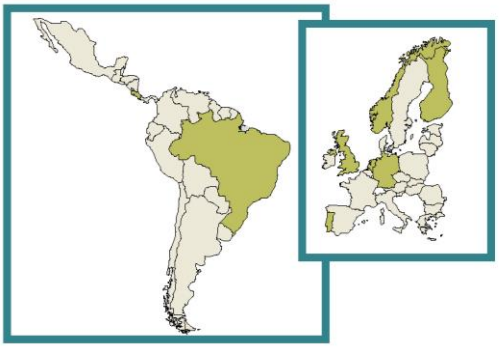
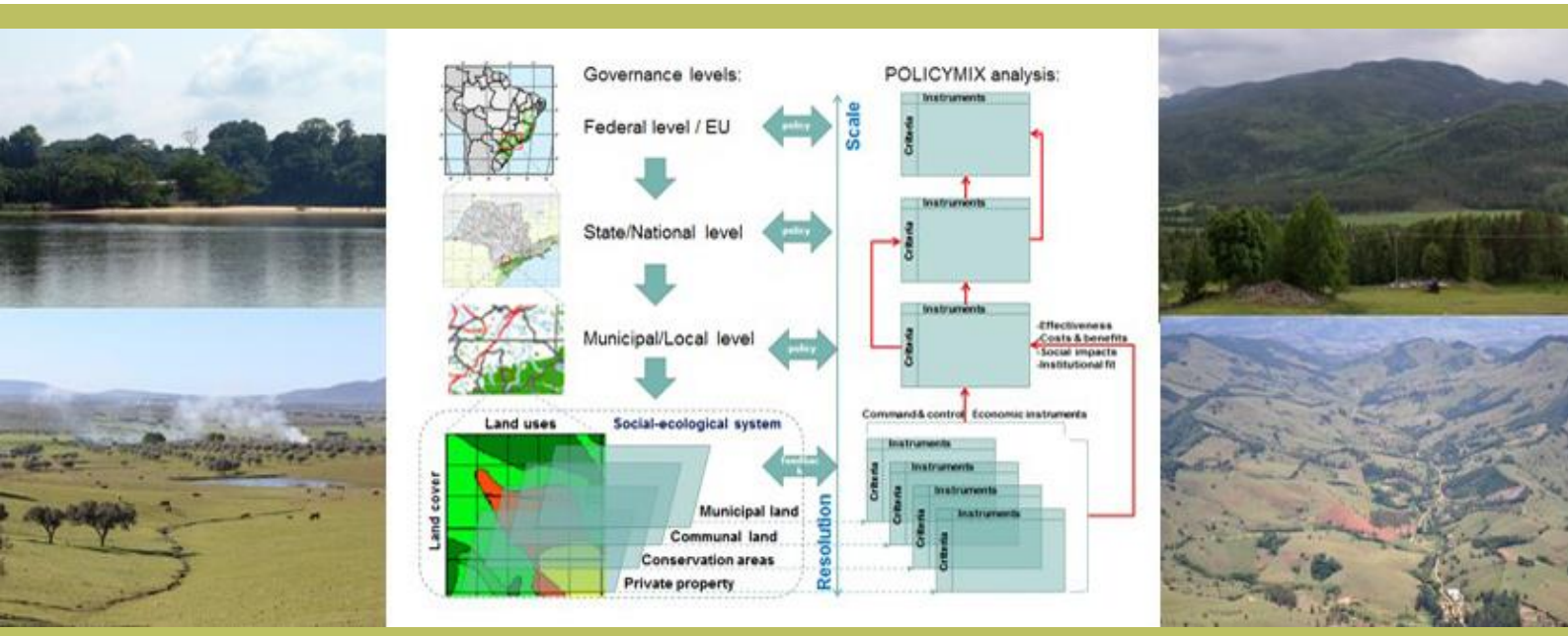


TECHNICAL BRIEF

Issue No.12

POLICYMIX - Assessing the role of economic instruments in policy mixes for biodiversity conservation and ecosystem services provision



Guidelines for multi-scale policy mix assessments

David N. Barton, Irene Ring, Graciela Rusch, Roy Brouwer, Maryanne Grieg-Gran, Eeva Primmer, Peter May, Rui Santos, Henrik Lindhjem, Christoph Schröter-Schlaack, Nele Lienhoop, Jukka Similä, Paula Antunes, Daniel Caixeta Andrade, Ademar Romerio, Adriana Chacón-Cascante, Fabrice DeClerck

policymix.nina.no

The POLICYMIX Technical Brief series presents work in progress. It summarises intermediate project results addressing project partners, as well as other researchers dealing with similar issues.
All Briefs are also available online: **http://policymix.nina.no**

About POLICYMIX. POLICYMIX focuses on the role of economic instruments for biodiversity conservation and ecosystem services provided by forest ecosystems. POLICYMIX evaluates the cost-effectiveness and benefits of a range of economic versus regulatory instruments in a variety of European and Latin American case studies.

Title of project: Assessing the role of economic instruments in policy mixes for biodiversity conservation and ecosystem services provision

Instrument: FP7-ENV-2009-1: Collaborative project. Small or medium-scale focused research project

Grant Agreement number: 244065

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1 A 'policy mix' call to action

"To explain the world of interactions and outcomes occurring at multiple levels, we also have to be willing to deal with complexity instead of rejecting it." (E. Ostrom 2009 Nobel Prize Lecture)

The EU Biodiversity Strategy with its combination of targets and actions is a policy mix. What is 'call to action' for policy mix research? Making sure no single policy instruments is seen as a panacea for biodiversity conservation, and in so doing avoiding agenda capture in policy debates by special interests.

2 What is a policy mix ?

A mix of several kinds of instruments may be effective because achieving the overall goal involves many specific conservation objectives; different actors involved with different social and economic characteristics; and different levels of governance due to different geographical scales of the conservation problem. Policy instruments can be thought of along a government-to-market-based continuum, from direct regulation, through incentives, to policies that facilitate self-regulation (Figure 1).

A *policy mix* for biodiversity conservation is a combination of policy instruments, which has evolved to influence the quantity and quality of biodiversity conservation and ecosystem service provision in public and private sectors [2]

The POLICYMIX project stresses that the assessment of mixes of policies requires addressing complexity. However, the study of instruments has often focused on single dimensions such as the payment incentive in PES, identifying instruments as either 'market-based' or 'command-and-control' depending on whether a payment or regulation was deemed the central feature. In fact, so-called market-based instruments like PES or biodiversity offsets are themselves composites of rules-in-use governing land users' actions, only a minority of which govern payoffs. The public sector also has a large role in setting up and financing market-based instruments[3]. Economic instruments for conservation can exist between government entities, as is the case for ecological fiscal transfers, with no involvement of the market. For these reasons the POLICYMIX project has defined its focus as the assessment of the roles of '*economic instruments*' for conservation within policy mixes.

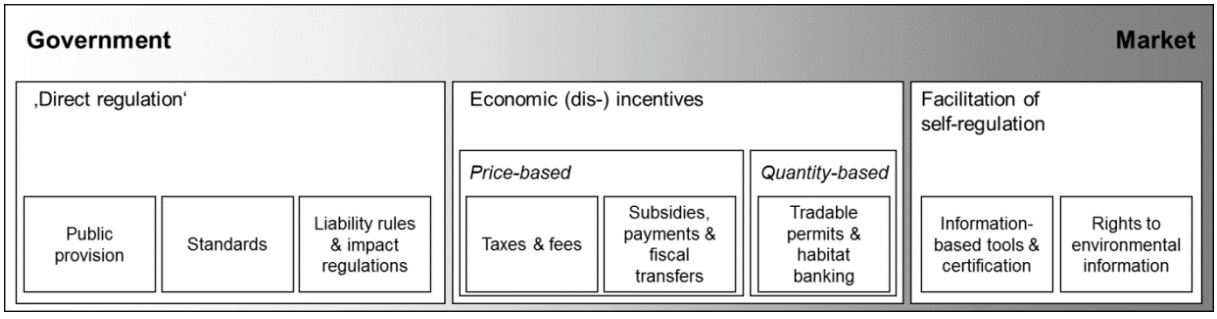


Figure 1. A continuum of policy instruments[2]

3 How can policy mix thinking help conservation policy understanding?

Policy mix analysis improves our understanding of how different instruments interact with one another to achieve the overall goal of halting the loss of biodiversity and the degradation of ecosystems. Policy mix analysis shows why single types of policy instruments (e.g. economic, regulatory) alone are not a panacea for biodiversity conservation or sustaining the provision of ecosystem services problems and puts their role in a landscape and context. Policy mix analysis promotes cross-sectorial understanding and collaboration across different levels of governance when designing and across different policy sectors regarding implementing biodiversity conservation policy.

Thinking in terms of policy mixes provides policy research with concepts that help to structure knowledge of complex multi-dimensional biodiversity management problems and practices into key features, enabling researchers and policy makers to communicate their understanding of these complex systems using a common terminology.

4 What are policy mix evaluation criteria?

The context in which economic instruments are implemented is critical for its outcomes. 'Alignment' of economic instruments to the policy mix is at once both a rational and a very complex objective given co-evolution of instruments, institutions and the environment. An economic instrument is implemented in an existing mix of institutions and their policies, which evolves within a social-ecological system[4]. The policy research challenge can be defined in terms of policy goals which are also used to evaluate policy impact and legitimacy[3].

Institutional fit

What is the role of multi-level governance institutions in policy? Institutions play a crucial role in defining what new policy instruments are feasible at different levels of governance. For example, the pre-existing rights that land-owners have as to managing their land, and the responsibilities that go with property rights, will have a direct effect on how a new instrument can be designed to encourage conservation. Similarly, the formal division of roles between different authorities with accredited rights and responsibilities can influence how the new instrument is integrated in the existing mix of instruments, i.e. how it is implemented and what impact it can generate. Moreover, long established informal institutions, e.g. administrative norms, cultural-cognitive framings and customary access rules; can influence the implementation of conservation instruments, even though they may not be formally recognized. Hence, the analysis of policy instruments and instrument mixes aimed at biodiversity conservation must explicitly analyse the formal and informal institutions that condition the design and implementation of policy[5]. How do international institutions and national conservation policies influence each other and in particular the use of economic instruments in conservation policy? Legal analysis can help

evaluate the relationship between WTO law, European state aid and nature conservation law, and the opportunities and constraints for economic instruments for biodiversity protection [6].

Policy impacts - effectiveness, efficiency, equity

External policy impact evaluation criteria have been grouped into "three E's**"** (1) effectiveness, (2) efficiency, and (3) equity. However, the elegance of simplifying policy analysis to "three E's" also oversimplifies the conceptual framework that is necessary to evaluate the impacts of policy.

More than effectiveness . In policy evaluations, 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, and contribute to better design of policy instruments. Indicators and metrics of ecological state and conservation value need therefore to match conservation objectives which in turn, must reflect the conservation problem that is addressed. One important consideration is that different ecological processes are threatened at different spatial scales. For instance, problems of population decline associated with population dispersal, migration and meta-population dynamics often need to be addressed at the landscape scale, whereas representation of ecological variability and of evolved adaptations to ecological conditions, require a regional perspective. 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 limits to how the outcome of policy instruments can be assessed. Before-after-control-impact studies against policy baselines are limited in the spatial multi-dimensionality they can address. Impact evaluation studies can also be carried out against policy 'benchmarks' using conservation planning tools (Figure 2) [7] .

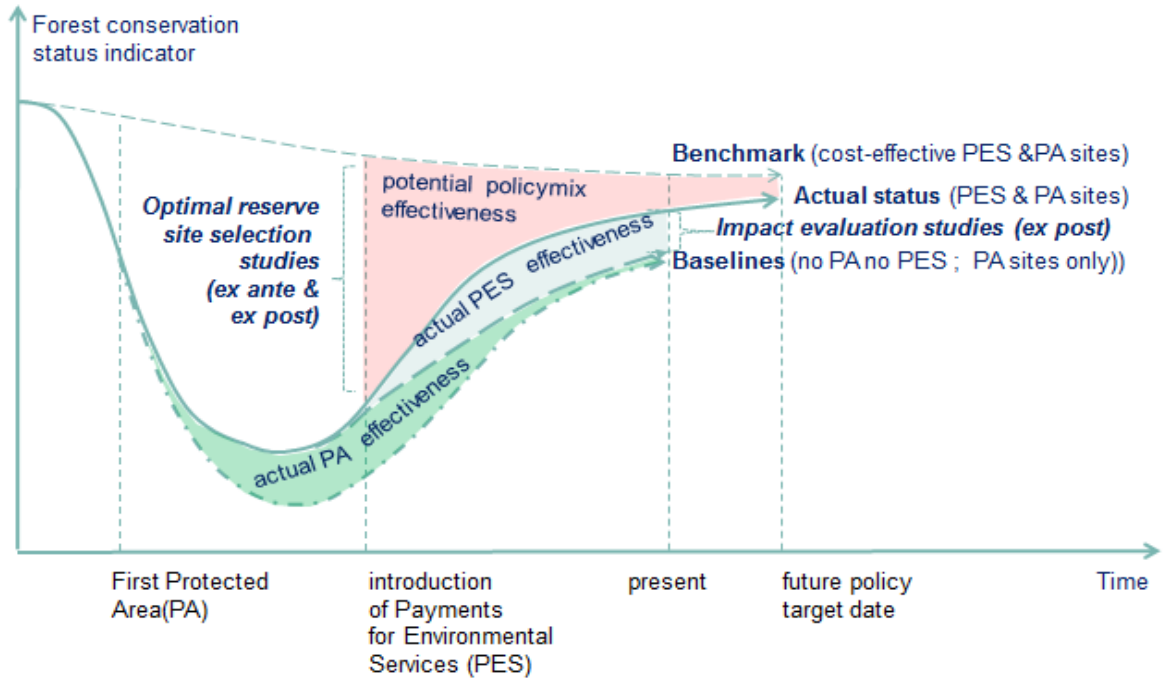


Figure 2. A multi-scale policymix approach evaluates instrument impacts both against

'baselines' and 'benchmarks'. In this example, PES= payment for ecosystem services; PA=protected areas.

More than efficiency. The efficiency of economic instruments for conservation combines the notions of the benefits from ecosystem services from biodiversity conservation and the costs of actions to achieve this effect. Costs include direct implementation costs, transaction or process costs, and the opportunity costs of foregone landuse opportunities. The welfare effects of economic policy instruments on ecosystem services provision through biodiversity conservation can be measured and valued in market and non-market terms. Although few economists believe that information about the net benefits of alternatives should be the sole basis for social choice, nearly all believe that it should be an important consideration in public policy decisions. In particular, valuation methods have been underexploited for the evaluation of instrument characteristic, because by varying institutional framing the value is expected to vary[8]. Using GIS to describe the spatial variation of landuse opportunities and opportunity costs of conservation policies are a further support for spatial targeting of economic instruments [9].

More than equity. Equity is not only about distributional 'equality' regardless of peoples characteristics. 'Distributive justice' or 'fairness' by peoples' own account must also consider 'ability to pay and need'; that groups/individuals with higher income should take a higher share of the costs. Conversely, those with lower income or greater *need* should receive a higher share of the benefits. Furthemore, the concept of 'proportionality' argues that groups/individuals that contribute more to biodiversity loss (improvement) should take a higher share of the costs (benefits) [10].

