a contradictory ideology to that of traditional innovation policy focused on economic growth. Thus, ideally innovation policy mixes for transitions might include elements of 'creative destruction' aiding sustainability niches to gain ground by simultaneous processes inducing the destabilisation of existing unsustainable socio-technical regimes. Therefore, we propose that policy mixes favourable to sustainability transitions need to involve both policies aiming for the 'creation' of new and for 'destroying' the old, with the latter creating 'windows' for competence-destroying innovations. This paper conceptualises innovation policy mixes for fostering sustainability transitions and applies this conceptualisation to study low energy innovation policy mixes in Finland and the UK. We define low-energy innovations as innovations which reduce the demand for energy and/or increase energy efficiency.We explore 1) whether in general, such fundamentally different policy goals and instruments can be combined into a coherent policy mix able of fostering transitions; and 2) whether present public sector activities aimed at stimulating low energy innovations in Finland and the UK add up to a coherent innovation policy mix suitable for fostering transitions towards low energy systems? The paper provides a mapping exercise of current policies influencing energy use and efficiency across sectors to identify significant gaps and incoherences in the policy mixes from the perspective of transitions. It creates a novel analytical framework describing elements that policy mixes should ideally address to facilitate competence-destroying innovations for sustainability.

A policy assessment under uncertainty of fishery management and marine ecosystem: Japanese clam fishery collapse

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This study develops a fishery assessment model which will play an important role in facilitating policy design for the increasing real-world aquatic resource depletion and fishery collapse. The model considers economic and ecosystem uncertainties. Therefore, a dynamic computable general equilibrium model is formulated with the Gordon-Schaefer bioeconomic model and the Michaelis−Menten predator-prey model, and then the observation data is incorporated into the model for the statistical model estimation. The extended Kalman filter is applied for the model identification. Contrary to the conventional econometric model employing parameters of fishing vessels and fish equipments, the model defines the capital as those aggregates in a framework of the regional social accounting. This assumption cannot trace the substitutability between specific fishing elements, but gives a broader interpretation of not only the relation between the fishery and the rest of industry but also the global response over time. Especially, the identified model gives a comprehensive insight into the fishing effort of labor, the trend of technological change, trading markets, and the dynamics of marine ecosystem, i.e., predators and preys. Therefore, the model will provide information to get great performance out of policy mix when a specific resource management should be examined by the stakeholder.

An empirical study of the Japanese clam fishery collapse is performed by the identified model. The following results are obtained. The clam stock decreases by a little bit of overexploitation. The problem is the following feeding damage after the clam seedling releases with predators. The model predicts that the natural growth rate of clams gradually decreased to balance the clam reduction by feeding damage. This indicates that the resultant catch by fishing asymptotically approaches zero, i.e. the fishery collapse. According to the estimated input-output structure of the clam fishery, the growth accounting reveals excessive inputs of labor and capital even in the stable fishing period. In addition, the fishery output decrease can be explained by the total factor productivity.

From the analytical result, the fishery collapse occurs by the economic and ecological reasons; the weaken fishery in economic market over time and the drastic decrease of clam stock incurred by an ecologically improper seedling release. This study indicates that a certain policy mix, the economic policy to strengthen fishery and the ecological policy to recover the clam stock, should be sought as long as the clam remains a marine resource.

Funding forest conservation with payments for ecosystem services in Indonesia: are economic signals lost in the way?

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Building on a model of economic signals (incentives), their receiving by recipient farmers, and the latter's resulting strategy, behaviour and land use chosen, this article analyses a payment for ecosystem services (PES) scheme in the Cidanau watershed, Indonesia. In this area, land use changes, erosion and sedimentation are associated with decreased water quality and quantity and thus have led a downstream private water plant company to willingly pay, through an intermediary non-governmental organization (NGO), several groups of upstream farmers to plant and conserve a minimum number of trees on their individual private lands. Contract run for a renewable five-year period and payments are conditioned by participating farmers' compliance with rules (no cutting or felling of trees, conserving 500 trees per ha minimum) and annual monitoring by the ecosystem service buyer together with the NGO.

In January 2013, within the INVALUABLE BiodivERsA research project, we administered a structured survey questionnaire to a random sample of 270 participating farmers (75% of all households joining the scheme) so as to investigate several research questions: a) is the economic signal (payment in the PES scheme) sent to appropriate actors (receivers)?; and b) do the governance structure of the PES scheme allows participating farmers to correctly understand the economic signal and behave accordingly?

To answer such questions, household surveys allow us to analyse farmers' rationality and capacity, as well as their behaviours and motivations. Contributing to the growing behavioral literature on PES, results on farmers' motivations first show that participating farmers do not join the PES scheme for economic reasons but rather for intrinsic, including cognitive and social, motivations; as a result, contrary to assumptions in the standard economic theory of PES, economic signals sent (payments) seems marginally essential when ES providers decide to participate and modify land-use strategies. Second, farmers receiving the signal are not well targeted as most of these already displayed 'pro- environment' behaviours and actually conserve trees prior to the project. Third, understanding about the PES (signal) is low among farmers: while most of them generally know about rules associated with the scheme, almost none of them do know about the periodicity and amount of payments. On the contrary, decisions are felt to be centralized in leaders' hands. In fine, one cannot expect this PES scheme in Cidanau to prove environmentally effective and additional. Chosen land-use patterns are indeed far from being influenced by the project economic signal, but rather determined by already existing social influence, traditions and dependency to forest as a main source of livelihood. This in turn casts some doubts on the strong economic assumptions underlying the recent emergence and development of PES schemes in developing countries, and calls for further research on farmers' motivations and behavioral response to such environmental schemes.

Assessing the status of biodiversity politics and biodiversity policy perceptions at the federal government level in Germany – Implications for applying policy instruments

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How a policy field is regarded and dealt with by its practitioners is an important question when considering the issue of applied and preferred policy instruments. A new study undertaken by the Leuphana University and WWF Germany is addressing exactly this question with relation to the field of Biodiversity. The study focuses on biodiversity politics and its integration in Germany's political process on federal level in order to determine to what extent biodiversity is institutionalized in politics as its own topic.

The topic of biodiversity – which includes the variety of species, ecosystems, and genetics – is becoming a more prominent as well as a more pressing problem in political science and for political and administrative stakeholders. Therefore, it is of vital importance to review the status of biodiversity policies in the political and administrative processes and to offer analyses and solutions to their governance challenges. One of these governance challenges is finding a configuration of policy instruments that would best serve achieving the goal of preventing biodiversity loss. Biodiversity can also illustrate how a state and its actors (e.g. agencies, ministries) concretely handle sustainability politics because all sustainability dimensions (ecological, economic and social) are affected when it comes to biodiversity.

To take a fresh look at biodiversity politics and to gain a better understanding of the level of recognition, implementation and significance of biodiversity politics as a distinct political realm, the study reviews almost every federal ministry as well as the political parties in the German parliament (2009-2013) by conducting in-depth interviews with practitioners, such as members of Parliament, undersecretaries, heads of divisions and subdivisions to referents, and analyzing official documents. The main focus lies on how institutionalized biodiversity is in Germany's federal political and administrative landscape and if there is a strategic perspective for its implementation in the political process. Closely connected to this and of equal importance, is a detailed examination of which policy instruments are used and preferred by various institutions. Reviewing different actors' preferences is expected to reveal their political viewpoints and perceptions on how to best shape the political agenda. Additionally, by taking into account their respective roles in the political-administrative process and power to influence the political agenda, it may be possible to gain a better understanding of the possibilities and limitations of effective biodiversity policies. Recognizing the importance of biodiversity to the survival of all species, any opportunities and constraints to integrate biodiversity in all activities of respective sectors of politics and public administration are also identified. Conclusions and recommendations are developed to address more effective biodiversity policy implementation in future.

Individual impact of a collective program: Repartition mechanism and impact of the Mexican PES

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This article investigates the impact of the Mexican program of payments for environmental services hydrological (the PSA-H), at community and household-level. Since 2003, the PSA-H remunerates communities for forest conservation. As most of PES initiatives, the design of the program is based on individual compensation of opportunity costs. In Mexico, most of the forest land is managed as common land by small communities. Therefore once enrolled into PSA-H, communities are free to share the payments between the different members according to their own rules. This article explores the determinants of payments repartition and discusses how it complies or conflicts with the individual compensation logic of PES. Once discussed the determinants of the share of payments received by each household, we analyze the impact of the program on their economic behavior. We investigate this issue based on community and household surveys conducted in the state of Yucatan

How can farmers be convinced to afforest? A choice experiment approach

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Many regions in the EU aim to increase their forest cover in order to expand timber production, sequester CO2 or to provide more opportunities for recreation. Despite funding opportunities to support afforestation on private land, some of these regions do not succeed in enhancing their forest area. The objective of this study is to explore the institutional, economic and biodiversity-related conditions that would encourage farmers to enrol in an agri-environmental scheme for afforestation in Saxony. Using choice experiments, farmers' demand for varying contract designs are estimated. The findings show that farmers have a strong disutility for large forests and long contracts and would be willing to receive less subsidy if they receive technical forest management advice and have the opportunity to return to agricultural land-uses after the contract ends. Ecological factors such as biodiversity, timber production and recreational access do not influence farmers' choices.

Assessing policy and intervention options related to REDD+ benefit sharing mechanisms

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One of the most pressing hurdles of national scale REDD+ implementation is the question of how monetary and non-monetary benefits, generated through the implementation REDD+ projects and policies, can be distributed among individuals and groups in an effective, efficient and equitable manner (Luttrell et al. 2012, 2013, Pham et al. 2013). Functioning environmental governance will require a variety of institutional means, governance structures and instruments to distribute benefits from natural resource provision to be in place (Vhugen et al. 2011). With these benefit sharing mechanisms (BSM) benefits can be channeled from national, via regional to local levels (vertical axis), and within and across communities, households and other local stakeholders (horizontal axis) (Lindhjem et al. 2010; UN-REDD 2011). In order to provide guidance for policymakers different options for the design and adaptation of national BSM, we developed a framework for the assessment of different policy and intervention options.

In the framework we consider BSM as an element of conditional REDD performance based policy instruments, those that influence human behavior by providing incentives to achieve defined policy objectives (Börner and Vosti 2013). For the assessment of BSM it is important to identify the different policy objectives (environmental, economic and social), e.g. aim at reducing forest degradation, alleviate poverty or foster economic development, as they have an effect on the instrument performance, and the combination of different aims can lead to trade-offs.