Fairness of the process and the outcome can be judged on the basis of external criteria for procedural and distributive justice but also by examining how the people affected perceive the extent of fairness according to their own criteria[10]. This can be called sense of justice and is linked to legitimacy [1]. The assessment of social impacts and legitimacy of policy instruments can therefore be divided into the concern for three types of justice: (1) *distributive justice*; (2) *procedural justice*; and (3) what we call *sense of justice* [1](figure 3). We also argue that externally evaluated outcomes of policy, namely distributional equity, effectiveness in reaching conservation targets, and the efficiency by which this is done, are all determinants of what can be called 'legitimacy of outcomes' [3].

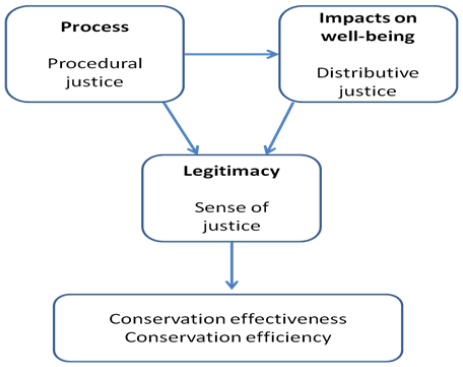
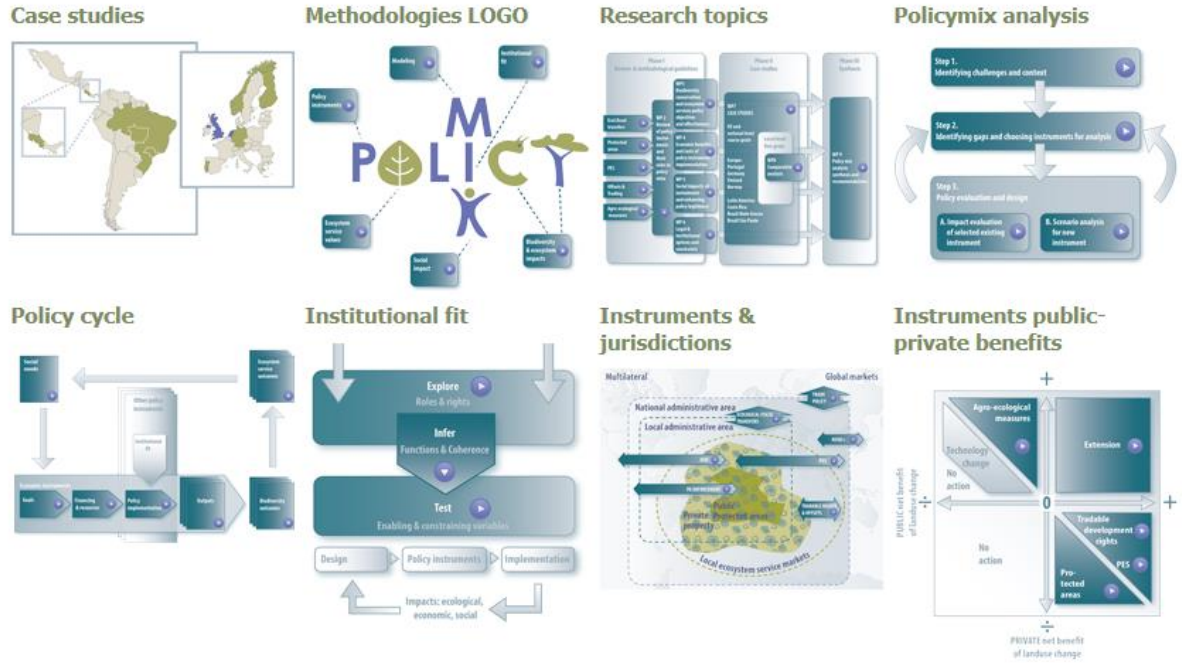


Figure 3. Sense of justice as a key concept in evaluating conservation policy conservation impacts [1]

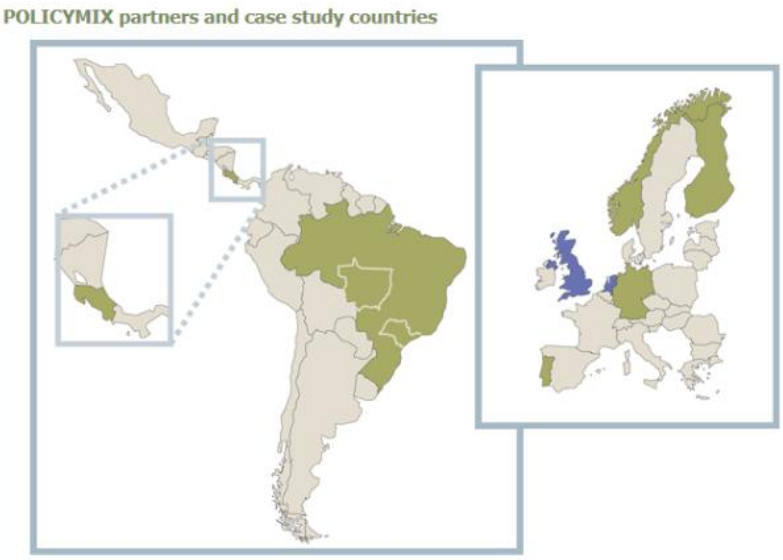
5 POLICYMIX TOOL – online access to multi-scale policymix analysis

The POLICYMIX TOOL provides access to policymix publication summaries and background material through a number of interfaces that reflect the multi-scale nature of policymix analysis.

The POLICYMIX TOOL interface



CLICK HERE or in figure above to go to the POLICYMIX TOOL interface online.



Policymix case studies

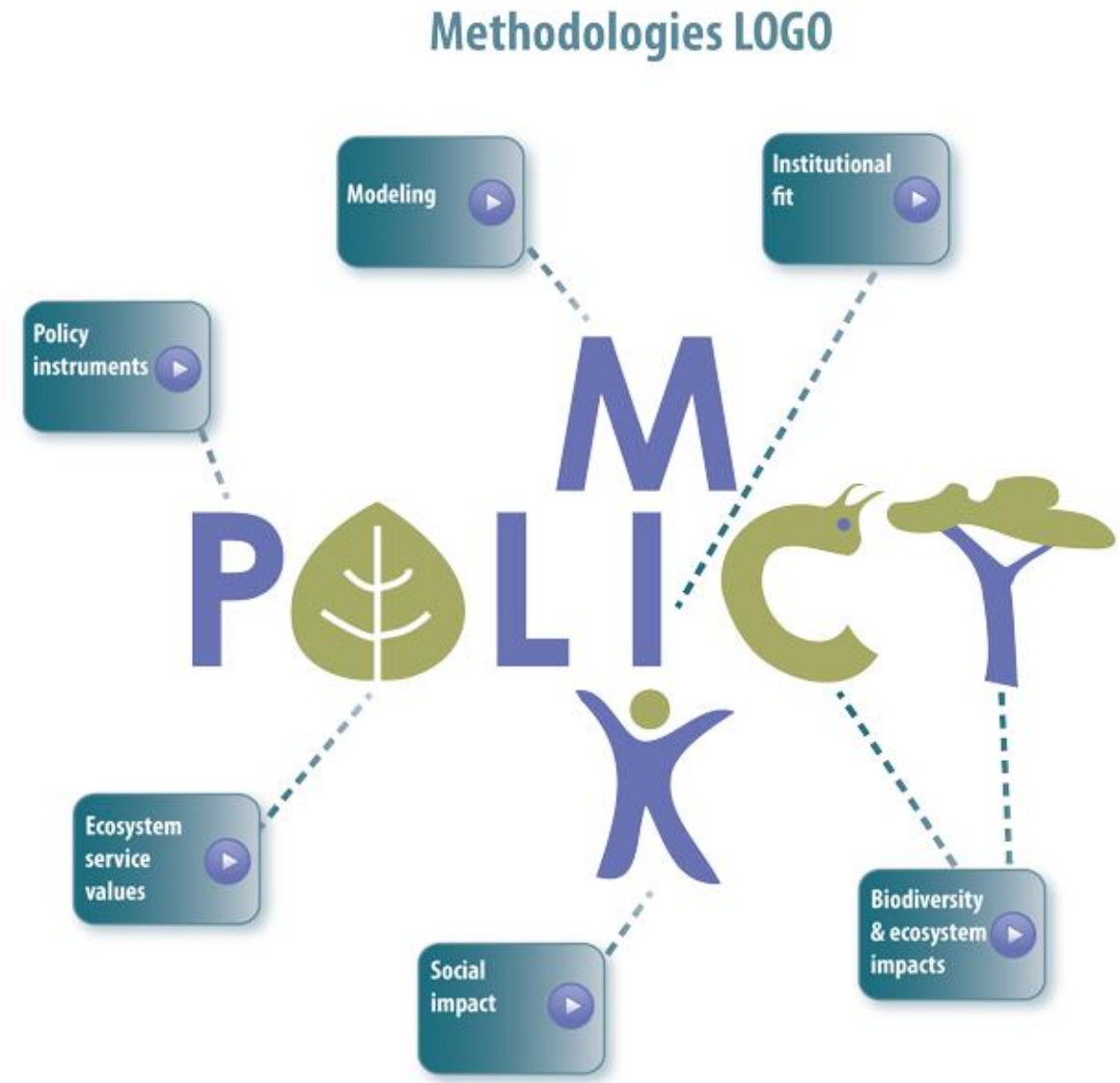
Policymix conducted case studies in Norway, Finland, Germany, Portugal, São Paulo and Mato Grosso states in Brazil, and Costa Rica. Partners in the UK and Netherlands provided methodological support.

CLICK HERE or in the figure to go to the case study interface and explore POLICYMIX case study publications.

POLICYMIX methods

Policymix is an interdisciplinary project applying a number of different methodological perspectives including;

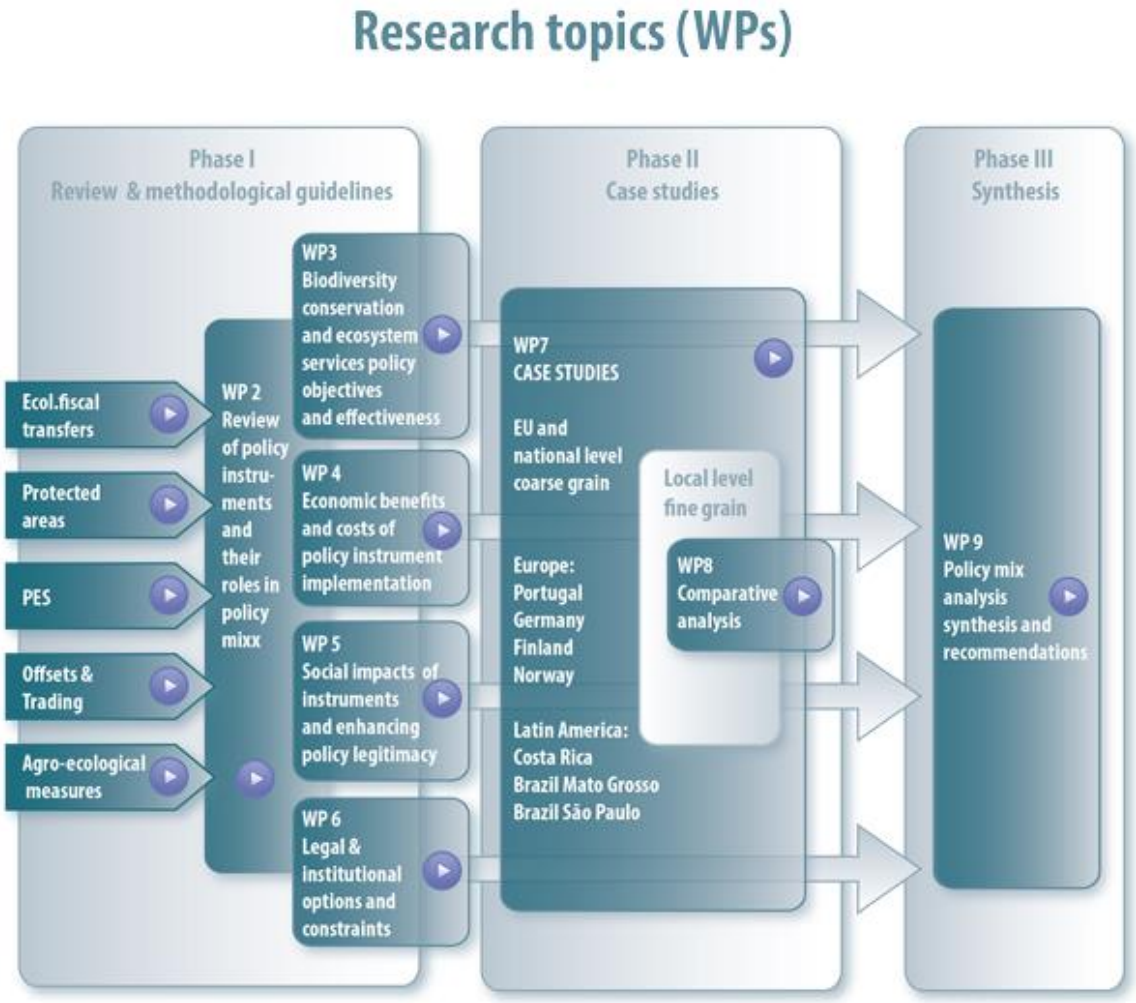
- Institutional fit
- Biodiversity & ecosystem impacts
- Social impact
- Ecosystem service values
- Policy instruments
- Modeling



CLICK HERE or in the figure to go to the case study interface and explore POLICYMIX methodology publications.

POLICYMIX research organisation

The POLICYMIX project was organized in three phases, including a first phase reviewing economic instruments, and second phase conducting coarse grain analysis at national level and the fine grain analysis at local level, followed by a comparative case study analysis. Phase III consisted of synthesis of multiscale policy analysis recommendations.



CLICK HERE or in the figure to go to the case study interface and explore POLICYMIX project structure and outcomes by working package.

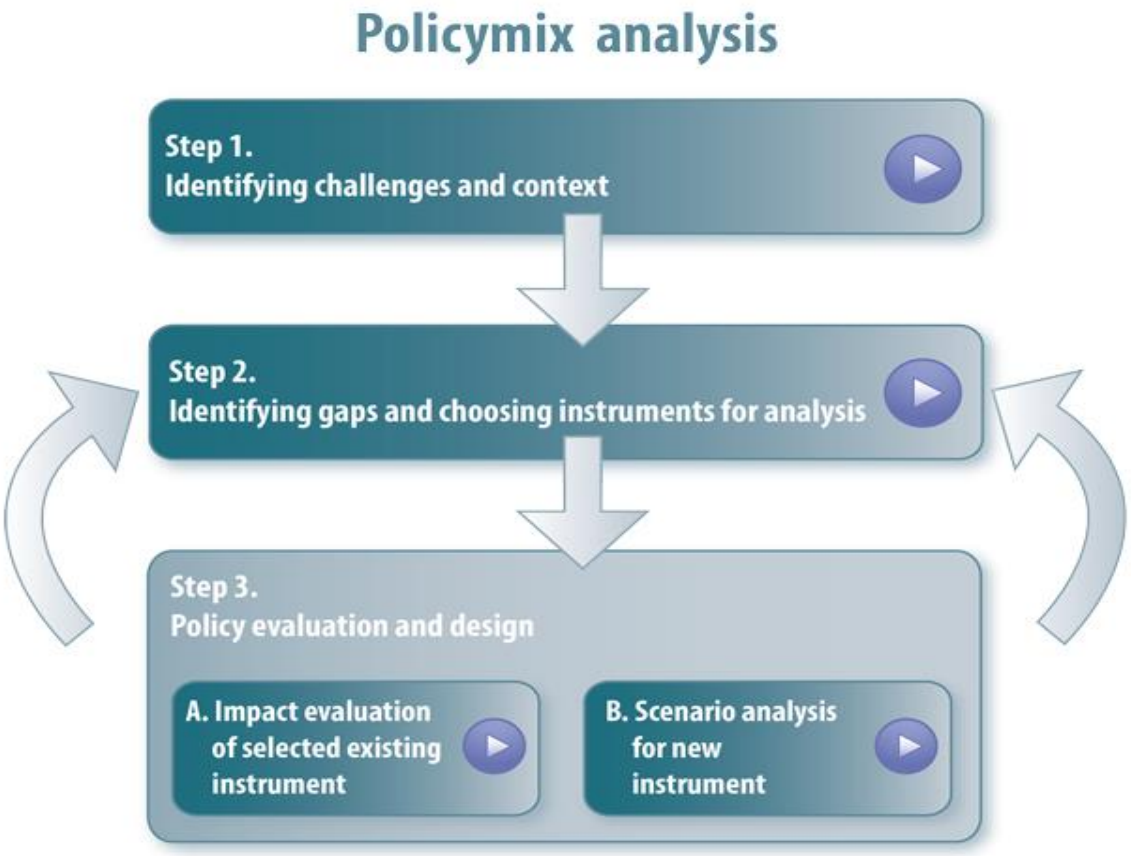
Policymix analysis framework

A 'policymix analysis' considers the following steps [2]:

Step 1. Scoping:. The context of any instrument involves identifying the relevant dimensions of instrument interaction – land use conservation challenges and objectives, landuse situations, actor groups, locations and time frame – for the assessment. A matrix of instruments is used to define different types of interactions – interactions have different geometries, either direct or indirect. Scoping also includes assessing institutional fit of proposed instruments.

Step 2. **Policy gap analysis** and identification of **instruments' roles**. Conservation instruments have different roles in a policy mix, e.g. a conservation payment acting in synergy with protected area regulations provides a combined conservation incentive to a landowner.

3.Evaluation and design. Synergy, conflict etc. can be evaluated at different stages of the policy cycle. Quantitative methods of impact evaluation and scenario analysis focus on resource allocation and outputs/outcomes (cost-effectiveness), whereas qualitative methods are used to assess the process of policy implementation. As a result, recommendations for the design of policy mixes do not seek to optimize single policy instruments in regard to single evaluation criteria, but consider that instruments need to be designed according to their functional role within the mix.



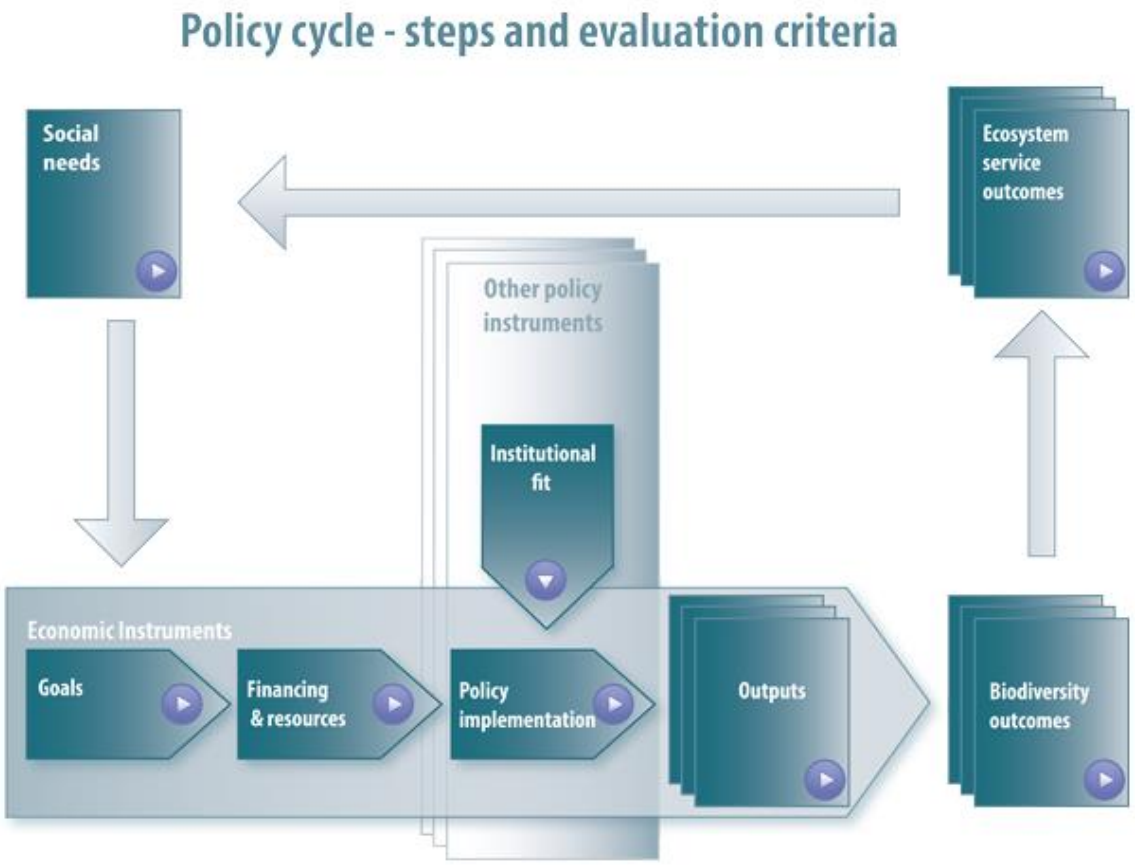
CLICK HERE or in the figure to go to the case study interface and explore POLICYMIX studies addressing different phases of policymix analysis.

Policy cycle

A familiar approach to instrument evaluation in i.a. economics is to assume a 'once-and-for-all implementation' and evaluate a single outcome against a single output (e.g. instrument spending, landuse coverage). A multiscale policymix approach the analysis is broadened to consider how instruments are proposed, designed, tested and adapted in a policy-cycle. in In a dynamic framing causes of path-dependency of individual instruments are evaluated.

In an adaptive policy-cycle perspective we may use any entry point for the analysis. An economic instrument may interact with other instruments in relation to goals, resources, implementation processes, outputs and outcomes.

The functional role of an economic instrument – whether it is complementary, in conflict, redundant or synergistic relative to the other types of instrument in the policymix – can also be defined at any one of these entry points in the policy cycle.

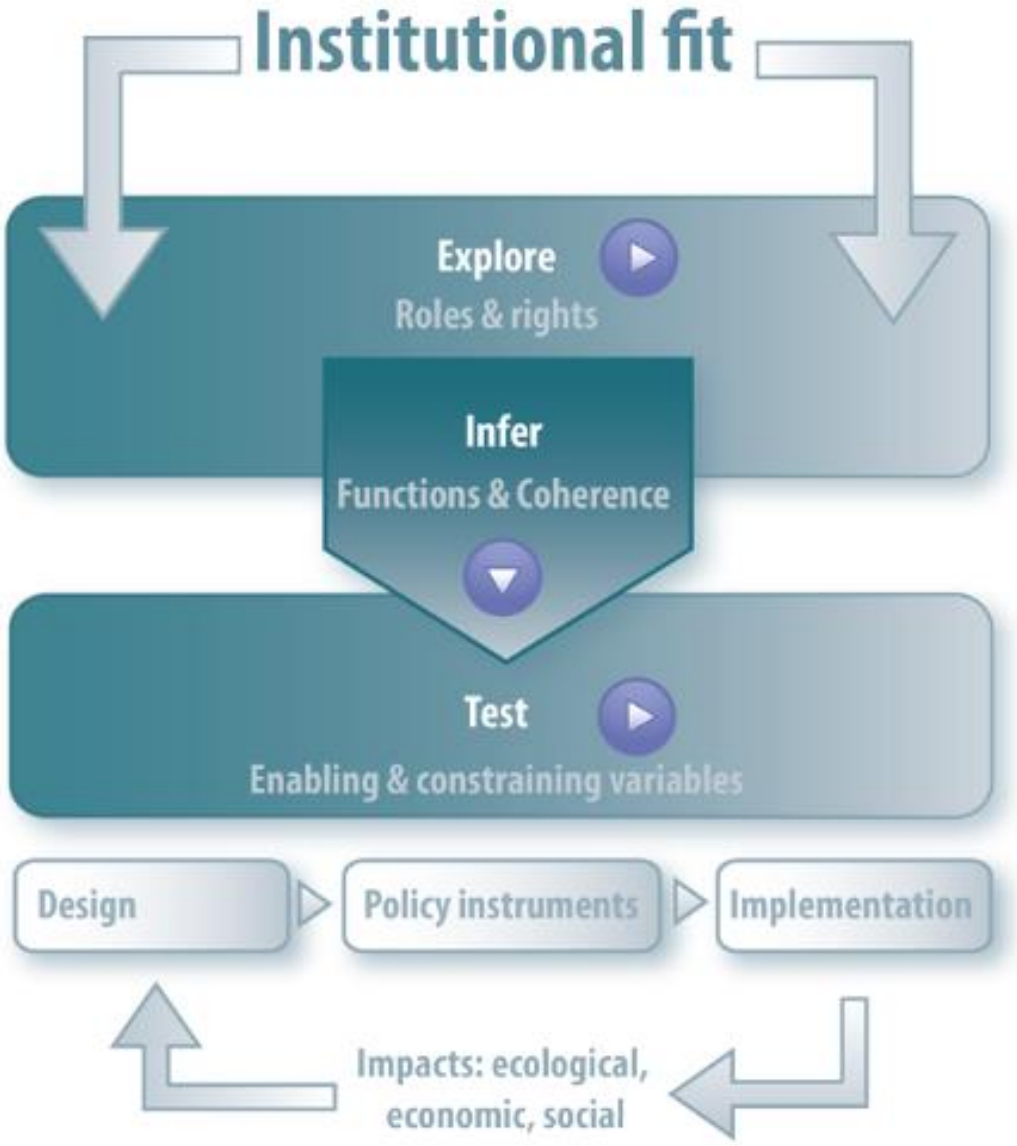


CLICK HERE or in the figure to go to the case study interface and explore POLICYMIX studies addressing different phases of the policy cycle.

Institutional fit

A multiscale policymix approach considers how instruments are proposed, designed, tested and adapted in a policy-cycle. Multiple governance levels create policy instruments that overlap in the landscape, creating combinations of formal and informal roles and rights applying to particular locations and situations. These combine with other characteristics of the social-ecological system to determine landuse.

Policymix analysis of institutional fit explores the roles & rights, infers functions & coherence and tests enabling and constraining variables in the socio-ecological system. Institutional fit is evaluated on ecological, economic and social impacts across the policy cycle from design to implementation.

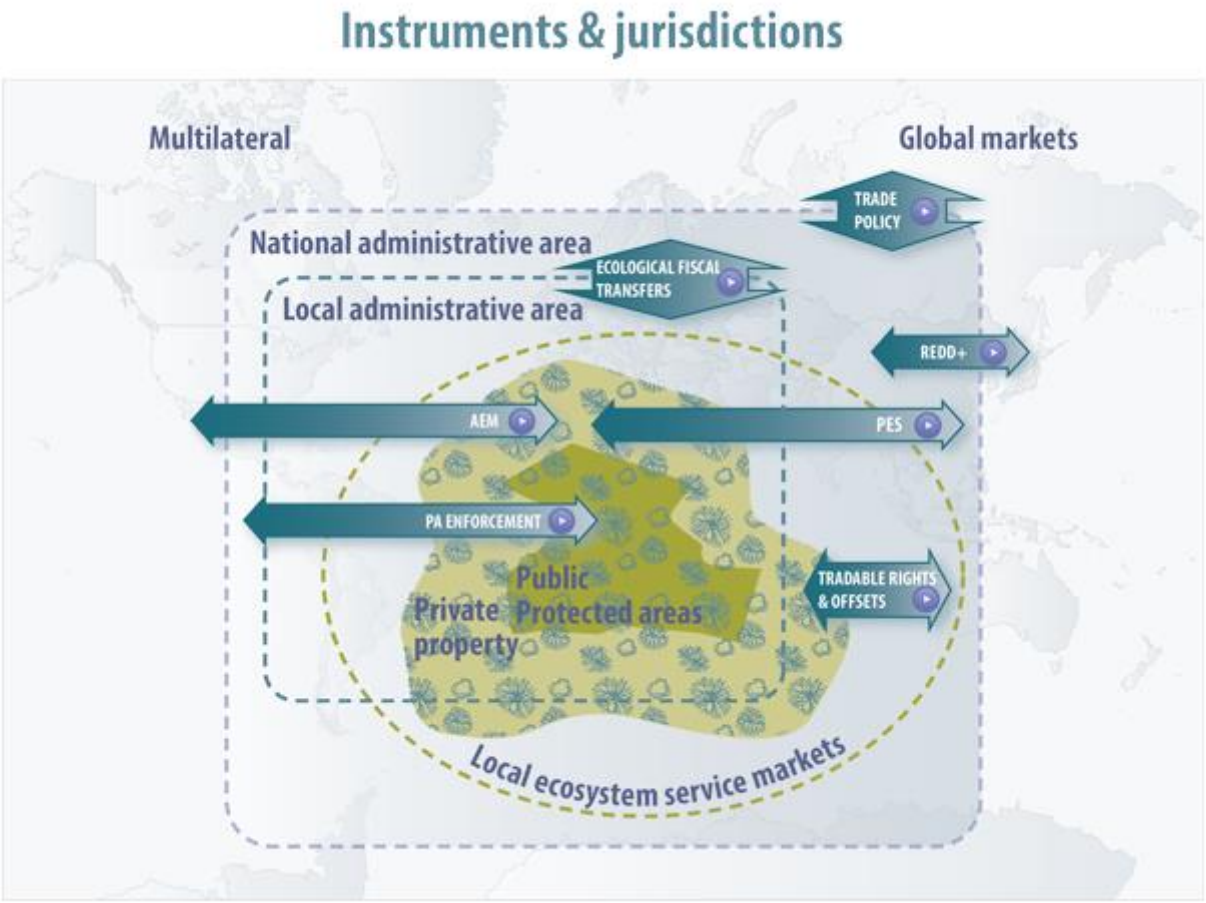


CLICK HERE or in the figure to go to the case study interface and explore POLICYMIX studies of institutional fit of economic instruments.