The impact of policy instruments can be assessed according to a predefined set of criteria. In policy evaluation the criteria effectiveness and efficiency (Turner and Opschoor, 1994; Michaelis, 1996; OECD, 1997; Gunningham, 1998), and equity (Corbera et al. 2007, McDermott et al. 2012) are frequently applied. To compare and assess different performance based mechanisms, policies and measures, we adapted these criteria and developed specific indicators for a three-step performance assessment of BSM. Firstly, we analyze how a given BSM performs in terms of incentive distribution and stakeholder targeting. This first step is common in measuring operational performance. As a second step, we include an assessment of the institutional change, which can be perceived as 'indirect benefits' as they constitute the necessary preconditions for benefiting from the implementation of REDD+. A variety of institutional context factors exist, and they can have an effect on the outcome of policy instruments (Börner and Vosti 2013). These factors "involve the basic institutions of a society, consisting in the formal and informal rules that govern society (economic, political, social institutions)" (Ring et al. 2011). Relevant factors for REDD BSM include: existing legal frameworks, especially property rights definitions, operational structure and administrative capacity for the implementation and monitoring of the instrument, the size and timing of benefit distribution, and the transaction and opportunity costs associated with the implementation of the instrument. Changes in governance can effect these factors to enable the policy instruments or effect the stakeholders directly, such as the definition and enforcement of property rights, capacity building, restructuring of responsibilities within administrations, etc. Thirdly, we assess how the distributed benefits lead to a change in behavior in terms of an outcome evaluation.

The framework is designed to be flexible to capture both the economic and institutional (multi-level governance, rights and tenure) aspects, and incorporate lessons from performance-based practices in other sectors.

Is costless biodiversity protection possible? NATURA 2000 network introduction in Poland

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In the paper it is investigated what is the relative role of economic, regulatory (legal) and informational/ educational incentives in the biodiversity protection in the case of NATURA 2000 network introduction in Poland. The analysis is based on the review of the legislative and policy documents as well as on the interviews with the stakeholders.

It is argued that the policy on NATURA 2000 network introduction in Poland relies on regulatory approach, while missing the economic ones. The educational tools are used in order to defend the regulatory framework. As introduction of NATURA 2000 network involved substantial reallocation of assets (basically loss of land value due to land use restrictions) restricting local governments and private owners their property rights, a compensation would be required. This however, was not fiscally feasible. Local governments' problems with NATURA 2000 are of economic nature, including mainly:

(a) concern on restrictions on various types of economic development (e.g. tourism, enterprise, general rise in costs) and (b) concern referring to infrastructure development (e.g. tourism, roads) (Grodzińska-Jurczak, Cent 2010)

Moreover, know-how about economic compensation was missing. At the same time, protection of biodiversity as the public good was hardly reasoned. It resonated only to narrow society of environmentalists. Educational and informational instruments were applied in order to explain the regulations (with limited success) (Pietrzyk et al. 2009, Grodzińska -Jurczak et al. 2010).

The particular mixture of policy types and their sequence, as observed in the analyzed case, is explained in accordance with the Europeanization concept, claiming that the national policies and politics are adapted to the EU requirements (Böhme, Waterhout 2008). The particular policy mix in the introduction of the NATURA 2000 in Poland was driven by the urgency of the task to comply with the EU directive combined with relatively weak institutional capacity. Designing the borders of NATURA 2000 sites was done before of species inventory was done.

Implications of the path-dependant development is discussed. Authors examine the environmental legislation, and complication of environmental policy is found. In several instances, policy acts exclude one another and replicate - there are many similar documents on the same policy level.

The role of ‘policy mix’ in creating sustainable city districts: Lessons from Freiburg city

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Urban arena provides a good example of operationalization of policy mix, where many actors and institutions work together for an efficient use of urban resources and artifacts. By drawing on insights from studies in urban innovation policy and institutions, this paper will examine the potentials and challenges of using the ‘policy mix’ as a tool to achieve urban sustainability. Freiburg has been internationally recognized as forerunner of environmental policy and urban sustainability transitions. The City of Freiburg decided to construct two new city districts (Rieselfeld in the early 1990s and Vauban in the mid-1990s) to meet the increased demand for housing. However, the City has used a mix of different policy instruments to achieve its sustainability goals about which there is only fragmented research.

Many scholars emphasize the context of institutions and actors in which the policy instruments operate (Flanagan, et al. 2011; Foxon and Pearson, 2007). This study will shed new insights on the role of institutions and organizations in creating a coherent and integrated policymaking framework for sustainable city district, which has not yet been systematically addressed in the current debate on policy mix. The interaction and trade-offs between policy instruments (social housing, low-carbon neighborhood and sustainable mobility) in Freiburg will be studied from the early 1990s. It will be discussed how the sectoral policies are mixed up over time to achieve the urban sustainability in Freiburg city.

The wider institutional and actor context in which the innovation policy operate can change over time, which require flexible policy instruments. According to Flanagan, et al (2011:711) “A key role for innovation policy studies should be to highlight the trade-offs and tensions inherent in any policy mix”. The case of Freiburg offers opportunities to conduct an in-depth analysis on how the policy instruments for different sectors have evolved and adapted over time to achieve transitions to urban sustainability. The key question would be how the interaction and trade-offs between different policy instruments has been occurred. It will be analyzed if and how the policy instruments have been flexible and coordinated across sectors and evolved over time. The information finding methods will largely be desk study and semi-structured interviews with key actors.

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The effectiveness and fairness of the ecological ICMS as a fiscal transfer for biodiversity conservation. A tale of two municipalities in Mato Grosso, Brazil.

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The main purpose of this research is to appraise the role of the Ecological ICMS (ICMS-E), an economic instrument for biodiversity conservation in Mato Grosso, Brazil. Our principal hypothesis is that ICMS-E resources can generate different conservation outcomes, depending on how they are distributed within municipalities. The case study focused on Northwest Mato Grosso (NW MT), a region of Amazonia which is under great deforestation pressure. We selected two municipalities - Juína and Cotriguaçú - to evaluate the potential role of this instrument in inhibiting further biodiversity loss at the forest frontier. A prior secondary data analysis showed a restricted role for ICMS-E in promoting protected area creation in the Amazon region of Mato Grosso. We now seek to investigate the reasons for this, the potential institutional innovations to improve the instrument and to understand the role of ICMS-E in Mato Grosso in the existing policymix with respect to its effectiveness and fairness. Our research questions include: (a) Is the ICMS-E an effective instrument for conservation?; (b) How fair is the intramunicipal allocation of ICMS-E revenues according to standards of procedural and distributive justice? (c) What legal and institutional arrangements including flexibility in intra- municipal benefits distribution could allow an improvement in the effectiveness and equity effects of ICMS-E implementation? In summary, our research suggests that innovative revenue sharing instruments such as ICMS-E can have positive results for conservation effectiveness, but their improvement for these purposes requires local commitment to environmental governance and procedures to ensure equitable distribution of the rewards.

Direct economic incentives for sustainable fisheries management: the case of Hilsa conservation in Bangladesh

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Fisheries provide millions of people with a livelihood source. Yet across the world, these resources are fast diminishing because of pollution, habitat destruction, overfishing, natural disasters and climate change. Traditional approaches to halt this decline focus on regulating against destructive practices, but to little effect. A more successful strategy could be to establish a direct economic incentive mechanism such as payments for ecosystem services (PES), or incorporate an element of PES in existing regulatory mechanisms. Examples from terrestrial environments and a few from aquatic environments suggest that economic incentive based mechanisms can work to protect both livelihoods and environments. But to succeed, these schemes must be underpinned by robust research, clear property rights, effective monitoring and compliance, equitable benefit sharing and sustainable finance. One of the rare examples of using direct economic incentive mechanism for sustainable fisheries management is the payment for hilsa conservation in Bangladesh. Hilsa (Indian shad) is as important as any major fishery of the world, on which 250 million Bengali people are dependent for their food and nutrition and more than half a million people for their employment and livelihood. In this study examine how direct economic incentive mechanism complement regulatory fisheries management approaches. However, we believe that there is room for improvement. We argue that the effectiveness of the scheme can be enhanced by understanding the complex socio-economic and ecological systems; identification of beneficiaries from the management plan (ecosystem service buyers); assessing the preference of fisher communities for compensation packages; and empowering local fishermen to monitor and enforce compliance. Hilsa is anadromous in nature (an uncommon phenomenon in tropical waters), and lives in the sea for most of its life, but migrates up to 1200 km inland along major rivers in the Indian sub-continent for spawning. It is also one of the most important single species fisheries in the Bay of Bengal which is shared by Myanmar and India. However, there is very limited regional cooperation between the three countries to work together to conserve hilsa. Therefore we also argue that there is need for regional cooperation is very crucial to ensure the success of the scheme.

From landfilling to waste valorization: a policy-mix for waste management in Palárikovo Municipality

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The case study was analyzed within DYNAMIX project, funded within the 7th Framework Programme and focusing on policy mixes for natural resources management and resource efficiency. The analysis focuses on the instruments of the policy mix in order to understand their mutual interaction and the conditions necessary for achieving targets.

The Municipality of Palarikovo, Slovakia, has developed a policy mix for managing waste in a very unstructured and sometimes informal way, but has done that so effectively that it achieved to decrease landfilled waste from 100% to 37% (with a peak of 25% in 2005) and to increase recycling and composting from zero to 63%, thus becoming an example for waste management for the entire country. In addition, the policy mix resulted in several positive environmental outcomes: over the past 14 years, it was possible to close the life cycle for 50.4% of all waste produced, and in 2011, 45 Mio Mega joules of energy and 27,000 tons of greenhouse gases were saved thanks to recycling activities.

From the analysis, it resulted that the initial stimulus for change was due to progressive change in the national waste legislation. Later on, the success of the strategy was made possible due to the implementation of: an integrated waste management system for waste recycling and composting, the introduction of a 'Pay-as-You-Throw' scheme, and the development of an awareness program targeting inhabitants and supported by the NGO Friends of Earth. In addition, the Municipality was supported by the Recycling Fund, a non-state special purpose fund to pool financial means that resulted essential to cover part of the costs for running the waste management system and for buying machineries. The contribution of the Recycling Fund is calculated based on certain quotas of commodities that the Municipality is obliged to collect in order to obtain the financial support.

Two main lessons were learned from the analysis of the policy mix. Firstly, the results show that raising inhabitants' awareness was extremely important. The awareness campaign was conducted in such a way that people felt emotionally attached to the programme and proud to collaborate: currently, 98% of inhabitants in the municipality participate in the scheme, and in many cases the request for introducing the separation of further commodities comes from inhabitants.

Secondly, the way the system is organized appears to be controversial: by depending on the financial support granted by the Recycling Fund, the Municipality is actually encouraged to produce waste. Altough Palarikovo performed a shift on the Waste Hierarchy (from landfilling to recycling and composting), many opportunities were lost in terms of reuse and prevention. Thus: if such instrument can be essential for supporting countries still performing landfilling, different approaches should be considered in order to achieve a further shift on the Waste Hierarchy (from recycling to reuse and prevention), for instance by targeting lifestyle and consumption patterns.