Instruments and overlapping jurisdictions

Multiple private and public governance levels create policy instruments that overlap in the landscape, creating combinations of formal rights applying to particular locations. Multiscale policymix analysis provides concepts for understanding multiple overlapping jurisdictions and governance levels in the landscape and how they determine externalities.

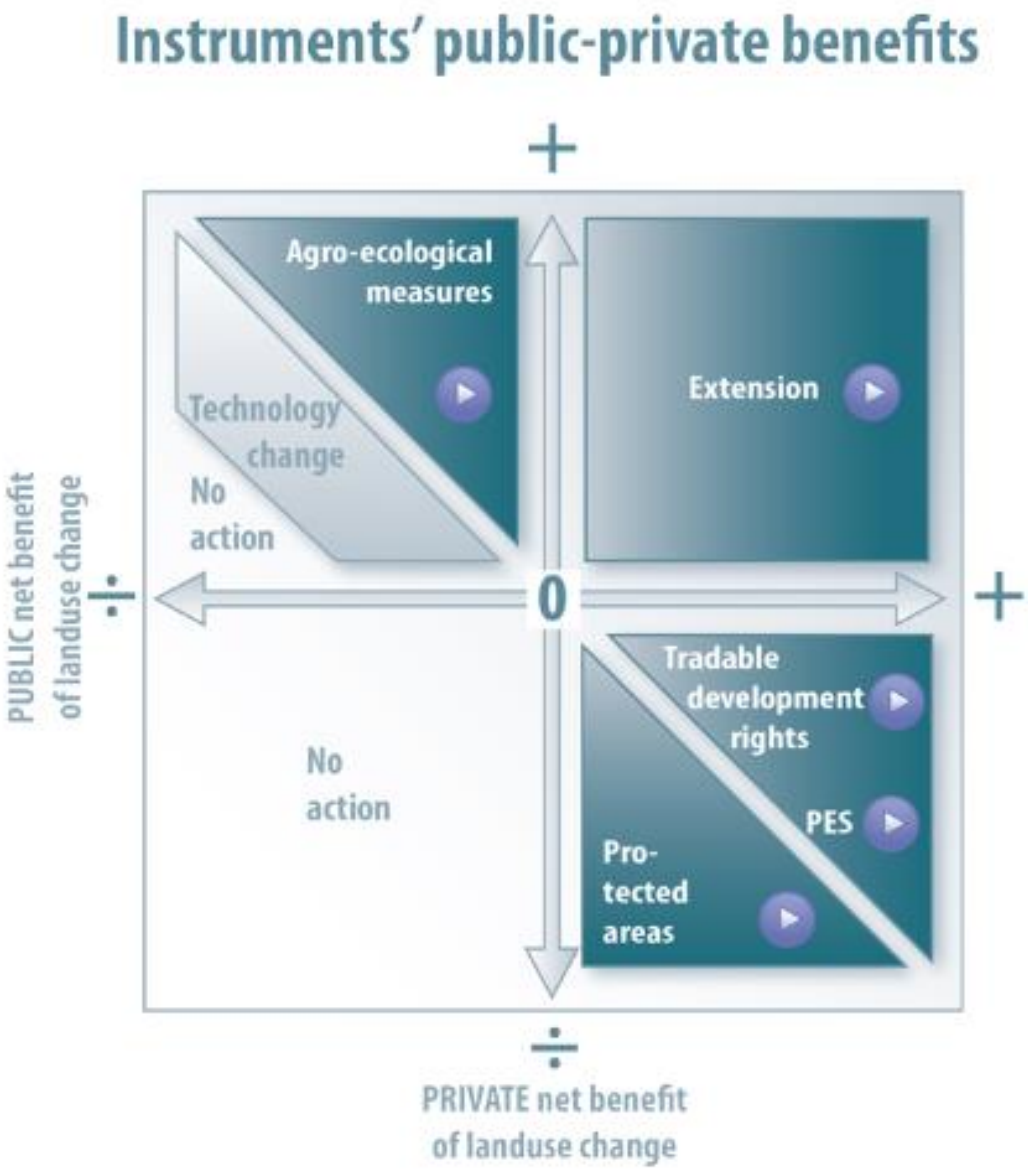
Jurisdictions do not match ecosystem and landuse boundaries which means that there are spatial externalities from one jurisdiction to another, with potential for policy conflict if impacts go uncompensated. Managers have a detailed knowledge of the formal instruments relevant to their jurisdiction, and a need to understand the causes of externalities affecting them from other jurisdictions.



CLICK HERE or in the figure to go to the case study interface and explore POLICYMIX studies on instrument spatial overlap and externalities.

Public and private net benefits of landuse change

In the public-private benefits framework, Pannell [11] proposes that the effectiveness of the choice of policy instrument in conservation – whether positive or negative incentives, flexible hybrid cap-and-trade instruments, or extension or promotion of technological change - depends on the relative ratio of public to private net benefits of landuse change of any particular 'project' location. Pannell's 'project' level approach suggests how different instruments should be combined across a landscape. Each location has a particular public-private net benefits ratio such that across a landscape mosaic of ratios a rational planner should assign a mosaic of instruments using the framework. Multiscale policymix analysis builds on the notion that instruments are specific to the public-private benefits of an landuse change situation.

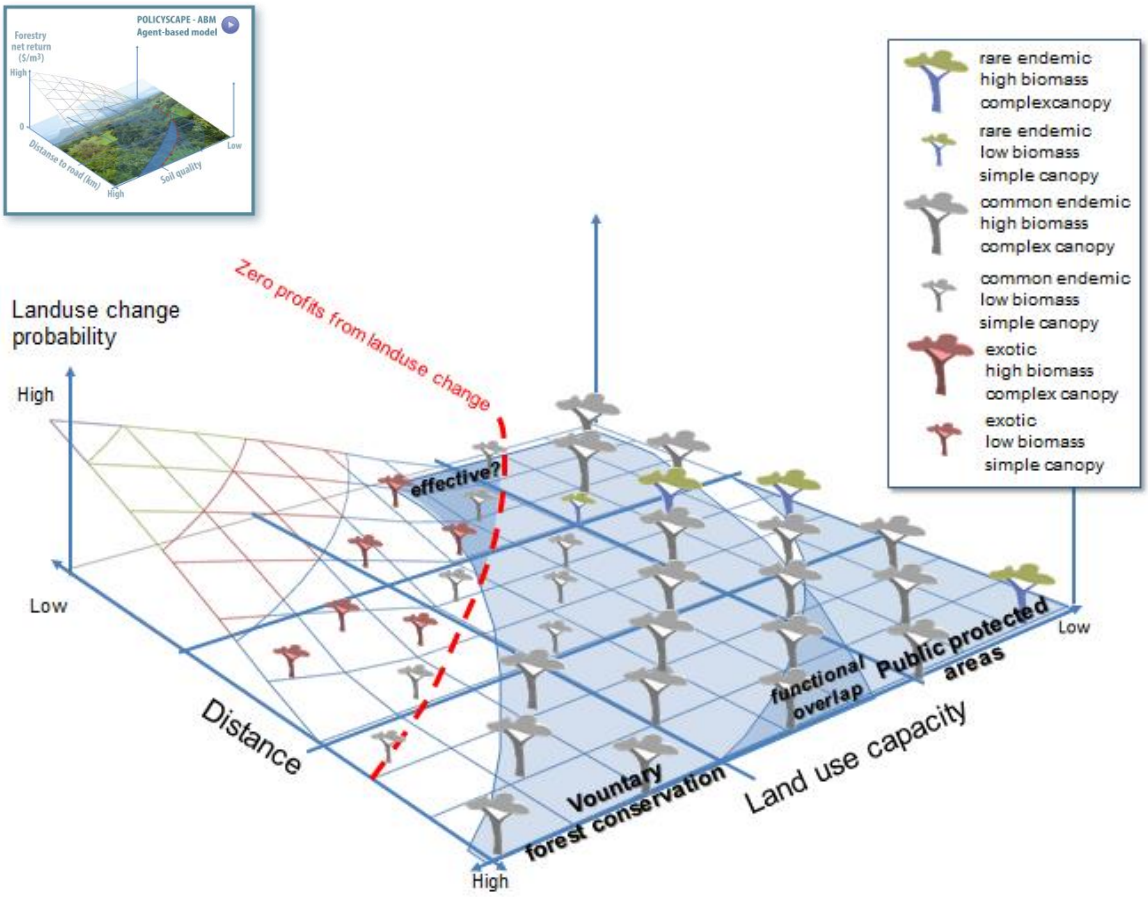


CLICK HERE or in the figure to explore POLICYMIX studies on the public and private benefits and costs of landuse change and related economic instruments.
Figure Source: adapted from Pannell [11].

Policyscape – the spatially explicit policymix

A multi-scale policymix approach defines the concept of a 'policyscape' to help managers visualize spatially explicit policy mixes across the landscape. The multiple dimensions of a landscape that determine where policies are targeted to 3 main dimensions that best explain spatial policy patterns. A number of studies have found that accessibility and biological landuse capacity significantly explain spatial patterns of rents for land conversion and location of conservation policies. While national parks and nature reserves have as their principle goal to target high biodiversity value areas, national parks are typically found on low productive land, far from markets. A policyscape 'state space' as shown below helps researchers communicate with managers about situations where multiple policies are implemented simultaneously on the same types of land. This in turn helps to visualize functional overlaps of instruments spatially. By also evaluating spatial locations of conservation instruments in relation to opportunity costs of alternative landuses we can also help managers formulate their own hypotheses about whether instruments can be expected to be effective and additional (because they have opportunity costs). Such mapping also helps identify potential conflicts.

CLICK HERE or in the icon below to go to test the **POLICYSCAPE ABM** – agent-based model for experimenting with spatially explicit policy mixes.



A multi-scale policymix approach defines the concept of a 'policyscape' to help managers visualize spatially explicit policy mixes across the landscape. Source: Barton and Adamowicz [12]

Methodologies

instruments

	Norway	Finland	Germany	Portugal	Costa Rica	Brazil, São Paulo	Brazil, Smato Grosso	General
Biodiversity & ecosystem impact	Time-line analysis of a public instrument mix Assessment of conservation cost-effectiveness A policyscape for conservation of biodiversity and ecosystem services Biodiversity and zero return forestry areas	Biodiversity Protection and Compliance in Private Forests	Biodiversity indicators for Ecological Fiscal Transfers Understanding landowners' objections towards afforestation Agri-environmental policy valuation for afforestation measures in Germany Ecological Fiscal Transfers across Europe	Farmers' perceptions on agri-environmental schemes Evaluating spatial targeting and planning effectiveness of policies Assessment of conservation cost-effectiveness Ecological Fiscal Transfers across Europe	Green house emission balance and Payment for Environmental Services in cattle farm in the Nicoya Peninsula of Costa Rica Evaluating spatial targeting of payments for forest ecosystem services: Using 'policy benchmark scenarios' derived from conservation planning tools Substitutability and complementarity of forest conservation policies 20 years of PES in Costa Rica Assessment of conservation cost-effectiveness	Cost-effectiveness of tradable development rights Assessment of conservation cost-effectiveness	The effect of forest proximity on biological control of pasture in Northwest Mato Grosso, Brazil Pilot projects and agro--environmental measures in northwest Mato Grosso, Brazil: impacts and lessons for forest frontier "policyscapes"	Instrument Mixes for Biodiversity Policies
Ecosystem service values	Benefits and Costs of Preserving Forest Forest owner compensation for conservation Accounting for capacity and flow of ecosystem services for Telemark, Norway A policyscape for conservation of biodiversity and ecosystem services Best practice of spatial modelling for ecosystem accounting		Understanding landowners' objections towards afforestation Agri-environmental policy valuation for afforestation measures in Germany	Evaluating spatial targeting and planning effectiveness of policies	Evaluating spatial targeting of payments for forest ecosystem services: Using 'policy benchmark scenarios' derived from conservation planning tools Land prices and PES in Costa Rica	Costs of environmental protection in different types of agricultural production units		Economic Costs of Avoided Deforestation Benefits assessment of economic instruments Opportunity cost evaluation guidelines
Social impacts	Comparative assessment of policy mixes across case studies	Comparative assessment of policy mixes across case studies	Comparative assessment of policy mixes across case studies	Farmers' perceptions on agri-environmental schemes Comparative assessment of policy mixes across case studies	Substitutability and complementarity of forest conservation policies Comparative assessment of policy mixes across case studies 20 years of PES in Costa Rica Land prices and PES in Costa Rica	Comparative assessment of policy mixes across case studies	Comparative assessment of policy mixes across case studies The effectiveness and fairness of the "Ecological ICMS" as a fiscal transfer for biodiversity conservation in Mato Grosso, Brazil Pilot projects and agro-environmental measures in northwest Mato Grosso, Brazil: impacts and lessons for forest frontier "policyscapes"	
Institutional fit	Comparative assessment of policy mixes across case studies Forest owner compensation for conservation Forest Owners' Participation in Conservation	Comparative assessment of policy mixes across case studies Legitimacy and empowerment Institutional adaptation integration of conservation into forestry PES Evolution and institutional constraints on new policy Forest owner perceptions: Not crowding out but staying out Economic Instruments and EU State Aid Regulation European state aid and nature conservation law, REDD+ and economic instruments Biodiversity Protection and Compliance in Private Forests	Comparative assessment of policy mixes across case studies European state aid and nature conservation law, REDD+ and economic instruments Ecological Fiscal Transfers in Germany from theory to possible outcomes MBIs in EU Biodiversity Policy Legal analysis of ecological fiscal transfers EurUP 2013, 85-94 and Policy-Mix Report 1/2013 EFT in the German biodiversity conservation policy mix Ecological Fiscal Transfers across Europe	Comparative assessment of policy mixes across case studies Ecological Fiscal Transfers across Europe	Substitutability and complementarity of forest conservation policies Comparative assessment of policy mixes across case studies 20 years of PES in Costa Rica Transaction and compliance costs in Costa Rica's PES	Comparative assessment of policy mixes across case studies Institutional dimensions of PES in Cantareira PES and Fisheries Co-Management in Brazil European state aid and nature conservation law, REDD+ and economic instruments	Comparative assessment of policy mixes across case studies PES and Fisheries Co-Management in Brazil Pilot projects and agro--environmental measures in northwest Mato Grosso, Brazil: impacts and lessons for forest frontier "policyscapes" European state aid and nature conservation law, REDD+ and economic instruments	Payments for Watershed Services Instrument Mixes for Biodiversity Policies
Modelling	Comparative assessment of policy mixes across case studies Policyscape analysis Norway Accounting for capacity and flow of ecosystem services for Telemark, Norway A policyscape for conservation of biodiversity and ecosystem services Best practice of spatial modelling for ecosystem accounting	Comparative assessment of policy mixes across case studies	Comparative assessment of policy mixes across case studies EFT in the German biodiversity conservation policy mix	Evaluating spatial targeting and planning effectiveness of policies Economic instruments in the Portuguese conservation policy mix Landowners Preferences for Agri-Environmental Agreements Comparative assessment of policy mixes across case studies	Substitutability and complementarity of forest conservation policies Evaluating spatial targeting of payments for forest ecosystem services: Using 'policy benchmark scenarios' derived from conservation planning tools Substitutability and complementarity of forest conservation policies Comparative assessment of policy mixes across case studies Land prices and PES in Costa Rica	Comparative assessment of policy mixes across case studies Cost-effectiveness of tradable development rights	Comparative assessment of policy mixes across case studies The effectiveness of the Environmental Reserve Quota (CRA) for on-farm forest conservation in Cotriguaçu, Mato Grosso, Brazil	Payments for Watershed Services Economic Costs of Avoided Deforestation

methodologies

Instruments

	Norway	Finland	Germany	Portugal	Costa Rica	Brazil, São Paulo	Brazil, Mato Grosso	General
Integrated & comparative	Comparative assessment of policy mixes across case studies	Comparative assessment of policy mixes across case studies	Comparative assessment of policy mixes across case studies	Comparative assessment of policy mixes across case studies	Comparative assessment of policy mixes across case studies	Comparative assessment of policy mixes across case studies	Comparative assessment of policy mixes across case studies	
Trade policy		European state aid and nature conservation law, REDD+ and economic instruments	European state aid and nature conservation law, REDD+ and economic instruments MBIs in EU Biodiversity Policy			European state aid and nature conservation law, REDD+ and economic instruments	European state aid and nature conservation law, REDD+ and economic instruments	
REDD+	Best practice of spatial modelling for ecosystem accounting	European state aid and nature conservation law, REDD+ and economic instruments	European state aid and nature conservation law, REDD+ and economic instruments			European state aid and nature conservation law, REDD+ and economic instruments	European state aid and nature conservation law, REDD+ and economic instruments	Economic Costs of Avoided Deforestation Instrument Mixes for Biodiversity Policies
Ecological fiscal transfers	Comparative assessment of policy mixes across case studies A policyscape for conservation of biodiversity and ecosystem services Best practice of spatial modelling for ecosystem accounting	Comparative assessment of policy mixes across case studies	Comparative assessment of policy mixes across case studies Ecological Fiscal Transfers in Germany from theory to possible outcomes MBIs in EU Biodiversity Policy Legal analysis of ecological fiscal transfers EurUP 2013, 85-94 and Policy-Mix Report 1/2013 EFT in the German biodiversity conservation policy mix Ecological Fiscal Transfers across Europe Biodiversity indicators for Ecological Fiscal Transfers	Economic instruments in the Portuguese conservation policy mix Fiscal transfers for biodiversity conservation: the Portuguese Local Finances Law Comparative assessment of policy mixes across case studies Directing economic instruments at public and private local stakeholders for biod. conservation Ecological Fiscal Transfers across Europe	Comparative assessment of policy mixes across case studies	Comparative assessment of policy mixes across case studies	Comparative assessment of policy mixes across case studies The effectiveness and fairness of the "Ecological ICMS" as a fiscal transfer for biodiversity conservation in Mato Grosso, Brazil Role of economic and regulatory instruments in the conservation policy mix for the Brazilian Amazon	Instrument Mixes for Biodiversity Policies
Protected area enforcement	Policyscape analysis Norway Time-line analysis of a public instrument mix Benefits and Costs of Preserving Forest Forest owner compensation for conservation Forest Owners' Participation in Conservation Assessment of conservation cost-effectiveness A policyscape for conservation of biodiversity and ecosystem services Best practice of spatial modelling for ecosystem accounting	Institutional adaptation integration of conservation into forestry European state aid and nature conservation law, REDD+ and economic instruments Biodiversity Protection and Compliance in Private Forests	European state aid and nature conservation law, REDD+ and economic instruments Ecological Fiscal Transfers in Germany from theory to possible outcomes MBIs in EU Biodiversity Policy	Farmers' perceptions on agri-environmental schemes Evaluating spatial targeting and planning effectiveness of policies Economic instruments in the Portuguese conservation policy mix Fiscal transfers for biodiversity conservation: the Portuguese Local Finances Law Landowners Preferences for Agri-Environmental Agreements Assessment of conservation cost-effectiveness	National level assessment of forest conservation policies Substitutability and complementarity of forest conservation policies Assessment of conservation cost-effectiveness	Assessment of conservation cost-effectiveness European state aid and nature conservation law, REDD+ and economic instruments	European state aid and nature conservation law, REDD+ and economic instruments Role of economic and regulatory instruments in the conservation policy mix for the Brazilian Amazon	Opportunity cost evaluation guidelines Instrument Mixes for Biodiversity Policies
PES	Comparative assessment of policy mixes across case studies Policyscape analysis Norway Benefits and Costs of Preserving Forest Forest owner compensation for conservation Forest Owners' Participation in Conservation Assessment of conservation cost-effectiveness A policyscape for conservation of biodiversity and ecosystem services Best practice of spatial modelling for ecosystem accounting Biodiversity and zero return forestry areas	Comparative assessment of policy mixes across case studies PES Evolution and institutional constraints on new policy Forest owner perceptions: Not crowding out but staying out Economic Instruments and EU State Aid Regulation European state aid and nature conservation law, REDD+ and economic instruments	Comparative assessment of policy mixes across case studies European state aid and nature conservation law, REDD+ and economic instruments MBIs in EU Biodiversity Policy	Fiscal transfers for biodiversity conservation: the Portuguese Local Finances Law Comparative assessment of policy mixes across case studies Assessment of conservation cost-effectiveness	Substitutability and complementarity of forest conservation policies Substitutability and complementarity of forest conservation policies National level assessment of forest conservation policies Green house emission balance and Payment for Environmental Services in cattle farm in the Nicoya Peninsula of Costa Rica Evaluating spatial targeting of payments for forest ecosystem services: Using 'policy benchmark scenarios' derived from conservation planning tools Substitutability and complementarity of forest conservation policies Comparative assessment of policy mixes across case studies 20 years of PES in Costa Rica Land prices and PES in Costa Rica Assessment of conservation cost-effectiveness Transaction and compliance costs in Costa Rica's PES	Comparative assessment of policy mixes across case studies Costs of environmental protection in different types of agricultural production units Institutional dimensions of PES in Cantareira Assessment of conservation cost-effectiveness PES and Fisheries Co-Management in Brazil European state aid and nature conservation law, REDD+ and economic instruments	Comparative assessment of policy mixes across case studies PES and Fisheries Co-Management in Brazil European state aid and nature conservation law, REDD+ and economic instruments	Payments for Watershed Services Opportunity cost evaluation guidelines Instrument Mixes for Biodiversity Policies
Agri-environmental measures (AEM)	Comparative assessment of policy mixes across case studies Assessment of conservation cost-effectiveness	Comparative assessment of policy mixes across case studies European state aid and nature conservation law, REDD+ and economic instruments	Comparative assessment of policy mixes across case studies European state aid and nature conservation law, REDD+ and economic instruments Understanding landowners' objections towards afforestation MBIs in EU Biodiversity Policy Agri-environmental policy valuation for afforestation measures in Germany	Farmers' perceptions on agri-environmental schemes Evaluating spatial targeting and planning effectiveness of policies Economic instruments in the Portuguese conservation policy mix Comparative assessment of policy mixes across case studies Landowners Preferences for Agri-Environmental Agreements Directing economic instruments at public and private local stakeholders for biod. conservation Assessment of conservation cost-effectiveness	Comparative assessment of policy mixes across case studies Assessment of conservation cost-effectiveness	Comparative assessment of policy mixes across case studies Assessment of conservation cost-effectiveness European state aid and nature conservation law, REDD+ and economic instruments	Comparative assessment of policy mixes across case studies Pilot projects and agro--environmental measures in northwest Mato Grosso, Brazil: impacts and lessons for forest frontier "policyscapes" European state aid and nature conservation law, REDD+ and economic instruments	Instrument Mixes for Biodiversity Policies
Tradable rights & offsets	Assessment of conservation cost-effectiveness		MBIs in EU Biodiversity Policy	Assessment of conservation cost-effectiveness	Assessment of conservation cost-effectiveness	Cost-effectiveness of tradable development rights Assessment of conservation cost-effectiveness	The effectiveness of the Environmental Reserve Quota (CRA) for on-farm forest conservation in Cotriguaçu, Mato Grosso, Brazil	Instrument Mixes for Biodiversity Policies

8 Case study summaries

Policymixes in conservation

Substitutability and complementarity of forest conservation policies

Keywords	Costa Rica, Reforestaton, Conservation, Policy instruments, Institutional fit, Payments for Environmental Services(PES), Social Resiliance, Ostrom

Main research question

Is there a relationship between the evolutionary process of policy instruments related to environmental management in Costa Rica, and its impact on socio-ecological resilience?

Research finding in brief

Hojancha went through a gradual process of resilience loss due to socioeconomic and ecological changes occurred in the last 60 years. The most significant cause of stress in social-ecological systems was the continuing changes in livestock systems. They triggered high economic vulnerability causing large waves of emigration and changes in the landscape, threatening the stability of services provided by ecosystems.

Results show that in Nicoya, Nandayure and particularly in Hojancha, public participation played an important role in their resilience to crisis situations. As recognized, public participation in decision-making allows integrating cultural diversity and the rights and duties distinct social sectors in environmental management. It also increases the environmental awareness of the population, generating legitimacy and transparency in environmental decision, as has been the case of Hohancha, even before its declaration as a canton. This canton is known for establishing integrated networks around the environment which has encouraged the private sector to get involved in solving environmental problems.

Policymix approach

This paper highlights the relationship between the evolutionary process of policy instruments related to environmental management in Costa Rica, and its impact on socio-ecological resilience of the Hojancha Peninsula. It identifies various causal factors and combinations that have contributed development of the areas.

As central theoretical basis, we used the "Framework for analyzing social-ecological systems" proposed by Elinor Ostrom et al. (2009). This method identifies first level variables of analyzing such as: social, economic and political scenarios; system of resources, governance, resource units, users, interactions, and related ecosystems. It also incorporates more specific (or second level) variables; which allows to narrow the range of possible indicators within social-ecological systems.

Reference:
Chacón-Cascante et al. 2013. Evaluating the policymix path dependency of PES using socio-ecological system characteristics: the case of Hojancha, Nicoya and Nandayure

Website:
Forthcoming at http://policymix.nina.no/

Contact:
achacon@catie.ac.cr

Keywords	Costa Rica, Social impact, Reforestation, Conservation, Payments for Environmental Services(PES), Modeling, Matching

Main research question

What is the socio-economic impact of conservation and reforestation PES contracts in the Nicoya Peninsula?

Research finding in brief

Families participating in the PES program are different from their counterfactuals; ingeenral they are better endowed. Protection payments are more likely to be located in farms with lower opportunity cost. Notheless, payments for reforestation, concentrate in farms that are closer to markets.

There is no evidence of any socio-economic impact (either positive not negative) of the any of the two PES modalities analyzed.

Policymix approach

This paper conducts an evaluation of socio-economic impact of two of the most extensively used PES contract modalities in Nicoya Peninsula. Data was collected from a family level survey in 2011 and later combined with Cadastre data. This combination of data sets added methodological value to the paper as it demonstrates the use of the recently completed Cadastre for Costa Rica in conducting policy evaluation at property level.

The overlap of policies can be seen as a policy mix. It allows us asses for the policy mix effect and the policy separation effect. Then we could cleanly compare the effects to conclude about substitutability or complementarity of policies.

Reference:
Chacón-Cascante et al. 2014. Social Impact evaluation of forest conservation and reforestation PES contracts in Hojancha

Website:
Forthcoming at http://policymix.nina.no/

Contact:
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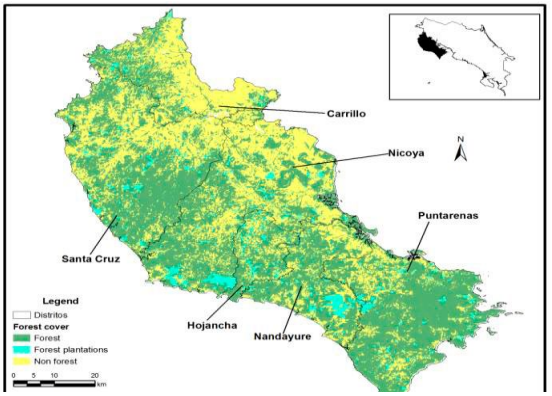
Keywords	Costa Rica, Biodiversity conservation, Payments for Environmental Services, Certification, Protected areas

Main research question

What are the main conservation policies historically implemented in CR for biodiversty conservation and what are their main interactions?

Research finding in brief

Based on existing literature, this report analyses the effectiveness, efficiency and social impacts of several existent instruments aimed at biodiversity conservation in CR. Main instruments included are the payment for environmental services (PES) program, forest certification, mandatory regulations and REDD+ as a proposed instrument (not currently adopted).



Source: Diego Tobar. Programa GAMMA/CATIE

Also, an interaction analysis between the different instruments was performed. It was concluded from this exercise that although there are complementarities between the different instruments, they also relate in a counterproductive manner limiting their potential effectiveness and decreasing their cost efficiency.

Policymix approach

This report discusses Costa Rican biodiversity goals and the main policies historically implemented to reach conservation objectives. The study first discusses national current biodiversity status and challenges; then an assessment of the existing economic instruments is presented to later analyze their roles in the policy mix for forest biodiversity conservation and ecosystem service provision. Instruments considered in the analysis are the national payment for ecosystem services program, protected areas, certification and law-enforced measures.

Reference:
Chacón-Cascante et al. 2012. Costa Rica: National level assessment of the role of economic instruments in the conservation policymix

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Policymixes in conservation

Green house emission balance and Payment for Environmental Services in cattle farm in the Nicoya Peninsula of Costa Rica

Keywords	Costa Rica, biodiversity and ecosystem impact, greenhouse gas balance, PES, cattle ranching

Main research question

Does the PES program contribute to the neutral balances of greenhouse gases in Costa Ricas´ cattle farms?

Research finding in brief

Farms with PSA had positive greenhouse balances. However, the result cannot be fully attributed to PES participation. There are other economic, political, cultural and social factors that together with the adoption of the PES policy favor the neutral carbon.

Source: Jose Cárdenas. Programa GAMMA/CATIE

Policymix approach

Based on the Costa Rica national goal of carbon neutrality by 2021, we investigated if cattle farms participating in the PES program are more carbon neutral compared with farms without PES. With the use of Costa Rica greenhouse gases (GHG) metodologies and the carbon fixation rates of the land uses of farms, GHG balance was performed with a scope of one (farm level). Also other factors, such as socioeconomic and related to the policymix, linked to ecosystem services and the GHG mitigation in livestock landscapes were analyzed.

Reference:
Cárdenas et al. 2014. Costa Rica: Effectivity of PES carbon balance in livestock systems in Nicoya peninsula, Costa Rica

Website:
Forthcoming at http://policymix.nina.no/

Contact:
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Policymixes in conservation

Evaluating spatial targeting of payments for forest ecosystem services: Using 'policy benchmark scenarios' derived from conservation planning tools

Keywords	Costa Rica, PES, biodiversity and ecosystem impact, ecosystem service values, effectiveness, Marxan, modeling

Main research question

What are the spatial congruencies among important areas for ecosystem services provision and with areas of greater deforestation risk? How much does actual PES contract distribution agree with ecosystem services and greater deforestation risk areas?