ISEP- Identification of stakeholders and evaluation of PES-like instruments in Flanders (Belgium)

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Over the past decade there has been a substantial increase in the use of market based and voluntary financial instruments to address environmental issues. Using price premiums and/or financial incentives, these instruments try to achieve desirable land use practices and sustainable resource management. In recent years PES (Payment for Ecosystem Services) emerged as such an instrument with high potential. Roughly speaking, PES aims to issue incentives and compensations for extra costs induced to ecosystem owners and managers (e.g. farmers, water companies, etc.) for maintaining a stable or increased supply of ecosystem services. Although this seems a quite straightforward approach, much confusion arose about what PES really is, and how it can be defined. We explore why it is important to come to a single definition of PES for Flanders (Belgium) and identify in which setting PES would be an efficient and desirable alternative to current policy instruments. Additionally we compiled a series of 20 key conditions and success factors for PES instruments based on a thorough review of international (practical) experiences and state of the art literature. Based on these success factors, we critically examined and evaluated a series of financial, “PES-like”, instruments currently used in Flanders (e.g. agri-environment measures). For that purpose 3 case studies were conducted in the areas of Gent (Gentse Kanaalzone), Leuven (Doode Bemde) and Sint-Truiden (Melsterbeek) and focussed on a series of financial instruments (mainly subsidies) and their impact on ecosystem services and stakeholders. The ISEP project resulted in a guideline for the identification of ESD stakeholders and an opportunity analysis to manage and enhance additional ecosystem services with current financial instruments. We concluded that some existing financial instruments show great potential to mainstream a PES approach, which could greatly improve their ecosystem service output. Also participation to voluntary financial instruments can be substantially increased with a better understanding of the links, in terms of ecosystem services, between stakeholders and land use practices promoted by voluntary financial instruments.

The role of certification standards for sustainable biofuels – a polycentric approach to understanding private transnational governance

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Rising fossil fuel prices, energy insecurity, climate change threats, and rural development motivated governments around the world to create demand for biofuels through blending mandates, subsidies and policy programs. The rapid expansion of biofuel production has raised several concerns about detrimental effects on the environment and on communities living in and around production sites. In anticipation of and in response to these effects, public and private actors on different scales have developed regulations, standards and codes of conducts. This fragmented, layered and multi-objective governance arrangement forms a part of the broader institutional context in which certification systems are embedded. It reflect the shift from government to governance, which is a phenomenon seen in other primary commodity sectors, with increasing proliferation of certification standards. The EU's 2009 Renewable Energy Directive in particular relies on certification as proof of compliance with EU sustainability criteria; certification became a de facto mandatory requirement for producers targeting the EU's thus 100 percent captive market for 'sustainable' biofuels. This policy can thus be considered significant as tit explicitly functions as a meta-standard, recognizing 'qualifying' certification schemes as "quasi-implementing agencies". It thereby exemplifies hybrid governance by actively blending state authority and private actors. In this role, certification systems transcend nation state boundaries and affect local producers' resource management.

While the body of literature on private governance in general is growing, results are also dispersed across disciplines and substantive research interests. We lack a comprehensive understanding of the mechanisms and structures underpinning certification systems, and thus if and under which conditions this policy instrument promotes sustainable outcomes. Our paper aims to 1) synthesize existing knowledge in a more comprehensive analytical approach for examining private transnational governance, and 2) to apply the approach to better understand the potentials and boundaries of hybrid biofuel governance.

We propose to view transnational private governance and the institutional arrangement in which these interventions are embedded from the perspective of polycentricity. Polycentric systems consist of multiple, public and private governing authorities at differing levels, each unit exercising considerable independence to make norms and rules within a specific domain. Vincent and Elinor Ostrom substantially advanced the concept of polycentricity for the analysis of collective-action problems involved in the provision of diverse public goods and services. The major difference between a polycentric and conventional approaches to the study of policy, or for the of private transnational governance in our case, is the scope of analysis: in order to explain outcomes, polycentric approaches look beyond single tier factors to include institutions and their interplay at multiple levels - thereby paying tribute to the complexity of real-world governance modes. Thereby, it also draws attention to contingent local contexts and the need for empirical studies. Furthermore, it provides for an evaluative and thus more diagnostic approach that may be advanced to inform policy-making.

Structuring the criteria for the revitalization of the Cantareira region to assess the impact of policy instruments: an application of MACBETH process.

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The Cantareira region located on Southern Brazil holds the most important water provision region for São Paulo Metropolitan Region and its main ecosystem service threatened are water related services. Consequently, is necessary to promote actions to diminish the environmental negative impacts mainly in the area where are located the main headwater of rivers that compose the region. A group of stakeholders that have been developing actions in the area met together in the beginning of 2012 to discuss which are the objectives to be achieved aiming to solve the several problems in the region and formed the working group (WG) for the Revitalization of the Cantareira Region, which is composed of NGOs, universities and research government institutes, municipalities, state agencies, PCJ watershed technical committee representatives, among others. The WG agreed that they had not a shared understanding about the meaning of the revitalization of Cantareira region and consequently could not identify which should be the objectives to achieve to revitalize the region. Consequently, it would be difficult to assess which could be the policy instruments most useful to help them solving their socio environmental problems. It was suggested to the WG that they could build a shared understanding about the meaning of the revitalization of the Cantareira region applying the social component of the MACBETH process, which is composed the following phases: (a) analysis of the decision context and design of the intervention process; (b) structuring the problem; (c) building the evaluation model; and

(d) sensitivity and robustness analyses and elaboration of recommendations. In this study case only the phases (a), (b) and partially phase (c) were applied since the objective of the intervention was to help the WG to build a shared understanding regarding the revitalization of Cantareira region. The following activities were done during the process of structuring: the WG worked together with the help of a facilitator during two decision conferencing (DC). During the DC the WG participants expressed their main concerns regarding the problems in the Cantareira region and identified a set of objectives to solve the problems following the value-thinking approach, i.e., the criteria were structured to distinguish between means and ends objectives. The WG identified seven criteria which are: present to society the importance of the contribution areas for water production; increasing environmental mobilization in the region; development and implementation of management plans of protected areas; encouraging environmental-friendly agricultural practices; increase rural extension as a way to spread environmental-friendly agricultural practices; conserve forest remnants and biodiversity; reforest areas around the reservoirs between quota filling and SABESP property boundary. To each criteria the WG established two reference levels of impacts in order to increase their understanding and establish intrinsic levels to assess policy instruments, when necessary. The WG analyzed the results and agreed that the identified criteria could represent their understanding regarding the revitalization of Cantareira region.

Evaluating the spatial targeting and planning effectiveness of policies: the example of an agri-environmental measure application in a multifunctional system

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Over the last few years, economic instruments for biodiversity conservation have been gradually implemented in conservation policy frameworks to address the degradation of ecosystems in targeted areas. In this context, several attempts have been undertaken to investigate how spatial analysis tools can be used to target the most suitable geographical areas for specific environmental policy interventions and to design more effective policies.

This work investigates how the use of these tools, more concretely Marxan with Zones (MARZONE), can support the evaluation of the cost-effectiveness of biodiversity conservation policies, using the case of the incentive-based agri-environmental measures (AEM) in a human shaped Portuguese multifunctional system (montados) as an illustrative example. The selected AEM aims to enhance agro-pastoral systems, while protecting the habitats for threatened species, e.g. Felis silvestris.

Based on the spatial distribution of the conservation features identified by the nature conservation authorities as relevant for that ecosystem (e.g. species distribution), as well as on the map of estimated opportunity costs for the selected AEM, MARZONE provides the best set of areas to apply this specific measure, maximizing its cost-effectiveness.

The Portuguese agri-environmental program, to be reviewed in 2014, can be improved in several aspects (e.g. instrument design and stakeholder participation), but one of the top priorities is to maximize the cost-effectiveness of the provided subsidies, as the funds available on following Programs will be increasingly lower. The selection of the most cost-effective policies to be implemented in a region is crucial to the success of both protected areas and socio-economic development of populations. The effectiveness of AEM can be enhanced through their specific allocation to sites identified as priority areas for conservation, supporting biodiversity values, habitat connectivity and ecological processes, while minimizing opportunity costs for landowners.

This work discusses the target areas identified by MARZONE at the landscape scale and how the design and targeting of areas could be enhanced by conducting this kind of testing in an ex-ante analysis. It concludes that, despite the effort, time and data requirements to perform these analyses they provide useful insights and improved information for policy design. If available to all stakeholders, MARZONE results can also guide landowners in deciding which measures can be more suitable to their properties, improving the landscape-scale design of existing land use schemes.

Leaning from 20 years of the Costa Rican payments for ecosystem services programme

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Costa Rica's Payments for Ecosystems Services (PES) Programme has become somewhat of an icon in the world of PES. Its hitches and successes provide a valuable source of information and inspiration for other countries interested in exploring mixes of economic and regulatory instruments to promote biodiversity conservation.

In this paper we explore how the governance of the PES Programme has evolved over time, how the context in which it sits has changed, and how it prepares to face future challenges by incorporating new tools and strengthening its alliances with other institutions. We discuss the policies used by the Programme to affect the way forest are managed and what are the reported outcomes on the ecosystem services they are expected to provide. We find that:

Most payments are still going to forest conservation;

A better targeted, landscape-based approach (that links PES to other instruments like Protected Areas and local regulation plans) is expected to improve the impact on deforestation;

- The Programme struggles to create sufficient interest to encourage regeneration of degraded ecosystems and expand to non-forested areas to meet national 'carbon zero' and REDD+ targets.
- The debate on reliable, yet practical metrics for ecosystem services is hot on the table. Acknowledging that a healthy environment benefits society as a whole, we look at the direct impacts on those directly receiving PES, and what policies and personal characteristics may affect how PES funding seeps into the rural economies. We find that:
- The Programme has significantly increased the participation of indigenous groups - with important social benefits albeit questions regarding environmental additionality;
- Increasingly large amounts of funding is captured by legal entities with relatively medium and large properties–whose legal anonymity masks the people actually receiving the payments;
- Promoting agroforestry has definitely increased participation of smaller farms – although potentially more fragmented in terms of ecosystems, they are a more attractive land use in non-forested areas;
- The Social Development Index as criteria to confer priority access to low-income areas has not been effective as it gives indiscriminate priority to relatively larger (and wealthier) properties

located in these areas. Although it can be argued that some of these resources are re-invested locally, the direct beneficiaries of the priority policy are not always captured by the more relatively vulnerable.

Also published in Spanish, this paper is aimed at local practitioners, international researchers and donors interested in zooming in on the Costa Rican experience and the lessons that emerge from it.

The success of the PES scheme in Costa Rica is ultimately linked to the governance and governability of the programme that guarantees the provision of ecosystem services. This implies a greater application of technical and scientific knowledge that maximises the possibilities of effective provision of ecosystem services. By providing better ecosystem services all of society, rich and poor, will benefit, directly and indirectly. But the social and environmental objectives of the scheme cannot be random, and renewed efforts are needed to guarantee that the Programme delivers.

Institutional analysis of policies for ecosystem service governance at multiple levels: bridging explorative and deductive empirical approaches

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Institutions condition and shape biodiversity conservation and ecosystem service provision at various governance levels. The conceptual work on institutions addressing rules, rights, and norms as well as institutional arrangements and regulatory frameworks has culminated to a useful level of understanding. Although the theory has been supplemented by ample empirical exploring of the ways institutions work and testing of institutional hypotheses, empirical analyses of institutions are not well supported with systematic frameworks.