Research finding in brief

Source: Jose Cardenas. Programa GAMMA/CATIE

Our results show differences among the distribution of selected sites for biodiversity, water and carbon. Important areas for biodiversity showed positive correlation with carbon, and carbon with water. Between biodiversity and water the correlation was negligible. When targeting ecosystem services considering additionality, the correlation and overlap among the services decreased. Ecosystem services and additionality may be jointly addressed but at the expense of selecting more fragmented forest areas. When comparing the distribution of actual contract PES allocation with the planning scenarios – with and without additionality – we observed some spatial overlap, but there was a slightly better overlap when solely targeting ecosystem services. Although this is an exploratory analysis, we show the potential of spatial policy benchmarks as a tool for evaluating the effectiveness of PES targeting, and for exploring potential synergies and tradeoffs between alternative conservation objectives.

Policymix approach

Costa Rica's nation-wide Payment for Environmental Services (PES) program is built on the main assumption that forestland uses provide a bundle of desired ecosystem services. The functional outcome of this assumption is that 'avoided deforestation' has become a proxy for assessing the impact of the PES scheme on achieving conservation goals. However, this proxy may not offer an appropriate measure of the effectiveness of PES. We used a conservation planning tool for developing spatially explicit 'policy benchmark' scenarios based on ecosystem services distribution and additionality value for preventing forest loss.

Reference:
Ramos-Bendaña et al. 2014. Evaluating spatial targeting of payments for forest ecosystem services: Using 'policy benchmark scenarios' derived from conservation planning tools

Website:
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Policymixes in conservation

Substitutability and complementarity of forest conservation policies

Keywords	Costa Rica, Biodiversity and ecosystem impact, Matching, Protected Areas, Payments for Environmental Services(PES), Modeling

Main research question

Does combining Parks and Payments for Environmental Services (policy mix) avoid more deforestation than implementing Parks and Payments separately (policy separation)?

Research finding in brief

Parks and 'protection PES' are perfect policy substitutes in terms of forest conservation.

There is high substitutability between 'protection PES' and buffer zones on avoiding deforestation.

Policymix approach

This work evaluates the effect of two individual policies, National Parks and PES, on avoiding deforestation when they are implemented in the same location. The overlap of policies can be seen as a policy mix. It allows us asses for the policy mix effect and the policy separation effect. Then we could cleanly compare the effects to conclude about substitutability or complementarity of policies.

National Park Volcán Arenal in Costa Rica.

Reference:
Robalino et al. Substitutability and complementarity of forest conservation policies

Website:
Forthcoming at http://policymix.nina.no/

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Farmers' perceptions on agri-environmental schemes (paper to be submitted in May 2014)

Keywords	Portugal, CENSE-UNL, WP7, Challenges, context and gaps, Impact evaluation, Biodiversity and ecosystems impact, Social impact, Policy instruments, Goals, Implementation process, Outputs, Protected area enforcement, AEM

Main research question

How do farmers perceive the implementation process and performance of a specific Portuguese AEM scheme oriented for biodiversity conservation in a Natura 2000 montado landscape?

Research finding in brief

The Integrated Territorial Interventions (ITI), an innovative AEM, are a locally-based approach designed to compensate farmers for the costs of managing agricultural and forestry systems in areas of special interest, failed to deliver any ecological outputs in the case study area.

There are four key constraining factors: low level of incentives, poor participation of relevant stakeholders in the design and implementation processes, lack of information provided to farmers, and constraining institutions.

Policymix approach

AEM were analyzed in the scope of the conservation policy mix at play, adopting the POLICYMIX framework for assessing the role of instruments in policy mixes for biodiversity and ecosystem governance, complemented by a survey used to capture the perceptions, motivations and expectations of local farmers and other relevant stakeholders.

Reference:
Clemente, P., Santos, R., Antunes, P., Pinto, R. Assessing farmers' perceptions and performance of agri-environmental schemes in a multifunctional agro-forest system: lessons for instrument design in a conservation policymix.

Website:
Forthcoming at http://policymix.nina.no/

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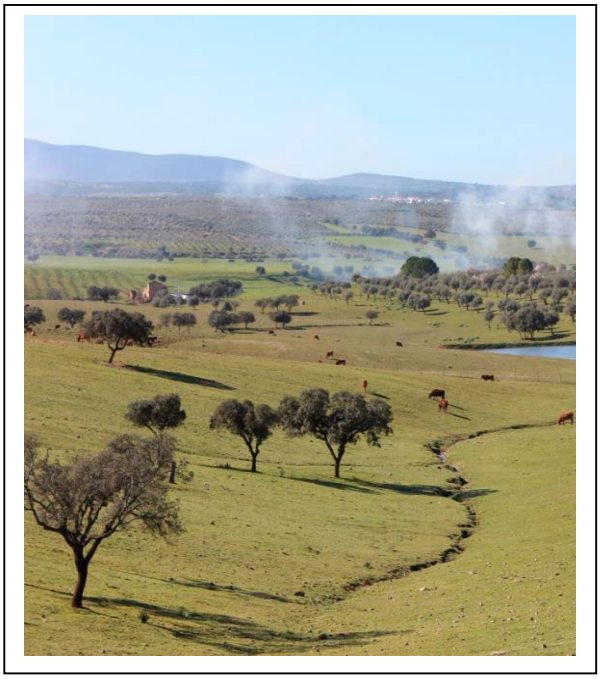
Evaluating spatial targeting and planning effectiveness of policies (to be submit. in May 2014)

Keywords	Portugal, CENSE-UNFL, WP7, Impact evaluation, Scenario analysis, Modelling, Biodiversity and ecosystem impact, Ecosystem service values, Goals, Ecosystem service needs, Implementation process, AEM, Protected areas

Main research question

Is it possible to improve the cost-effectiveness of agro-environmental measures (AEM) within protected areas through the application of spatial targeting tools like Marxan with Zones?



Research finding in brief

Planning policy-scapes to achieve conservation objectives in a cost-effective way requires an interdisciplinary approach. Spatial targeting tools, like Marxan with Zones, can be useful to promote the integration of ecological indicators and opportunity costs maps for targeting AEM, identifying potential cost-effective solutions. The Portuguese case study in a montado ecosystem area illustrated the application of this tool and confirmed its contribution to improve the targeting of AEM in a cost-effective way. The implementation of a particular AEM should be developed in conjunction with other measures, to mutually increase cost-effectiveness.

Policymix approach

The approach adopted in this study relied on: 1) a spatially explicit mathematical programming model, which had as underlying basis an opportunity cost map considering the implementation of a specific AEM in the study area; 2) the spatial distribution of key conservation features, that include both species and habitat type; and 3) the establishment of different scenarios of achievement of conservation targets. The overall aim would be to maintain a (spatially) coherent multifunctional landscape. The degree of clumping (size of coherent areas) was also analysed, based on both ecological and economic knowledge.

Reference:
Pinto, R., Antunes, P., Santos, R., Blumentrath, S., Clemente, P. Evaluating spatial targeting and planning effectiveness of policies: Illustrative example of an agri-environmental measure application in a multifunctional system. (in preparation)

Contact:
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Economic instruments in the Portuguese conservation policy mix (Project Report)

Keywords	Portugal, CENSE-UNL, WP7, Challenges, context and gaps, Impact evaluation, Scenario analysis, Policy instruments, Modelling, Ecosystem service needs, Goals, Resources, Implementation process, Final outcomes, Ecological fiscal transfers, Protected area enforcement, AEM

Main research question

What is the role and interactions with other policy instruments and what is the (potential) impact on forests and biodiversity conservation of two economic instruments (ecological fiscal transfers and agri-environmental measures) directed to public and private actors in the Portuguese conservation policy mix?

Research finding in brief

The economic instruments at play in the Portuguese conservation policy mix do interact and in some cases overlap. The multiplicity of regulations and land use planning mechanisms, linked with conflicts and overlaps between managing institutions has a negative impact on economic instruments uptake. There are potential positive complementarities not yet effective. Conclusions are derived regarding the way instruments effectiveness can be enhanced through design changes, in light of their co-existence with other current conservation instruments

Policymix approach

A coarse grain analysis of two economic instruments - Ecological Fiscal Transfers and Agri-environment Measures, is presented, focusing on their main complementarities, synergies, overlaps and contradictions in the context of the Portuguese conservation policy mix.

Reference:
Santos, R. et al. (2012) Assessment of the role of economic instruments in the Portuguese conservation policymix a national coarse grain analysis. Report 6/2016.

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Fiscal transfers for biodiversity conservation: the Portuguese Local Finances Law (Published paper)

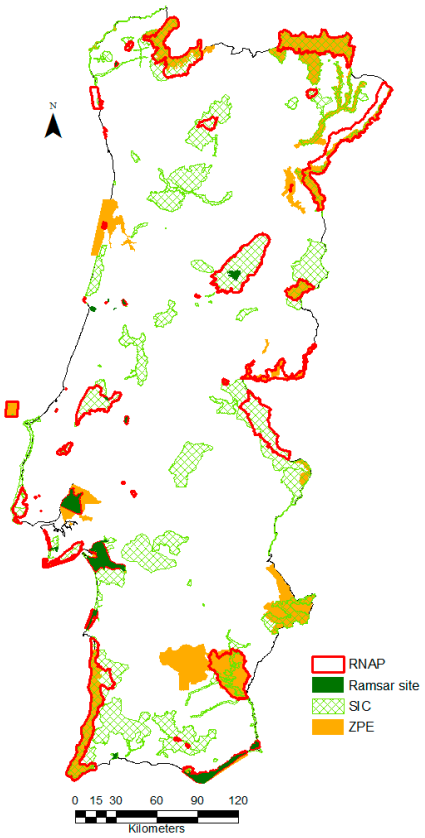
Keywords	Portugal, CENSE-UNL, UFZ, WP7, Impact evaluation, Policy instruments, Outputs, Final outcomes, Ecological Fiscal Transfers, Protected areas

Main research question

Are the Ecological Fiscal Transfers introduced in the amended Portuguese Local Finances Law (LFL) of 2007 an effective instrument to support municipalities' role in biodiversity conservation policy?

Research finding in brief

Ecological fiscal transfers, implemented in Portugal as a positive discrimination for those municipalities with land designated as Natura 2000 network sites or other national protected areas, can represent a significant source of income for those municipalities with a large proportion of land under protection status. However, because a significant number of changes to the previously existing legislation were introduced at the same time, the ecological component of the new scheme is difficult to grasp by the affected stakeholders. The instrument is potentially less effective for municipalities not significantly dependent on fiscal transfers. In these cases, direct regulation, planning and biodiversity offset policies that involve restrictions on development are necessary elements of a comprehensive biodiversity instrument mix. The results obtained indicate some main reasons for the lack of success and offer significant insights both for improving the Portuguese LFL and for designing new ecological fiscal transfer schemes.



Protected Areas in Portugal. Source: ICNB

Policymix approach

Ecological fiscal transfers were analysed as part of the Portuguese conservation policy mix. The share of fiscal transfers in the Portuguese municipalities' budgets was calculated (cover on average 60%), showing that almost all municipalities depend on these transfers to some extent. The magnitude of ecological fiscal transfers was also calculated for all municipalities and impact indicators were computed to analyse the incentive effect

Reference:
Santos, R., Ring, I., Antunes, P., Clemente, P., 2012. Fiscal transfers for biodiversity conservation: the Portuguese Local Finances Law. Land Use Policy, 29, 261-273
Acknowledgement: SCALES EC-FP7 project, which funded part of the research

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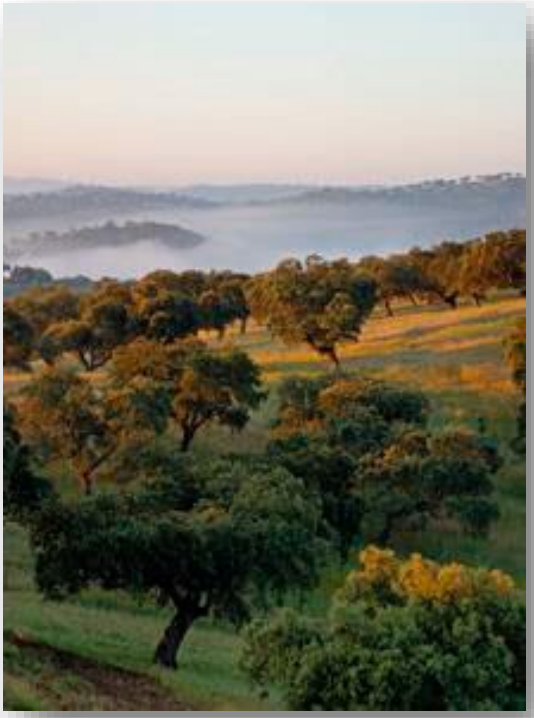
Comparative assessment of policy mixes across case studies (Project Report)

Keywords	Norway, Finland, Germany, Portugal, Costa Rica, Brazil - São Paulo, Brazil - Mato Grosso, CENSE-UNL, REDES, NINA, UFZ, SYKE, CATIE, FUNDAG, WP8, Challenges, context and gaps, Impact evaluation, Scenario analysis, Institutional fit, Social impact, Policy instruments, Modelling, Implementation process, Outputs, Final outcomes, Ecological fiscal transfers, PES (public, private), AEM, Explore, Infer, Test

Main research questions

The perspective of high-level policy organizations on the use of economic instruments for biodiversity conservation holds true in POLICYMIX case studies? Is the proposed POLICYMIX framework useful for the comparative assessment? What are the prospects for transfer of instruments and lessons between the Latin American and European contexts, namely for policy mixes associated with i) Payments for Environmental Services, ii) Agro-Environmental Measures and iii) Ecological Fiscal Transfers?



Research finding in brief

An appropriate command and control regulatory framework is a crucial factor in the success of PES, AEM and EFT. Several of the formal aspects of PES that are proposed in the literature are not always feasible to implement in practice. AEM appear to represent a policy mix in their own, causing additional complexity in administration. The introduction of modifications in AEM design (e.g. contract options, spatial targeting) has the potential to make them both more cost effective and more attractive to farmers. EFT can serve as a stimulus to proactive local conservation policies, although a range of factors hinder the designation of new protected area s.

Policymix approach

The POLICYMIX framework was applied.

Reference:
Santos, R., May, P., Barton, D.N., and Ring, I. (eds.) 2014. Comparative assessment of policy mixes across case studies - common design factors and transferability of assessment results. Report 1/2014.