Standard analyses of institutional constraints take e.g. property rights or international regulations to condition the design and outcome of particular instruments. In an alternative approach, the analyses focusing on institutional coordination and interplay elicit the roles of different actors and the coherence or matching of various regulation mechanisms at a local, national or international level. These differing analytical approaches tend to take institutions as either constraints or enabling coordination mechanisms.

However, the two approaches rely on each other and their acknowledgement and complementary use is necessary for systematizing empirical institutional analysis of ecosystem service governance. The analysis of institutions should have a foundation on explorative analysis of relevant rights, rules and arrangements. Identification and description of formal and informal institutions should be followed by inference about the mechanism through which they function. Testing of the constraining or conditioning functions can take place only after this explorative work.

This paper develops a systematic framework for analyzing ecosystem service governance institutions and illustrates its empirical usefulness with a number of empirical analyses of policy instruments; economic instruments in particular, for biodiversity conservation and ecosystem service provision at different governance levels. These analyses of economic instruments and policy instrument mixes illustrate the epistemological and methodological dichotomy that should be overcome with institutional analysis building on exploration and aiming for hypothesis testing. The illustrative cases include international, European Union and national analyses as well as local level analyses from a number of European and Latin American settings.

Planning for urban biodiversity in a divided world

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Despite over two decades of interest in biodiversity conservation, including movements specific to urban areas, biodiversity loss continues. The few successes are overwhelmed by general losses. The primary drivers of biodiversity loss continue unabated. With repeated failure to meet biodiversity targets, we need to investigate more effective ways to stop biodiversity loss. This study analyzes urban biodiversity planning worldwide to develop an interconnected approach to biodiversity planning that includes social, economic, and cultural factors.

Urban areas are the primary economic and social nodes of our civilization. As such, urban land is costly to obtain and urban environmental impact reaches far beyond city borders. Traditional land-focused conservation approaches not only create conflict but also ignore wider-reaching impacts. Therefore, urban biodiversity planning must avoid engaging in a land war with social and economic interests. A more promising approach communicates the importance of biodiversity to a variety of stakeholders and involves them in the planning process. Urban areas in particular should include social, cultural, and economic factors when planning for the conservation for biodiversity. An approach that interconnects biodiversity impacts and drivers with other issues can broaden support and increase the effectiveness of biodiversity measures. This study surveys urban biodiversity planning documents around the world for signs of this connected approach.

This initial survey explores how urban biodiversity planning today connects the broad array of issues interrelated to biodiversity, if at all. It asks three questions: (1) how strong is biodiversity as a concept? (2) do urban biodiversity plans integrate social, cultural, and economic drivers of biodiversity loss, or are they limited to land use? and (3) do guideline systems promote an interconnected approach to urban biodiversity planning?

To answer these questions, I conducted a mixed methods analysis of 65 plans from cities worldwide, 48 of which are biodiversity plans. The analysis also compares four guideline programs each with over 30 city participants: the Local Action for Biodiversity (LAB) Pioneer program, the Cities Biodiversity Index (CBI), The Economics of Ecosystems & Biodiversity (TEEB) Manual for Local and Regional Policy Makers, and the Urban Biosphere Initiative (URBIS).

As a mixed models/mixed methods study, I combined automated lexical analysis with manual term searches and categorization of concepts. I investigated how the various documents defined and used the term biodiversity. I categorized the discussion of biodiversity into land use, education, social, economic, and cultural topics. I developed a simple integration index to allow for direct comparison of various plan and guideline documents.

My findings show that urban biodiversity plans rarely address connections between biodiversity and other interests. Over 80% of the concepts in urban biodiversity plans discuss land use/environment only, with little attention to social, economic, or cultural issues. Other types of plans have similar limitations. The most integrated discussions of the study can be found in “sustainability” plans. Initiating a participatory process when creating a biodiversity planning document appeared to correlate with a higher integration index. None of the four guidelines promote inclusion of social, economic and cultural factors, though some show capacity for social and economic integration into biodiversity plans.

The study shows that urban areas have yet to mine the possibilities of a more interconnected approach to urban biodiversity planning. This approach holds great promise and needs to be explored further. Additionally, new guideline systems need to be developed that promote a more interconnected method. Currently, only a combination of guidelines can begin to support an interconnected approach. To gain a more interconnected perspective, planners should use a participatory process that diversifies the stakeholders involved in authoring the plan. A participatory process has the potential to generate the innovative ideas we need to address drivers of biodiversity loss.

Evaluating the effectiveness of payments for ecosystem services in a spatially explicit conservation planning framework

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Payments for ecosystem services (PES) have gained much attention as a promising option for attaining conservation objectives on privately-owned lands. The current PES concept is based on the assumption that conservation problems originate from market failure, and that such an incentive-based instrument will allow this problem to be resolved through financial transfer from beneficiaries to providers. A further condition is that PES providers secure the provision of ecosystem services through specific land-use practices.

Costa Rica pioneered a nation-wide PES program in 1997. Several recent studies assessing the impact of Costa Rica's PES scheme on achieving conservation goals use 'avoided deforestation' as a proxy for effectiveness. However, this proxy does not offer an appropriate measure of the effectiveness of PES allocation, because provision of the ecosystem services is not quantified in space or time. A spatially explicit approach where ecosystem services are mapped is therefore needed. We submit that a conservation planning framework (CPF) can provide an effective platform for building spatially explicit benchmarks to evaluating the effectiveness and management of PES, especially in cases such as Costa Rica where a "baseline condition" is difficult to delineate.

We ask: how do the actual allocation of PES contracts and the current selection criteria compare with an optimal scenario (benchmark) based on ecosystem services mapping? We use the Nicoya Peninsula, Costa Rica, to study biodiversity conservation, water provision, and carbon storage and sequestration in different policy scenarios. We use the spatially explicit tool 'Marxan with zones' to assess the effectiveness of PES allocation within a policy-mix context. This policy-mix context is comprised of a ban to forest conversion (Forest Law 7575, in place since 1996), Protected Area designation, and PES. We focus on the PES protection modality, because most of the high financial investment goes into this program and because most of the selection criteria are spatially explicit.

We compare four scenarios: (a) the actual allocation of PES contracts (selected farms from 2007 to 2012); (b) an optimal scenario based on current PES conservation and social selection criteria; (c) an optimal scenario based on only current PES conservation criteria; and (d) an optimal scenario based on ecosystem service maps. To compare the scenarios we apply congruence, overlap and irreplaceability analyses.

We expect that through a spatially explicit CPF, new opportunities will arise for conserving bundled ecosystem services, providing measures of spatially explicit PES allocation effectiveness, and exploring the synergies and trade-offs between criteria. For example, preliminary results show when considering social criteria (e.g. farms smaller than 50 ha) the selection frequency of some areas increase; these areas are not necessarily of high conservation priority. Looking at these tradeoffs could help to provide recommendations for improving PES selection criteria.

Landscapes are dynamic and an approach that allows the integration of different policy priorities in a spatially and temporally explicit way opens opportunities for having an instrument that could provide benchmarks that adapt with changes in the provision of ecosystem services and the policy context, and provide valuable information for stakeholder's decision making processes.

REDD+ in Mexico:
linchpin of environmentally and socially sustainable rural development?

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Reduced Emissions from Deforestation and Forest Degradation (REDD+) is a climate change mitigation mechanism based on the maintenance and enhancement of carbon stocks in tropical forests, trees and soil. Despite increasing awareness that the drivers of deforestation and forest degradation often emanate from outside the forest sector, and a growing attention to landscape-based approaches, in many countries REDD+ is still tightly associated with forestry. REDD+ is seen with potential to accrue new resources to frequently under-funded, on-going efforts of forest conservation.

In Mexico, however, REDD+ is envisioned to bring together a much broader set of environmental and social development goals. The draft national REDD+ strategy defines REDD+ not as an isolated policy instrument, but an articulation of policies, programmes, measures and actions in those sectors of governance and economy that influence sustainable rural development. While national level accounting of reduced emissions is required, the autonomy of regions and states within the Mexican federation in defining their appropriate REDD+ actions is emphasized. As such, the central framework for REDD+ planning and implementation in Mexico is that of multilevel governance, requiring effective vertical as well as horizontal integration between various jurisdictional levels, sectors and actors.

This study scrutinizes the effectiveness and equity aspects of national REDD+ strategy development in Mexico within the multilevel governance framework. Through an examination of the integration of REDD+ processes at the national, regional and local levels, we ask how distinct interests are reflected in the 'REDD+ policy mix' and with what implications for environmental effectiveness and social equity. The study draws from qualitative and quantitative data collected through interviews of REDD+ policy actors at the national, regional and local levels, as well as secondary material, such as policy and project documents and reports related to the REDD+ processes. In the analysis, we focus on the structures and relations shaping the procedural equity and legitimacy of the multilevel, multi-actor REDD+ planning and negotiation processes, which are in turn expected to influence the eventual effectiveness of the policy mix. The study highlights the challenges and opportunities for achieving effective articulation of policies and actions under the REDD+ umbrella in the

Mexican context, while making linkages to wider debates and drawing conclusions for other contexts.

Substitutability and complementarity of forest conservation policies

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Forest conservation policies are the most widely used strategies to preserve biodiversity and promote carbon sequestration around the world. Instrument policies as Protected Areas and Payment for Environmental Services (PES) have been implemented all around the world. The evaluation of the impact of these instruments in achieving forest conservation has been studied in many countries separately (Vogt el al. 2006, Gimenez 2012, Gaveau 2011, Oliveira et al. 2007, Vuohelainen et al. 2012, Nolte et al. 2013, Mas 2005, Hanura 2010, Andam et al. 2008, Pfaff et al. 2009, Sanchez-Azofeifa et al. 2007, Alix-Garcia et al. 2012, Arriagada et al. 2012, Robalino and Pfaff 2013).

However, protected areas and PES are also implemented together and empirical analysis to assess the impact of the mix of these instruments is scarce. This document tries to contribute to fill the gap of evaluating policy-mix impacts on forest conservation. In other disciplines methods to evaluate the combination of two treatments use random assignment of the combination and each treatment separately. However, forest conservation policies are not implemented randomly and, therefore, their combination is not randomly located either. That makes this a complex empirical exercise. Important variables that affect deforestation are systematically different between groups. These differences make comparisons between policies and policy mixes biased estimates of the impacts they generate.

One alternative to address this problem is to fix, for instance, the characteristics of land within a policy mix (e.g. payments and protected areas), and search for observations similar to those with only payments, with only protected areas and without any policy. To do that, we apply matching method. Specifically, we use Propensity Score Matching approach (Rosenbaum & Rubin, 1983). That allowed us identifying similar untreated observations and compare with treated observations to remove the bias generated by the effects of other explanatory variables.

We find that for the period 1997-2005, parks and 'protection PES' are perfect policy substitutes with respect to conserving forest cover. The additional effect of using both instead of one is zero in both cases. When we analyze payments and buffer zones we find that the cross-effects differ. The estimated effect of payments when those are implemented outside any protection is around 2.5%. However, the effect of implementing payments inside a buffer zone around national parks decreases to 1.4%. This implies that proximity to national parks reduces the effects of payments by 1.1%. Additionally, buffer areas without payments reduce deforestation by around 1.2%. However, we find that, buffer zones do not generate any additional effect on avoided detestation once the land has been protected by payments. This implies that payments reduce the marginal effect of buffers to zero. Therefore, we also find high substitutability between payments and buffer zones.

Identifying suitable economic instruments by analyzing "ecosystem service opportunities"

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Within the ECO-BEST project in Thailand, a practical assessment guideline is developed for the identification and planning of economic instruments for protected area and buffer zone management. The identified economic instruments are supposed to support biodiversity conservation efforts but also contribute to improving local livelihoods through benefits from ecosystem services. The guideline emphasizes the integration of relevant local stakeholders in the assessment process, such as representatives of communities and municipalities in buffer zones, line agencies of relevant ministries and administrations, conservation or development NGOs working in the PA and buffer zones, or representatives of locally important economic sectors.

As part of the assessment guideline, we propose "ecosystem service opportunities" (ESO) as a heuristic framework for analyzing which opportunities based on ecosystem services arise in a specific context, and which economic policy or management instrument may be suitable.

The ESO framework

- Is issue-oriented, by starting out with identifying relevant local issues and how they relate to the provision of ecosystem services;
- Is actors-oriented, by explicitly analyzing how relevant (groups of) actors relate to the provision of ecosystem services;
- Orders opportunities based on ecosystem services along simple economic principles: the steward-earns principle, the beneficiary-pays principle, the polluter-pays principle, and what we label as "innovation-principle";
- Presents a direct correspondence of the four economic principles to commonly used economic instruments for biodiversity and ecosystem service protection.

The guideline and the ESO heuristic are exemplified for the distinct local contexts of three ECO-BEST project sites in Thailand.

The policy mix and technological innovation systems: the case of offshore wind in Germany

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Addressing the climate change challenge requires, among others, a transition of the energy system. One important requirement for such a transition is the redirection and acceleration of technological change towards sustainability objectives. However, this environmental technological change, often characterized by its three major stages of invention, innovation and diffusion is faced with multiple market, system and institutional failures and thus requires multi-faceted policy interventions.

Responding to this challenge, in recent years several scholars and practitioners in fields particularly relevant to eco-innovation have called for a policy mix which combines several policy instruments, including climate policy, environmental policy and innovation policy. However, existing policy mix studies often fall short of reflecting the complexity and dynamics of actual policy mixes, and they lack a common terminology. In this paper we take a first step towards a more comprehensive policy mix concept for environmental technological change based on a review of the bodies of literature on innovation studies, environmental economics and policy analysis.

The concept we develop consists of the three building blocks elements, processes and dimensions and introduces a clear terminology, which is particularly important for the characteristics of such a policy mix, including the consistency of its elements and the coherence of its processes. We illustrate the concept using the example of the policy mix for fostering the transition of the German energy system to renewable power generation technologies. We argue that the proposed concept provides an interdisciplinary analytical framework for empirical studies analyzing the impact of the policy mix on environmental technological change.

Finally, we derive policy implications and suggest avenues for future research.

Mitigation – Adaptation tradeoffs in climate policy

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Climate change is regarded as one of the main threats to mankind. In order to avoid the catastrophic consequences that this phenomenon might cause, the society has two options: adapting to the modified climatic conditions or stabilizing the atmospheric concentrations of GHGs. Mitigation of climate change can take different alleys like, e.g., reducing the combustion of fossil fuels, shift to low-carbon energy use or the sequestration of carbon dioxide. Adaptation consist on those adjustments in the socioeconomic systems aimed at accomodating the actual or expected climatic conditions.

The two pillars of climate policy exhibit different properties, which makes a careful integration of them necessary in order to attain globally efficient policy outcomes. Alternatively, individual countries could strategically exploit the different properties to their own advantage, which implies that they have to take the divergences into account when striving for a national welfare maximum.

One of the most important divergences is the degree of publicness. Mitigation is a global public good and thus mitigation activities in one country will generate externalities affecting all other. This in turn bears the risk that countries enjoying global positive externalities will take a free-ride on other countries' mitigation efforts. Such a free-riding risk is not pending with respect to adaptation efforts, as adaptation is largely seen as a private good from an individual country's point of view. Furthermore, domestic adaptation may generate strategic advantages in international negotiations on mitigation, as - due to vulnerability reduction via adaptation – the urgency of mitigation from an adapting country's point of view is diminished such that it is the other countries that should have a higher interest in accepting a higher burden in international mitigation efforts.

In this survey, we consider studies addressing such interrelations between the options of mitigation and adaptation. We restrict our attention to such studies focused on public policy measures. Besides research exclusively investigating domestic adaptation and mitigation activities, we also discuss studies which consider international transfers supporting mitigation and adaptation abroad. Such transfers are of rising interest as it was pledged to mobilize $100 billion in international climate financing annually by 2020 at the 16th Conference of Parties (COP) to the United Framework Convention on Climate Change (UNFCCC) in Cancun in 2010. These international transfers are planned to support both adaptation and mitigation projects in developing countries.

Our survey aims to give an overview of the present state of research concerning the management of the tradeoffs between public adaptation and mitigation policies and to describe remaining research gaps. It helps to identify scope for further research in this important climate science area.

Determinants of incentive-based forest governance in the Amazon: evidence from Brazil, Ecuador, and Peru

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Forest conservation polices have emerged as central components of climate change mitigation policy mixes in recent years. Policy-makers and scholars alike have concurrently tried to devise policies that could effectively curb deforestation in more effective ways than the command-and-control policies that dominate the forest sector in the majority of developing countries. Incentive-based forest conservation policies, such as payments for environmental services, are often proposed as promising complementary measures to reduce deforestation. The scholarly work on incentive design in the conservation sector has, so far, been largely focusing on economic dimensions, such as cost- effectiveness and welfare effects. More recently, equity issues and potential tradeoffs between social and economic policy objectives are being discussed in the academic literature. Yet, neither the former nor the latter research has actually led to significant changes in how conservation incentives are being designed. In fact, rather little is known about the political, including ideological, motivations and institutional constraints faced by policy makers who develop and implement PES schemes around the world.

To understand the gaps between recommendations and practice, it is important to find out how the composition of political forces and opportunities that led to the adoption of incentive-based forest conservation schemes is reflected in their design, towards environmental and non-environmental outcomes. Public policy theory offers a largely unexplored set of instruments to shed light on this question. In this article, we seek to understand the governance structures and the dynamics of three government-led, large scale, incentive-based forest conservation policies in the Amazon region, namely in Peru, Ecuador and Brazil. This will be achieved through the lenses of an analytical framework derived from Kingdon's Multiple Streams Framework, from institutional analysis theories and from the policy design literature. We find that government-led, incentive-based conservation schemes emerge due to factors such as changes in environmental awareness among policy makers and in the society, to the higher acceptability of policies analogous to conditional cash transfer programs within governments, and to demands for social assistance to poor forest-dwelling populations. Policy design tends to be more dependent on political-administrative factors, such as the acceptability of the design by target populations and other social groups, the political continuity of ruling groups, the appropriateness of design features to the values and ideologies of policy-makers, the technical feasibility of certain implementation tools, and budgetary constraints. These factors tend to dominate over efficiency criteria when it comes to scheme design in the cases studied.

Approaches for spatially explicit cost-effectiveness analysis of conservation policy mixes

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The dramatic loss of species since industrial times and particularly in the past 60 years shows that the efforts that have been dedicated until now to protect biodiversity and the provision of ecosystem services have proved to be insufficient. There is therefore a need to design policies that in a more effective way address the problems that derive from the changes forced on nature by human activities. The evaluation of existing policies provides the basis to improving existing policies.

Typical for the nature conservation problem is that multiple protection objectives encompassing different geographical scopes are necessary. These are more likely to be addressed successfully by a variety of complementary and synergetic instruments, a policymix, rather than by single instruments. This complexity needs to be addressed both when formulating and designing conservation policies, and in their evaluation. Cost-effectiveness is one criterion for evaluation that can help adapt policies to achieve more gains in conservation assuming a certain level of costs.

Typical for the nature conservation problem is that multiple protection objectives encompassing different geographical scopes are necessary. These are more likely to be addressed successfully by a variety of complementary and synergetic instruments, a policymix, rather than by single instruments. This complexity needs to be addressed both when formulating and designing conservation policies, and in their evaluation. Cost-effectiveness is one criterion for evaluation that can help adapt policies to achieve more gains in conservation assuming a certain level of costs.

Conservation gains are often assessed through simple indicators such as number and/or area of protected areas, but attention to more refined ecological criteria can more adequately evaluate impacts. One important consideration is that different ecological processes are threatened at different spatial scales. A tiered approach to assess gains at different nested levels of governance and of ecological scale is therefore needed.

The complexity of the conservation problem sets further limits to policy evaluation; an overall measure of biodiversity is practically not feasible, but appropriate indicators, combined with reference values, permit to assess relative changes in time.

Conservation planning tools (CPTs) have typically been designed for effective conservation planning, thereby, they offer opportunities for conservation policy analysis based on indicators such as the representation of ecological diversity, and the spatial coherence and size of areas under conservation actions. The algorithms compare gains in conservation in terms of these indicators with the costs associated with the conservation actions thereby, enabling cost-effectiveness analysis. In addition, CPTs enable to address the spatial structure of the conservation problem. Particularly suitable to the conservation problem is that some CPTs, such as Marxan with zones, can support the analysis of a

policymix by evaluating conservation gains attributed to the various instruments through a common 'currency of effect', the instrument's contribution to the achievement the conservation targets. Both ex-post analysis and prospective, ex-ante, analysis for instrument design or improvement can be conducted with CPT methods.

Using examples from the application of CPT methods in the case studies in Norway, São Paolo State (Brazil), Costa Rica and Portugal, we illustrate the potential and limitations of CPT methods for conservation policy mix analysis; and we compare the pros and cons of CPT methods with Program Impact Evaluation methods (BACI) for ex-post policy evaluation.

Using a choice experiment to link conservation objectives and farmer preferences in the design of agri-environmental agreements

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There has been a growing interest and need for carefully designed policies to protect and improve ecosystem conditions, especially under the EU 2020 Biodiversity Strategy. Although the basis for each policy may rely on different assumptions and terms and conditions, many if not most of them aim to minimize and resolve existing conflicts between conservational efforts and land-user interests. In this context, economic instruments have been applied to mitigate the impacts that human activities may have on ecosystems, and the services they provide.