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Landowners Preferences for Agri-Environmental Agreements (paper to be submitted in May 2014)

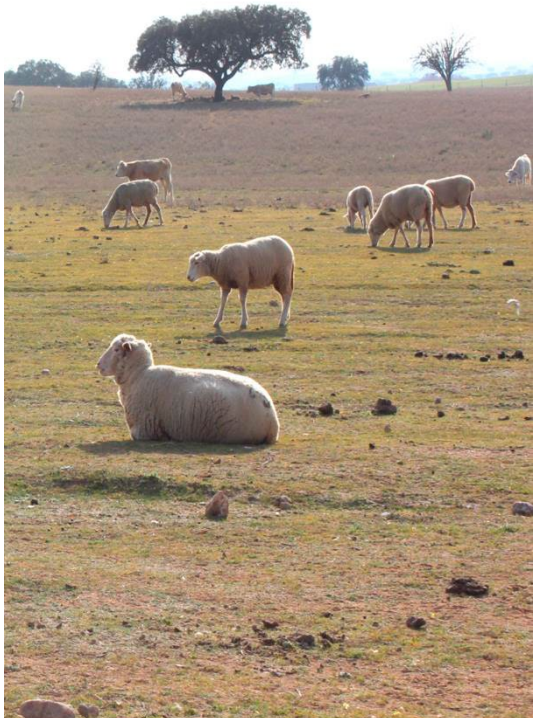
Keywords	Portugal, CENSE-UNL, IVM-VU, WP7, Scenario analysis, Policy instruments, Modelling, Implementation process, Outputs, Protected areas, Agro-environmental measures, Test

Main research question

How can the uptake of agri-environmental agreements (AEA) implemented in Portuguese Natura2000 conservation sites be increased by varying the institutional and economic terms and conditions underlying current contract design?

Research finding in brief

Current uptake rates of AEA are very low, but we find interest among landowners for AEA, both inside and outside the currently designated protection areas. There are clear trade-offs between willingness to accept financial compensation and opportunity costs, measured through varying cattle and endemic tree density levels. Also contract duration plays a significant role. Minimum willingness to accept financial compensation for the currently fixed contract is higher than current pay-out levels by a factor of six.



Policymix approach

The conservation mix of policy instruments at play in the case study area relies on the typical regulatory approaches directed towards the conservation of species and their habitats. This regulatory approach is complemented with a set of locally designed AEM - the Integrated Territorial Intervention for Alentejo Natura sites, to promote a proper management of agricultural and forestry systems in these areas of special interest. Landowner preferences are elicited for different agri-environmental contractual agreements using choice experiments in the Portuguese Montados, an agro-forestry ecosystem with high conservational value.

Reference:
Santos, R., Clemente, P., Brouwer, R., Antunes, P., Pinto, R., Landowners Preferences for Agri-Environmental Agreements to Improve the Conservation Value of the Montados' Ecosystem in Portugal (to be submitted in May 2014)

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Directing economic instruments at public and private local stakeholders for biod. conservation (accepted)

Keywords	Portugal, CENSE-UNL, UFZ, WP7, Challenges, context and gaps, Impact evaluation, Policy instruments, Goals, Implementation process, Ecological fiscal transfers, Agro-environmental measures

Main research question

How to conceive economic instruments targeting public and private actors that reinforce their individual contribution to a successful biodiversity conservation policy mix?

Research finding in brief

It is argued that a successful biodiversity conservation policy mix should include economic instruments directed at public and private local stakeholders, and that the selected instruments should be conceived in a way that is mutually reinforcing and targets decision processes regarding land use zoning and land management practices.

Taking the case of the ecological fiscal transfers and agri-environmental schemes that are currently in place in Portugal as an example, a proposal for coupling the two instruments, following a policymix approach is presented. This involves allocating part of the EFT funds to support nature conservation activities undertaken by private land owners and enabling public actors' participation in AES. Participation of the main actors in early stages of design of the instruments is an essential aspect in this context.

Policymix approach

The incentives provided to both landowners (in particular farmers and foresters) and public authorities by AEM and EFT, respectively, are analysed and their articulation is discussed.

Reference:
Santos, R., Antune,s P., Ring, I., Clemente, P., Ribas, T., Directing economic instruments at public and private local stakeholders for biodiversity conservation. The case of agri-environment schemes and ecological fiscal transfers. Environmental Policy and Governance

Website:
Forthcoming at http://policymix.nina.no/

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Cost-effectiveness of tradable development rights

Working Paper

Keywords	Brazil, São Paulo, FUNDAG, WP7 - case study, Scenario analysis (Step 3b), biodiversity and ecosystem impact, ecosystem service values, modelling, policy instruments, Final outcomes, Tradable development rights (TDR), Infer, test.

Main research question

The Brazilian environmental lesgislation requires 20% of natural vegetation on each rural property (forest reserve) and implies high opportunity costs for farmers in Brazil.

Are tradable development rights (TDR) combined with regulation more cost-effective for forest biodiversity conservation than a pure command and control regulation?

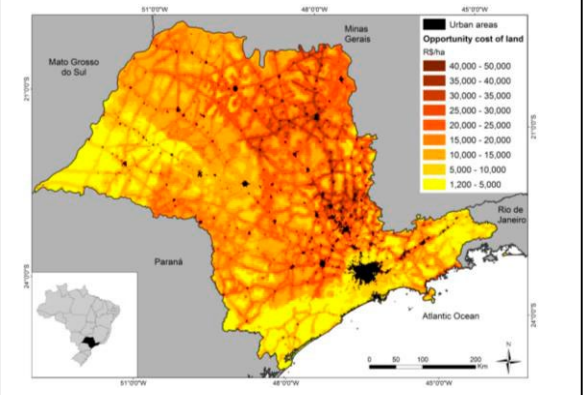
Research finding in brief

The simulations using Marxan showed a clear potential of the combination of TDR and C&C to both reduce compliance costs and improve ecological effectiveness depending on different market restrictions on allocation of forest reserves in Sao Paulo state.

Policymix approach

The combination of the regulation (establishing the cap) with the economic instrument allowing trades (reducing opportunity costs) can be a good answer to address the challenges of conservation in private areas in regions with heterogeneous opportunity costs.

Opportunity cost heterogeneity in Sao Paulo



Reference:
Bernasconi, P.; S. Blumentrath; D.N. Barton; G. Rusch & A. R. Romeiro (2013) Policyscape— The potential of Tradable Development Rights (TDR) to improve effectiveness and reduce the costs of biodiversity conservation: study case in Sao Paulo, Brazil.

Website:
Forthcoming at http://policymix.nina.no/

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Costs of environmental protection in different types of agricultural production units: Working Paper

Keywords	Brazil, São Paulo, FUNDAG, WP4, challenges, contexts and gaps, implementation process, opportunity costs, ecosystem service values, PES (public, private)

Main research question

PES schemes have been identified as desirable instruments to achieve ecosystem services preservation. Forest loss is the main threat to the sustainability of water-related services in the Cantareira-Mantiqueira Corridor Region
What are the different opportunity costs incurred by farmers from the São Paulo section of the Cantareira-Mantiqueira corridor?

Research finding in brief

Using the factorial analysis by main components, the structure of relations of 20 variables, constructed from the LUPA data of 2007, was summarized in 8 composite indicators (common factors), which explained 72% of the variability of the original variables. Great heterogeneity cost opportunities among farmers. This will cause difficulties in implementing the best way to compensate farmers

Policymix approach

The social aspects that reflect the heterogeneity of the economic contexts of the populations that reside in a given area are scarcely 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 policy mix able to ensure the preservation of biodiversity and the continual flow of ecosystem services. This study assumes that the PES is a complementary tool and should be implemented in an institutional framework capable of operating together different policy instruments.

Reference:
Fasiaben, M.C.R., Gori, A., Andrade, D.C., Ângelo, J.A. Costs of environmental protection in different types of agricultural production units: the case of Cantareira-Mantiqueira Corridor Region.

Website:
Forthcoming at http://policymix.nina.no/

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Institutional dimensions of PES in Cantareira

Working Paper

Keywords	Brazil, São Paulo, FUNDAG, WP6, Impact evaluation (Step 3a), Institutional fit, PES (public, private)

Main research question

By analysing three PES schmes in Cantareira-Mantiqueira Corridor Region the study aims to understand how these programs were designed and the necessary arrangements for their implementations.

Research finding in brief

The introduction of new instruments such as PES require a set of institutional arrangements that could not be observed in several places. The most successful PES policy in the region has turned out to be a result of evolving institutions and adaptive governance structure.

Policymix approach

With an ex-post analysis of ongoing PES projects, this study shed light on problems regarding the use of economic instruments in a context of regulatory-oriented environmental policy.

Reference:
Puga, B.P., Chiodi, R., Sarcinelli, O., Andrade, D.C., Romeiro, A.R. Institutional aspects of PES schemes in Cantareira System Region.

Website:
Forthcoming at http://policymix.nina.no/

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(*nearly*) 20 years of PES in Costa Rica

Project Report

Keywords	Costa Rica, IIED, CATIE, NINA, Biodiversity and ecosystem impact, institutional fit, social impact, PES,

Main research question

How has the governance of the Costa Rican PES programme evolved over time? How is it prepared to face future challenges given the changing contexts?

Research finding in brief

CR offers a successful approach to conservation in private lands through PES. However, as it enters a more mature phase, 'learning by doing' is no longer affordable and programme managers must engage in careful planning that responds to local environmental and social contexts.

Policymix approach

The competiveness of conservation policies will in future depend on a policy mix of PES acting in concert with national forest policy and local land use regulation. PES will need to act as a targeted complement of strengthened municipal level land use zoning regulations, both in rural and peri-urban areas.

Efficient, effective and socially responsible conservation has never been more difficult in Costa Rica. Can PES stand the test? Photo credits: M.H. Borloz.

Reference:
Porras, I., Barton, D.N, Miranda, M. and Chacón-Cascante, A. (2013). Learning from 20 years of Payments for Ecosystem Services in Costa Rica. International Institute for Environment and Development, London.

Website:
Forthcoming at http://policymix.nina.no/

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Land prices and PES in Costa Rica

Project Report

Keywords	Costa Rica, IIED, CATIE, NINA, evaluation methodology, opportunity costs, ecosystem service value, social impact, modelling, Payments for ecosystem services (PES)

Main research question

Given the difficulties in measuring opportunity costs of conservation, can land prices be used as an aggregate indicator at the national level? What is their relation to existing criteria for PES contract allocation and to measure its impact?

Research finding in brief

We provide hard evidence on what policy makers know in their hearts: the time of "cheap" conservation of biologically important land is gone.

Policymix approach

The competiveness of conservation policies will in future depend on a policy mix of PES acting in concert with national forest policy and local land use regulation. PES will need to act as a targeted complement of strengthened municipal level land use zoning regulations, both in rural and peri-urban areas.

Costa Rican best spots are expensive and are for sale. How will conservation and social justice fare in this new setting? Photo credits: D.N.Barton.

Reference:
Ina Porras, Adriana Chacon-Cascante, David N. Barton, Diego Tobar. To be published.

Website:
Forthcoming at http://policymix.nina.no/

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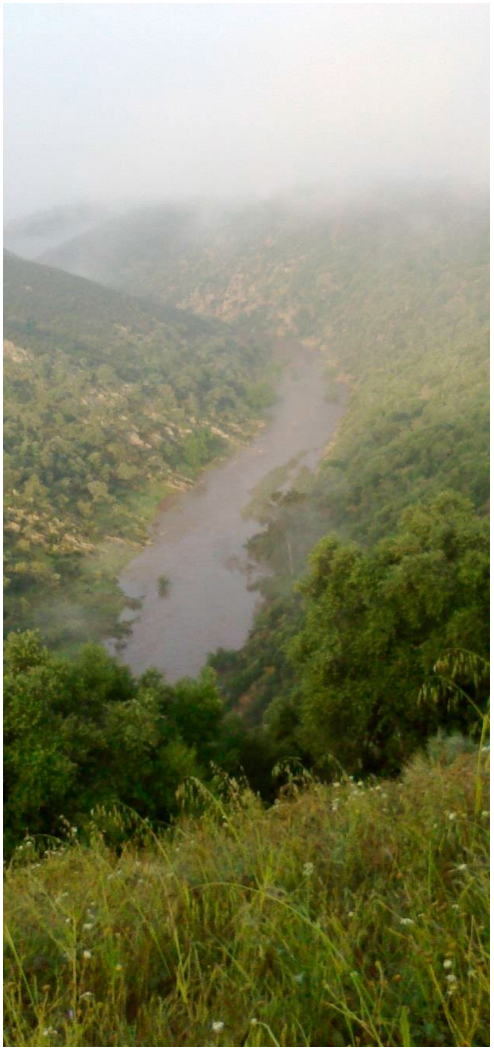
Keywords	IVM, Global Assessment, Payments for Ecosystem Services(PES) Impact of Institutional, Design Features, Institutional fit, Modelling

Main research question

The main objective of this study is to identify and analyze the factors that drive and explain the environmental performance of existing payments for watershed services (PWS) schemes. These schemes focus either on the conservation of forested land or the re-afforestation of deforested land.



Research finding in brief

A meta-analysis of causal relationships between the institutional design and environmental performance of 47 PWS schemes worldwide, covering 22 million hectares of land, shows a significant effect of the terms and conditions of scheme participation, including the selection of service providers, the existence of quantifiable objectives that are monitored, and the number of intermediaries between service providers and buyers on environmental achievement. International monitoring guidelines are needed to facilitate comparisons, identify success factors and support the future design of cost-effective PWS schemes.

Policymix approach

Meta-analysis of the effect of various institutional design factors on the environmental performance of existing PWS schemes worldwide.

Reference:
Brouwer, R., Tesfaye, A. and Pauw, P. (2011). Meta-analysis of institutional-economic factors explaining the environmental performance of payments for watershed services.

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doi:10.1017/S0376892911000543

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Economic Costs of Avoided Deforestation

Published paper

Keywords	IVM, Global Assessment, Carbon sequestration, REDD+, Ecosystem Service Values, Modelling

Main research question

This meta-analysis aims to identify the key factors governing the economic costs of avoided deforestation in developing countries.

Research finding in brief

Data were collected from 32 primary studies published between 1995 and 2012, yielding 277 observations. Results show that unit costs depend significantly on cost features like estimation methodology, inclusion or exclusion of cost components, carbon accounting method, area size, alternative land uses and beneficiaries, time horizon, and the continent in which the forest protection scheme is implemented, but also factors like the share of agriculture in a nation's economy play a significant role in explaining unit costs. In future studies, greater attention needs to be paid to additional cost components like transaction costs and the presence of the co-benefits of avoided deforestation.

Policymix approach

Meta-analysis of the opportunity costs of avoided deforestation of existing REDD schemes worldwide.

Reference:
Phan, T.D., Brouwer, R. and Davidson, M. (2014). The economic costs of avoided deforestation in the developing world: A meta-analysis. Journal of Forest Economics, 20(1): 1-16.

Contact:
http://dx.doi.org/10.1016/j.jfe.2013.06.0

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Benefits assessment of economic instruments

Technical Brief

Keywords	General, IVM, WP4, scenario analysis, ecosystem service values, ecosystem service needs, final outcomes

Main research question

Provide a concise set of guidelines to estimate the economic value of employing economic instruments as part of a policy mix for biodiversity conservation and ecosystem service provision.

Research finding in brief

The value added of this report is found in the assessment of the economic value of biodiversity conservation directly linked to the use of economic instruments and their impacts on ecosystem services. In this context, valuation methods are used principally for the evaluation of instrument characteristics, and in second place for valuation since by varying the institutional framing the value is expected to vary. The report differs in this way from the recently published The Economics of Ecosystems and Biodiversity (TEEB) book and reports, which focus primarily on ecosystems and their valuation.