Agri-environmental agreements are one of such instrument, conceived as financial incentives designed to encourage farmers to protect and enhance the environment on their farmland through the application of Good Agricultural Practices. The periodical review of the Portuguese Rural Development Program, to take place in 2014, creates the opportunity to propose alternative contract designs, in order to increase the acceptance and cost-effectiveness of agri- environmental agreements oriented towards nature conservation objectives.

The performance of the current agri-environmental schemes related to human-shaped multifunctional ecosystems (montados) is assessed, using a case-study located in the southeast of Portugal. The analysis focuses in particular on the so-called Integrated Territorial Intervention (ITI), a type of scheme designed to promote the management of agricultural and forestry systems suitable for conserving rural landscapes and biodiversity in areas of special interest, such as Natura 2000 sites.

Based on ITI's current performance in the case study area – insignificant number of contracts and low acceptability by farmers – the main research question is how to improve ITI's contract design in order to increase farmers' participation in future Rural Development programs. The research addresses one specific ITI agro-environmental measure, namely extensification of grazing and montado regeneration.

In a first step, interviews with farmers were conducted to understand their perceptions of the current ITI design, as well as their motivations and expectations regarding land use change and biodiversity conservation. The results of the first stage were used to set up a choice experiment aimed at identifying farmers' preferences regarding contractual requirements (e.g. duration, density of cork trees, cattle density), including the estimation of acceptable compensation payments.

The choice experiment, conducted with a sample of farmers in the case study area, tested alternative configurations of contract design, by combining different characteristic features of the contract with an attached compensation value. The main trade-off in this case is to increase tree density and abandon intensive grazing in productive pastures for which the farmer receives financial compensation in return. The estimated opportunity costs for this ITI measure are compared with the compensation levels considered acceptable by farmers.

Based on the choice experiment results, proposals to redesign ITI schemes are presented, in order to make the contract requirements and provided compensation more attractive to farmers, and still comply with the conservation goals established for montado regeneration in the case study area. Involving farmers in the design of this type of policy instrument contributes to increasing participation levels, while enhancing ecological effectiveness and policy legitimacy by ensuring feasible contract terms and an effective allocation of financial resources.

Private costs on water conservation: study case at Cantareira Mantiqueira Corridor Region

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One of the measures to minimize deadlocks caused by the need to guarantee the water supply in the metropolitan region of São Paulo (Brazil) is to enable the protection of forest remnants in the Cantareira-Mantiqueira corridor as a means to increase the supply of the ecosystem service of water supply. Payment for environmental services (PES), for example, have been identified as desirable in order to achieve this goal, especially when take into account the successful case of implementation of PES in the city of Extrema, in the state of Minas Gerais, located in the region of our study.

The problem is that the discussion on the measures for the protection of forests does not always come accompanied by appropriate considerations on the economic costs of such policies. In addition, often the social aspects that reflect the heterogeneity of the economic contexts of the populations that reside in a given area are not considered. It is true that the effectiveness of environmental policies is highly dependent on correct diagnoses regarding the socioeconomic and ecological reality of a given region. The appropriate balance between ecological and economic criteria is essential for the elaboration of a policymix able to ensure the preservation of biodiversity and the continual flow of ecosystem services.

This study aims to evaluate the private opportunity cost for an extensive forest recover program in the Cantareira-Mantiqueira Corridor Region and discuss its results focusing on three central questions: i. what is the private opportunity cost of forest restoration for the main land use activities in the Cantareira-Mantiqueira Corridor Region? ii. how the private opportunity costs varies throughout the region? iii. What are the most cost-effectiveness PES strategies available for the Cantareira- Mantiqueira Corridor Region? The survey's methodology was conducted collecting data in the field from production costs and revenues for the four most important agricultural activities in the Cantareira- Mantiqueira Corridor, and furthermore obtains the private opportunity costs using the net present value (NPV) analysis.

Besides the field investigation in the study area, we also built a typology of agricultural production units using factorial and cluster analysis. We identified seven main groups of agricultural production based on information from the Survey of Agricultural Production Units. Using estimates from the production revenue and expenditure of these groups, we have identified a high asymmetry in the distribution of average returns from agricultural activities in the region. Forestry exploration has the highest returnper hectare and total in the region, but the activity that prevails among the production units is still dual-purpose cattle. The results raise important questions about the best way to pay the owners in a policy of payment for environmental services.

How can the concept of ecosystem services influence conservation planning strategies?

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Considering ecosystem services in conservation decision-making is a fairly new approach (Chan et al. 2011), while conservation area networks represent a policy instrument which has been developed through the last century. Different types of conservation areas have different effects on the flow of ecosystem services. Some services are compliant with full protection (regulating services or certain cultural services), while others can be understood as an opportunity cost of conservation (provisioning services such as timber harvest).

Norway has a deficit of protected areas within the "productive forest" zone, and there are intentions to increase the area of old-growth forest with high biological qualities by implementing, for example, voluntary conservation schemes. Following the ecosystem services paradigm, raising awareness of public benefits provided by these forests other than biodiversity conservation may be used to argue for increased area under protection. Ecosystem services may also justify revision of some subsidies to the forestry sector such as those that support accessibility.

Hypothesising that protecting ecosystem services will broaden the scope of regulatory instruments, the aim of this paper is to investigate how the concept of ecosystem services can influence spatial targeting of conservation instruments. We analyse to what extent planning outcomes differ when multiple sets of ecosystem services are systematically taken into account from planning scenarios which only consider ecological criteria.

Using forest areas in Telemark County (Norway) as a case we simulate possible designs of future sets of conservation areas. For simulating such scenarios we use MARXAN with Zones (Watts et al. 2009) which enables to identify optimised solutions for conservation area network design where different levels of protection ("zones") are applied. Typically in MARXAN, conservation features have been weighed against opportunity costs in terms of foregone forestry. In our ecosystem services approach we compare solutions when timber harvest is modelled as one of many ecosystem services objectives, versus the more classical reserve site selection approach where foregone forestry is as an opportunity cost weighted against other ES as conservation features.

Ecological criteria that are considered independently of ecosystem services are old-growth forest habitat types, forest habitats of special conservation interest, ecological corridors and the Nature Index for Norway. Ecosystem services considered are timber harvest, forest carbon sequestration and storage, snow slide prevention, recreational hiking and existence of areas without technical interference. Spatial models for each of these services have been developed (Schröter et al. 2014). We consider two conservation instruments, namely fully and partially protected areas.

MARXAN with zones simulations help to identify and quantify both expected goal conflicts in the planning process and deviation among possible future scenarios in the outcome of the process. Thereby, the exercise will help to demonstrate the strengths and weaknesses of applying the ES concept with regard

to systematic conservation planning. Such information can be used for spatial targeting of conservation instruments.

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Ecological fiscal transfers in Germany and their role in the policy mix for biodiversity conservation

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Protected areas (PA) are the centrepiece of Germany's efforts towards biodiversity conservation. Although economic instruments such as payments for environmental services are a now a common tool to create incentives for nature conservation among private landowners there is an insufficient consideration of public opportunity costs attached with PA, causing opposition against the designation of further conservation areas or strict implementation of existing ones. Fiscal transfers based on conservation efforts undertaken by German states might correct for this and help to foster acceptance of biodiversity conservation among subnational government levels.

Fiscal transfers redistribute public revenue from national to subnational governments in order to provide resources to carry out public functions at subnational level. Transfers between the federal government and German states play an important role in local and regional development. Currently, lump-sum grants from the federal government are assigned on the basis of 'fiscal needs' in relation to 'fiscal capacity' (revenues based on taxes, etc.) of states. Fiscal needs are determined by the product of the number of inhabitants and a weighting factor that increases with population numbers. This is most beneficial to heavily developed German states with high population numbers. In turn, less dense populated states that play an important role in biodiversity conservation suffer as their fiscal need is comparatively low. Hence, the existing fiscal transfer system in Germany poses an incentive on states towards development and acts as a driver of opposition against more comprehensive biodiversity conservation via PA.

Against this backdrop, the objective of this study is to analyze the institutional context and conduct an assessment of the role of ecological fiscal transfers (EFT) in the policy mix for biodiversity conservation in Germany. It proposes the integration of ecological indicators into Germany's fiscal transfer scheme. Indicators are expressed as weighting factors of population to correct the fiscal needs of states. Such indicators may encompass the size and strictness of PAs as well as their connectivity. They could also build upon the responsibility of states to maintain Germany's natural heritage, e.g. to safeguard a unique but threatened species. When modeled against the backdrop of existing allocation rules the distribution of winners and losers among states and the amount of transfers redistributed depend on the type of indicator used and the weighting factor assigned to it.

In assessing EFTs role in a policy mix the study builds on the conceptual framework developed within the POLICYMIX project and is working towards two guiding questions: Firstly, what is the functional role of EFT in the policy mix in terms of synergies, conflict or temporal sequencing with other instruments? Secondly, what is the additional value of EFT in the policy mix in terms of conservation

policy outcomes? To these ends, the study analyses the institutional and legal background of biodiversity conservation and existing conservation policies in Germany and models the impacts of potential EFT between the federal level and German states. EFT have the potential to turn the opposition towards protected areas at subnational government levels into support for further conservation action as biodiversity conservation and associated opportunity costs are acknowledged as important public functions. Furthermore, EFT may provide necessary funds to subnational governments to fully implement and maintain the network of protected areas essential for biodiversity conservation.

Policy implication for green infrastructure development in urban areas of Nepal

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The improvements in communication, transportation, health, education and job opportunity has resulted high rate of urbanization in Nepal. The urban population has increased from 14.2% in 2001 to 17.07% in 2011. The urbanization in terms of increasing population and physical infrastructure is creating ever-increasing problems like climate change, waste generation, forest degradation, land use change, pressure on public utilities and social problems. The major social problems in city include urban poverty and increase in slums population. Nepal is the party to the various international treaties and convention but it fails to draft its own policies regarding those problems. The urban infrastructures are haphazardly built except few cities, which have taken their own initiative to control it. The government‘s most important five-year plan has never taken serious attempt to address the issues of urban areas except controlling the air, water and noise pollution. There are 58 existing municipalities and 41 are under declaration as new municipality in Nepal. The lack of proper policy has provided sufficient ground for unplanned urban infrastructure development in the country. The green city concept is dream for Nepal. However, Ilam Municipality in eastern development region of Nepal has taken this concept and has initiated the green infrastructure development in the Municipality. The municipality has been declared as the first plastic free and second cleanest city of Nepal. The local support has encouraged gaining the objectives green infrastructure development in Ilam municipality. The present paper used field visit, literature review, expert consultation, focal group discussion and interviews with locals and municipal officials as the study methodology. The field visit was carried out in July 2013. The paper aims to provide the knowledge on existing policies on urban development and initiatives of Ilam municipality together with suggested recommendation for sustainable city development. The outcomes of the paper provide reference for planners, researchers and academicians in the field of eco-friendly and sustainable city development.

The costs and benefits of Nordic carnivore conservation.

Conflicts and policy instruments

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In very many instances, wild animals provide benefits for humans. Quite frequently, however, we may also find that these species incur economic costs. Rodents damaging agricultural production are a typical example. In other instances, wild animals are simultaneously a nuisance and valuable. Large herbivores, for example, may cause grazing damage, but provide value through hunting and trapping. Nuisance may also be channeled through ecological interaction. Some marine species are of this type, where whales, for example, prey upon or compete with commercially valuable species. This holds also for terrestrial animal species, for example where bear and wolves prey upon livestock in addition to wild ungulates.

In the middle of the 1960s, the grey wolf (Canis lupus) was regarded as functionally extinct in Sweden and Norway (the Scandinavian Peninsula). In the last part of the 1970s the first confirmed reproduction in 15 years was recorded. Today, the re-colonized wolf population is Scandinavia numbers some few hundred individuals which live in small family groups, or packs, in the western- central part of Sweden and along the border area between Sweden and Norway. Although the wolf population is small in number, the wolf population is associated with several conflicts where the most important is related to predation on livestock, and particularly sheep.

This paper analyses the costs and benefits of this conflict where the efficiency of certain policy instruments are studied. We start to analyze the sheep stocking problem of the individual farmer without predation. We proceed to solve the stocking problem when predation is present, and where we look at the situation where the farmer may, or may not, use effort to protect animals from predation. Compensation for the predation loss for the farmer is then introduced, and this is studied when the per animal loss compensation is less than the slaughter value (market value) of the animals. Additionally, the farmer is given a fixed transfer (‘lump sum’) because the farmer by law should be given full compensation for the predation loss.

In the last part of the paper ‘The Directorate for Natural Resource Management’ (DN) is introduced. DN may control the wolf population and may choose between different compensation menus, i.e., mixes of per animal compensation value and size of the lump sum transfer. The interaction between the farmers and DN is formulated as a Stackelberg game where DN first determines the compensation menu while controlling the size of the wolf population. Next, the farmer determines the stocking rate and protecting effort use.

IAD Framework versus economic valuation – substitutes or complements of the ecosystem service analysis

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The concept of ecosystem services and payments for these services has become widely promoted in the environmental research. Related challenges are how to conceptualize and evaluate ecosystem services and how to use research results in policy-making. Different evaluation techniques exist and are being deepened to capture service values, but often it is difficult to make such findings operational and to clearly communicate them to decision-makers and the public. The effort to incorporate payments for ecosystem services to management schemes or to communicate ecosystem values to regional planners is undermined with institutional and cultural barriers.

Our research is focused on the locality of Eastern Ore Mountains (Krušné Hory/ Erzgebirge), the Czech-German border region that is characterized with the specific historical evolution, economic and structural problems and valuable ecological features. The overall goal of the research is to capture the value of ecosystem services provided with small-scale habitats (like mountain meadows, renaturalized creeks, peatbogs, clearance cairns) and to present it better to local people, tourists and decision- makers.

More specifically, our paper is dedicated to the combination of research methods used – qualitative IAD Framework and quantitative evaluation via Choice Experiment and Contingent Valuation Method (CVM) – and the justification of their complementarily in gaining of the policy-relevance. Questions we address are as follows: How (if somehow) IAD Framework results within the same territory are able to support monetary evaluation results? How (if somehow) does the combination of methods increase the robustness of conclusions and their acceptance by policy-makers? Answers to these questions are developed with the use of the Czech-German case studies, so the cross-border aspect (that brings similarities but also differences in approaches) is also included.

As mentioned, the method of the investigation includes the combination of qualitative (IAD Framework) and quantitative (Choice Experiment and CVM) features. The strong focus is on the practical use of research results in the regional policy, e.g. by consultations with local and regional policy-makers and other actors on the local level.

An economic perspective on instrument combinations

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This paper draws on joint work between the author and Vidar Christiansen (University of Oslo), which aims to develop moreextens ive theoretical underpinnings for the combined use of environmental policy instruments. The paperwill provide a non-technical review of this work, and its place in relation to other existing literature on the economics of instrument combinations , with the aim of contributing to an interdisciplinary discussion of policy implications .

Most economic analysis of policy instruments to address environmental and conservation policy objectives has considered instruments as alternatives, and has focussed on the relative merits of using one instrument or another. Many economists stress the efficiency advantages of “market mechanisms “ such as emissions taxes or tradeable pollution permits compared with direct “command and-control” regulation. Where polluters differ in costs of abatement,the flexibility affered by market mechanisms can reduce the aggregate cost of achieving a given reduction in emissions. This argument is, however, underpinned by implicit assumptions about instrument imperfection. Under conditions of full information, costless implementation and certainty, an equivalent first-best outcome could be achieved equally weil by either command-and -control regulation or a market mechanism .

Information costs and asymmetries are therefore central to the instrument choice debate . Regulated firms have little reason to reveal information about their abatement costs to the regulator, who may then compelled to treat firms the same when in fact they differ. Likewise, the Operating costs of market mechanisms such as emissions taxes may influence the design of such instruments. Often it may be eheaper to tax emission proxies (such as the use of a particular input) than to tax measured emissions .

The upshat is that, in practice, policy must employ instruments characterised by various practical compromises . None of the available instruments is alone capable of implementing the first-best. It remains an interesting question to ask which instrument gets closer to the fir st-best. But if both are sufficiently imperfect, we may also be interested in the properties of instrument combinations, in which two instruments are used to offset each others’ weaknesses . This aspect is the main focus of the work discussed in this paper.

We seek to characterize the circumstances in which combinations of tax and regulation may be required for efficient correction of some simple consumption externality problems under conditions of certainty, and to consider the interactions between the two instruments. We consider cases where the tax instrum ent is limited, in that it cannot differentiate eff iciently between activities generatingdifferent leveis of externality. For example , a tax on motor fuel cannot differentiate between fuel used to drive in congested road-space and fuel used for journeys which do not add to traffic congestion. We consider situations where the available tax instruments can be supplemented with some form of direct regulation which is, likewise , imperfect. We derive results showing the optimal combination of direct regulation with the imperfect externality tax, and consider how changes in the scale of direct regulation alter the optimal externality tax.

Towards a more efficient mix of energy-related environmental policies – The case of the German energy transition

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An energy transition towards sustainability is a complex issue – at the same time solution to several sustainability problems (climate change, oil spill, nuclear risks) while trigger of several new sustainability problems (space requirements of renewable energy sources (RES)). An efficient policy-mix would take this multitude of aspects into account. However, the academic debate is dominated by the idea of a stand-alone emissions trading scheme (ETS) to address climatic impacts of energy provision and doubts the necessity of additional RES support policies. Such a narrow perspective neglects the multi-faceted character of energy transitions. Taking the German case as an example, this paper sets out the requirements for an efficient mix of energy-related environmental policies.

Energy transition concepts might serve as a solution to several sustainability problems: Climate change is an important but not the only economically relevant motivation for the energy transition since several externalities derive from production, transport and use of fossil energy sources (e.g., oils spills, air pollution or radiation). Hence, an efficient energy policy mix needs to address all of these externalities.

Furthermore, policy advice should not rely on assumptions from an idealized textbook world, but account for the imperfect circumstances of real-world policy making, including self- interested decision-makers and vested interests. Thus, simplistic policy advice such as “emissions trading alone delivers optimal climate and energy policy” is misleading.

Yet energy transition processes also trigger a set of new sustainability problems because RES and RES-related infrastructure yield specific externalities. First, there are direct environmental impacts from RES and RES-related infrastructure (e.g., wind farms as hazard for birds). Second, there are indirect effects from the increased spatial impact of RES, such as the mounting pressure on ecosystems due to the relocation of agricultural production following increased land use by RES (e.g., biomass production).

Against this background, the paper analyzes the current interaction of ETS and support policies for RES in Germany. Specifically, the RES-support policies are interpreted as a second-best way to internalize the multiple externalities from conventional energy production: since first-best policies are not available, second-best policies are justifiable from an economic point of view. In order to further increase the efficiency of the policy-mix, RES- support policies should explicitly address RES-related externalities. In particular, the spatial dimension of RES-deployment has been hitherto neglected. Yet, spatially explicit RES- policies are a precondition for efficiently trading off the diverse environmental impacts (“sustainability trade-offs”) from energy production, such as climate protection vs. nature protection.

In sum, the paper shows that an efficient mix of energy-related environmental policies has to mirror the complexity of the energy transition process. First, calls for mono-instrumental policy intervention neglect the multiple externalities from conventional energy generation. Second, transition policies should address direct and indirect environmental impacts from RES and RES-related infrastructure. Thus, German energy transition policies, which mainly rely on RES-support, should be adjusted for spatially explicit consideration of RES-related externalities

Managing synergistic interplay: Experiences in the cluster of biodiversity- related conventions

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Regime complexes or loosely coupled systems of institutions have emerged in many areas of international co-operation where patterns of interests diverge. Scholars have observed that regime complexity introduces inconsistencies that are solved in the process of implementation; creates incentives for cross-institutional political strategies; forces bounded rationality or decision-making in conditions of relative uncertainty; generates small group environments; and produces a variety of feedback effects, including competition and reverberation. Managing regime complexity is necessary for coherent and effective global governance. The management of regime interplay and its effects has been described as interplay management and has been distinguished from broader notions of institutional reform based on institutional and/or organisational integration. Regime complexity studies have examined situations where conflict is managed to ensure internal consistency, but have paid less attention to cases where synergistic interplay is managed to achieve internal coherence. Examining how regime interplay is managed in these settings is important because potential for synergy is often left unexploited. This paper analyses the management of synergistic interplay in the cluster of biodiversity-related conventions, which comprises one framework convention and five specialist regimes focussed on wetlands, natural heritage, wildlife trade, migratory species and plant genetic resources. The biodiversity cluster provides an ideal empirical setting because it is characterised by high levels of inter-treaty co-operation and unfulfilled synergy opportunities. The paper identifies and discusses the factors that explain the extent and depth of co-operation in the cluster. The analysis is based on a series of interviews with treaty secretariat officials and representatives of international organisations conducted between September 2011 and January 2012. Research materials were examined using thematic analysis approaches. The broad picture reveals six major challenges affecting co-operation in the biodiversity cluster: 1) conditions of co-operative fragmentation or partial embedment under a core institution; 2) autonomous institutional arrangements; 3) bureaucratisation of inter-treaty co-operation; 4) strategies of mutual adjustment where costs are unequally distributed; 5) frames of reference not fully appropriated; and 6) limited executive capacities amid ever-increasing tasks. Clustering has long been raised as an option for improving synergy in the cluster and the idea has recently resurfaced in the light of experiences in the chemicals and hazardous waste sector, where administrative functions have been streamlined and decision-making procedures become more closely related. Findings of this study suggest, however, that a hypothetical integration of institutional and/or organisational arrangements would be less viable and cost-effective than more targeted efforts to improve internal management. This paper contributes to the literature on regime interplay by advancing understanding of the factors that prevent the full exploitation of synergy in settings where synergistic interplay is dominant. Results of this research are immediately relevant to debates on the reform of the system of international environmental governance, delivering insights into the value of interplay management vis-à-vis mainstream proposals promoting changes in institutional form.

Pilot projects and agro-environmental measures in northwest Mato Grosso, Brazil: impacts and lessons for forest frontier "policyscapes"

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[4]Juruena Carbon Sink Project, Mato Grosso, Brazil

This case study, located within the Brazilian Amazon "Arc of Deforestation" examines the effectiveness of a sequence of Integrated Development and Conservation projects (ICDPs) and respective Agro-Environmental Measures promoted for deforestation mitigation, in Northwest Mato Grosso. The study evaluates ecological, economic and institutional variables as vectors for land use decisions on deforestation on family farms in agrarian reform settlements, on lots of between 50-100 hectares. The region is a forest frontier comparable in size to Panama, and exhibits the highest deforestation rates in the Amazon, despite having experienced a broad range of initiatives aimed at halting deforestation and biodiversity loss over the past 15 years.

The study is based on a sample of farmers in three municipalities (Juína, Juruena, Cotriguaçú) with varying exposure to ICDPs between 1995 and 2010. We performed an ex post analysis of ICDP impacts by assessing: (a) biophysical indicators of land use, carbon stocks, and tree biodiversity in forest and agroforestry plots; (b) the distribution and magnitude of economic gains leading to permanence of the ecological impacts; and (c) the institutional design and social-political context behind the cases, assessed through farmer interviews considering perceptions on institutions and governance.

We identify opportunities for introducing sustainable land use practices and the need for a more systemic approach to project evaluation arising from ICDP experience. Environmental licensing and alternative, sustainable forest product marketing outcomes supportive to local livelihoods were achieved by integrating social organization with material and institutional infrastructure. The particular combination and sequence of ICDP interventions produced synergies between cooperative social organization, alternative commodity markets and state-administered policy instruments.

Case study comparison of forest cover dynamics over a 15-year period indicated that more forest area was conserved in settlements with sustained ICDP interventions. The Vale do Amanhecer settlement in the municipality of Juruena retained 57% of forest cover in 2011, in comparison to 35% in the Nova Cotriguaçu settlement in the municipality of Cotriguaçu, and 18% in the Iracema settlement in Juína. Alternative land use revealed that land rents were considerably enhanced in comparison to a smallholder farmer baseline of mixed beef and dairy. Participation in environmental regulation and licensing, as well as the social legitimacy of the regulatory system, emerged through attention to cooperative institutional arrangements.

In conclusion, even in a landscape subject to adverse political economic conditions, support for an integrated set of instruments over longer temporal scales and at finer spatial scales may be effective routes for forest and biodiversity conservation as well as economic and institutional improvements. On this forest frontier, 'policyscape' viability may be a function of the management of institutional and market synergies, which involve interfaces between formal and informal institutions and the socio- ecological evolution of 'rules in use.' These achievements may also lead the way toward effective application of other conservation-oriented economic instruments.

Policy mixes for landscape outcomes in Australian agri-environmental settings: challenges, principles and potential for implementation

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There is growing interest internationally and in Australia in coordinated landscape scale conservation actions to deliver the functional ecological connectivity required to ensure the persistence of biodiverse landscapes into the future. Functional connectivity moves beyond the human view of the connectedness of landscapes towards facilitating ecological processes across scales, which may include evolutionary and climate adaptation processes. Managing biodiversity across landscapes at such a these scales necessarily involves the private landholders who own or manage those tracts of land between areas managed specifically for conservation. Intervening tracts of land (the agricultural matrix) will likely need to generate multifunctional outcomes: agricultural production, direct support of ecological processes and ecosystem services, and buffering and protecting ecological processes and ecosystem services in core areas. Desired managements are will differ according to the nature of the interaction with biodiversity as illustrated in Figure 1.

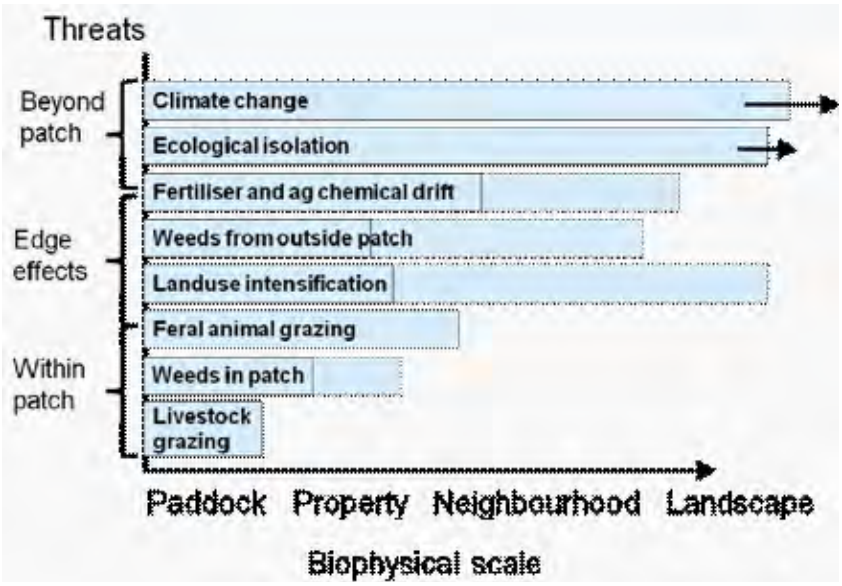

Figure 1: Examples of threat to management scale interaction

A key organisational arrangement addressing parts of this challenge in Australia has been the creation of 54 regional natural resource management units one of which is the Wimmera CMA. Wimmera CMA has a finite amount of resources available and must target where to spend these limited resources in order to deliver against the targets that it has set. In this paper we first describe a more formal framework for selecting and designing mechanisms that might fit into an 'efficient' mix, which is applied in a conceptual way to the policymix employed by Wimmera CMA. Not only will Wimmera CMA face the challenge of effectively addressing a suite of management actions (Figure 1), limited by institutional constraints and by interactions with mechanisms employed by other organisations / layers of government that are also delivering against similar goals (Figure 2). These will have a range of interactions on CMA programs; complementary, perverse, or competitive. The effectiveness of instruments will also be impacted by the inherent heterogeneity in the landholder population (partly derived from biophysical variation (which

could relate to the range of activities required), enterprise structure variation, and social and economic variations) mean that mechanisms will not influence landholders uniformly, and multiple mechanisms (or no mechanism) may be required.

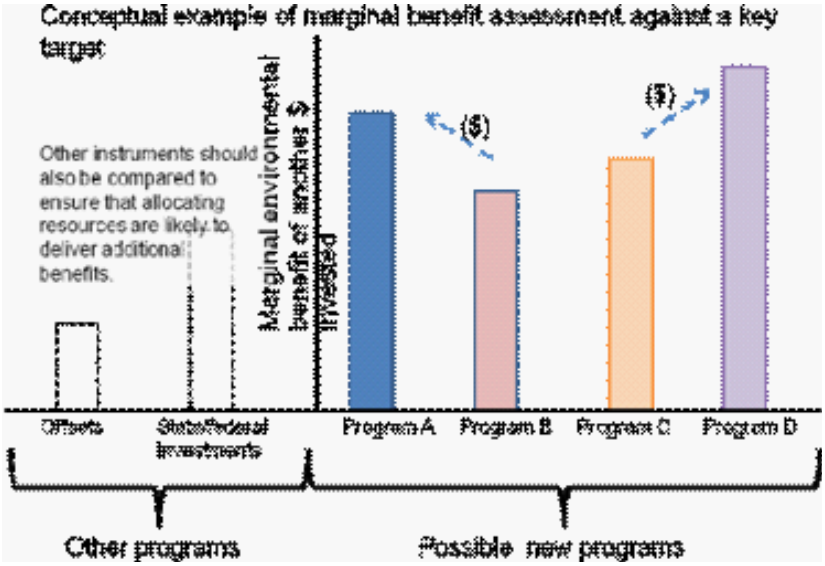

Figure 2: Conceptual example of when new programs may be considered desirable

The obvious conclusion is that a mix of policy mechanisms will be required to deliver landscape objectives. A detailed analysis of the policymix implemented by the Wimmera CMA indicates that, while different mechanisms are effective for different purposes, mechanisms that account for landholder heterogeneity at different scales, and which are mutually supportive rather than direct substitutes, are likely to form core elements of any successful policymix. Some principles for deciding between elements of an integrated policy mix are identified along with practical guidance for their implementation.

Adaptive governance of alternate stable states in social ecological systems: simulating the impacts of alternative policy mixes on farmer behaviors

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When exposed to exogenous shocks or endogenous surprises, recent complexity science-informed research on social ecological systems has demonstrated that these systems do not necessarily go through “gradual” change rather “abrupt shifts” in alternate stable states can suddenly take place. It is hypothesized that a loss of resilience usually triggers such critical transitions in the phase spaces of social ecological systems that leads the state variables in the system to be tipped into a contrasting state. It is however not well known when and how exactly the social ecological systems undergo abrupt shifts into alternate stable states. Further, if social ecological modeling approaches could be used to generate an early warning or foresight about the tipping points in a complex system, it is not certain whether the social/human components of the system would use the early warning/foresight to adapt and adjust their behavioral patterns to avoid the worst case scenarios. Different policy regimes with differential mixes of policy instruments could lead to competing outcomes on societal, economic and environmental criteria. This paper examines these questions in the light of social ecological system governing water quality in Lake Champlain. The multi- jurisdictional Lake Champlain Basin (LCB), situated in NY, VT and Quebec, covers approximately 21,326 square kilometers. Anthropogenic climate change could induce abrupt alternate stable states in the Lake Champlain from more frequent and more intense flooding events in LCB as well as reduced ice cover internally in the lake system. Under a baseline scenario of human induced climatic change, increasing agricultural landscape and rapid urbanization in the Lake Champlain Basin, the Lake Champlain can abruptly switch to a eutrophic state unless proactive adaptive management strategies, such as rapid adoption of nutrient management practices (NMPs) at the watershed scale,

are implemented in LCB. Purely regulatory (sticks) or purely incentive based (carrots) policies can result in differential NMP adoption patterns by the farmers in LCB watersheds. There is however potentially a continuum of regulatory and incentive based policy mixes that could potentially induce more proactive behavioral response from farmers in the face of climate change induced risks in LCB. To understand the relative differences in the impacts of regulatory and incentive-based policy mixes, this paper presents an agent based model of Missisquoi watershed in LCB system and tests the impacts of baseline and alternate policy mix scenarios on farmer behaviors in adopting NMPs. Experimental simulations from the agent based model are used to generate foresight about the likelihood of NMP adoption by farmers of heterogeneous political and economic groups. In the light of findings from this agent based model, this study draws broad theoretical implications for adaptive governance of alternate stable states in social ecological systems; with an emphasis on steering the behaviors of non-point source polluters through variegated policy mixes that balance carrots and sticks for retaining socially and environmentally desirable stable states in social ecological systems.

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