The report presents a conceptual framework for the valuation of the economic impacts of economic instruments for biodiversity conservation, more specifically based on the concept of payments for ecosystem services. It describes the general steps that have to be taken to evaluate the economic impacts of using economic instruments. Then it deals with the costs that are related to the use of policy instruments, in particular transaction costs. Opportunity costs are treated in greater detail in a separate report. We then discuss the question of how to value the benefits of biodiversity conservation. This section includes, among others, a critical reflection on existing (meta-analyses of) valuation studies.

Policymix approach

Why is this a policymix analysis? The report assesses the value added created by the use of economic instruments in biodiversity conservation and related ecosystem service provision

Reference:
Barton, D. N. et al. (2012)Assessment of existing and proposed policy instruments for biodiversity conservation in Norway. Report 1/2012

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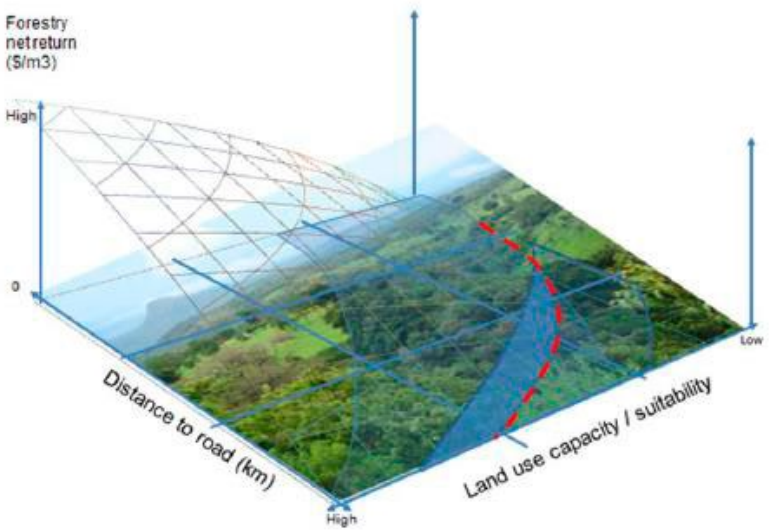
Opportunity cost evaluation guidelines

Technical Brief

Keywords	General , WP4, impact evaluation, scenario analysis, ecosystem service values, resources, final outcomes, protected areas, PES, AEM, tradable rights & offsets.

Main research question

Different conservation policy instruments impose different land use restrictions and hence entail different opportunity costs. What approaches can be used to calculate opportunity costs to be used in reserve site selection models?



Research finding in brief

Four examples of opportunity cost mapping from POLICYMIX case studies – Portugal, Costa Rica, São Paulo and Norway – are discussed. Maps of opportunity costs must be calculated 'fit-for-purpose', specifically for the type of conservation policy instrument in question. Opportunity costs vary with land use capacity and accessibility. We caution that GIS-based mapping does not easily represent land user characteristics and preferences which also determine 'percieved opportunity costs'. Opportunity cost maps incorporate large variation and provide at best rough approximations of opportunity costs at any particular location.

Policymix approach

Why is this a policymix analysis? Opportunity cost maps – although rough approximations - may nevertheless be useful for priority-setting using reserve site selection models and for illustrating the 'production possibility frontier' of mixes of conservation instruments in tools such as Marxan with Zones.

Reference:
Barton, D. N. et al. (2012)Assessment of existing and proposed policy instruments for biodiversity conservation in Norway. Report 1/2012

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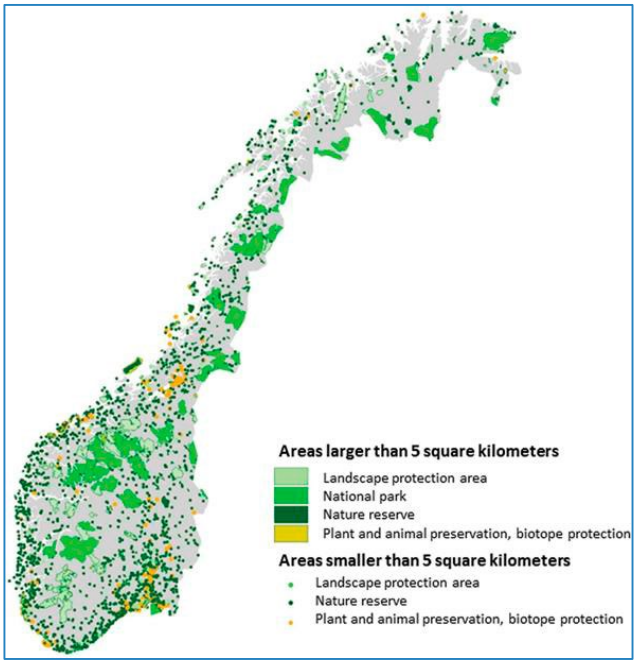
Policyscape analysis Norway

Journal article

Keywords	Norway, NINA, WP7, impact analysis, Modelling, Policy instruments, Needs/ gap identification , voluntary forest conservation(PES), protected areas, Test,

Main research question

We evaluate the actual spatial coverage in cost-effectiveness space of Norway's public protected areas and private voluntary forest conservation.



Research finding in brief

Voluntary forest conservation (VCF) is complementary to national parks on high forest productivity, relatively low biodiversity value lands. VCF has not been effective in targeting high biodiversity, high forestry opportunity cost lands.

Policymix approach

Why is this a policymix analysis? We use spatially explicit indicators for biodiversity conservation status and opportunity costs of conservation to evaluate the role of voluntary forest conservation in a mix of policy instruments distributed across a landscape. We define a spatially explicit evaluation of a policy mix as a ''policyscape analysis.'' A policyscape analysis includes a comparison of (1) actual spatial overlap of instruments, (2) ''functional overlap'' of instruments in a cost-effectiveness space, and (3) complementary spatial targeting of instruments as computed by reserve site selection models.

Reference:
Barton, D.N. , S. Blumentrath & G. Rusch (2013) Policyscape—A Spatially Explicit Evaluation of Voluntary Conservation in a Policy Mix for Biodiversity Conservation in Norway, Society & Natural Resources: An International Journal, 26:10, 1185-1201.

Website:
DOI:10.1080/08941920.2013.799727

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Time-line analysis of a public instrument mix

Project report

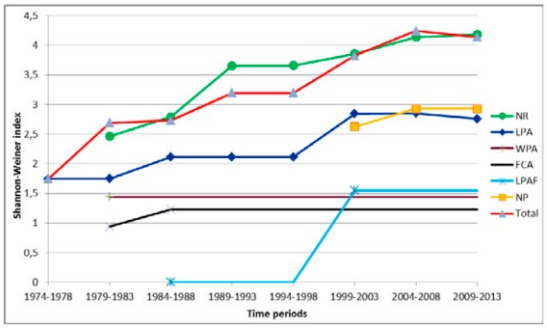
Keywords	Norway, NINA, WP 3, Step 3a, Biodiversity and ecosystem impact, final outcome, protected area enforcement, protected areas

Main research question

To what extent are public conservation instruments complementary and how has complementarity changed with time?

Policymix approach

Central to many conservation situations is that the network of protected areas help to protect a representative 'sample' of the biological and ecological diversity in a country or region. We studied the various forms of public instruments used to protect forest biodiversity in the county of Sør-Trøndelag in Central Norway. We show that from 1974 to 2012, efforts in the acquisition of protected areas increased exponentially, particularly in the last decade, which has also resulted in a steady increase in the diversity of habitats represented. The importance of nature reserves in terms of area (the most strictly regulated protection form) in forest habitat conservation has increased over time and nowadays it includes the largest area of protected forests (despite that the median size of a nature reserve is less than 1 km2). Nature reserves also represent the largest diversity of forest habitats (including the ones not protected by any other protection form). On the other hand the comparatively large national parks are considerably less important for the protection of forest habitats in Sør-Trøndelag, both in terms of total area and in diversity. Nevertheless, even though nature reserves embrace much of the forest habitat diversity, other common protection forms (e.g. landscape protected areas and national parks) tend to be complementary in terms of the kind of forest habitats protected such as high altitude deciduous forest.



Diversity of forest habitats (Shannon-Weiner index) calculated for different forms of public conservation over time in the Sør-Trøndelag County, Norway. NR: Nature Reserve, LPA: Landscape Protection Area, WPA: Wildlife Protection Area, FCA: Flora Conservation Area, LPAF: Landscape and Flora Protection Area, NP: National Park.

Reference:
Bunikyte, R., G. M. Rusch, and B. J. Graae. 2012. A time-line analysis of the public biodiversity conservation mix: Changes in conservation gains in the county of Sør-Trøndelag. In: Lindhjem et al. POLICYMIX Report Del. 7.1.2. pp. 179-196

Website:
Forthcoming at http://policymix.nina.no/
<journal DOI>

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Benefits and Costs of Preserving Forest

Forthcoming paper

Keywords	Norway, NINA, WP4, Scenario analysis, Challenges, context and gaps, ecosystem service values, institutional fit, PES, protected area

Main research question

Photo: Typical old-growth forest in Norway

The paper conducts a comprehensive cost-benefit analysis of the question of whether to increase forest conservation in Norway for biodiversity protection in particular. First, we assess the benefits of biodiversity conservation based on a national contingent valuation (CV) survey of a large, representative sample of Norwegian households that are asked to value three alternative conservation plans increasing the conserved forest area from the status quo. These plans are based on actual policy alternatives that have been or are under consideration. Then, we investigate the main social cost component, which is the opportunity costs of not using the land for timber production, in two ways. First, we scale up total compensations that would have to be paid to private forest owners based on actual compensation payments made from the start of the conservation program. Second, we conducted a CV survey of forest owners' willingness to accept (WTA) compensation to set aside their forests for reserves. WTA may be different from actual compensations, as many forest owners derive personal utility from reserve establishment. To these costs, we also add the efficiency loss of collecting taxes (marginal costs of public funds) to fund conservation, and the transaction costs of implementing the plans.

Research finding in brief

Results show that social benefits outweigh costs of the three conservation plans by a large margin. The middle option of 4.5% conservation of the productive forest land has the highest net present value. The results for the two smaller plans are robust to a range of assumptions, including considerations of potential hypothetical bias in benefit estimates. The results of this cost-benefit analysis reflect the preferences of the general population, the authorities and the forest owners with respect to biodiversity and ecosystem services conservation, and supplement the expert opinion of ecologists.

Policymix approach

This study precede policymix analysis in the way that its main purpose is rather to analyse what level of conservation gives the highest net social benefits. This can form the basis for choosing single instruments (such as using only the voluntary forest conservation program in Norway) or combine this with other instruments in a mix.

Reference:
Lindhjem, H ., K. Grimsrud, S. Navrud and S. O. Kolle (forthcoming) "The Social Benefits and Costs of Preserving Forest Biodiversity and Ecosystem Services". Forthcoming in special issue on Forest of Journal of Environmental Economics and Policy.

Website:
Forthcoming at http://www.tandfonline.com/toc/teep20/1/.U3-VOSiGtsI#.U3-VXiiGtsI 004

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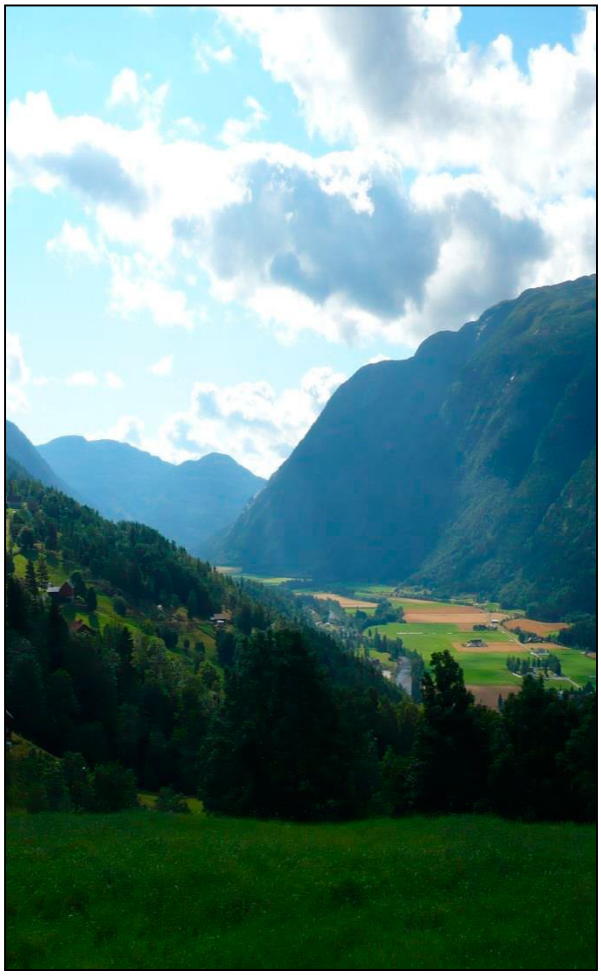
Best practice of spatial modelling for ecosystem accounting Submitted manuscript

Keywords	Norway, NINA, WP9, Challenges, context and gaps, Ecosystem service values, Modelling, Ecosystem service needs, REDD+, Ecological fiscal transfers, Protected area enforcement, PES (public, private)

Main research question

What have we learned from spatial modelling of ecosystem services in support of ecosystem accounting and other policy rationales? How can best practice of ecosystem accounting as a trade-off between accuracy and modelling feasibility be delineated?



Research finding in brief

We analyse the trade-offs between accurately representing spatial heterogeneity of ecosystem services and the practical constraints of modelling ecosystem services based on 29 applied spatial models. We propose that in best practice for ecosystem accounting an approach should be adopted that provides sufficient accuracy at acceptable costs given heterogeneity of the respective service. Furthermore, we suggest that different policy applications require different accuracy and different spatial modelling approaches.

Policymix approach

We propose different overlapping niches for policy rationales which can be supported by spatial ecosystem services models. Niches indicate the reliability range for the respective policy rationales. Ecosystem accounting can potentially support land-use planning or zoning by identifying areas critical for ES provision (priority setting). Ecosystem accounting can also potentially support the targeting of Payment Schemes for ecosystem services (instrument design). Furthermore, ecosystem accounting has its own niche in terms of monitoring changes in ecosystem capital and contributing to a better understanding of the link between ecosystem capital and economic activity.

Reference:
Schröter, M., R. P. Remme, E. Sumarga, D.N. Barton, L. Hein (under review), Lessons learned for spatial modelling of ecosystem services in support of ecosystem accounting. Under review in Ecosystem Services.

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Forest Owners' Participation in Conservation

Working paper under review

Keywords	Norway, NINA, WP4, Scenario analysis, Challenges, context and gaps, institutional fit, PES, protected area

Main research question

This paper analyzes what motivates non-industrial private forest owners to participate in a Norwegian nationwide voluntary forest conservation program. The ownership of the reserve remains with the forest owner, but he has to relinquish all rights to forestry activities for perpetuity. This time feature makes the Norwegian scheme quite unique. This can be a big downside for biodiversity conservation, as it is likely that owners will need much stronger motivation, beyond the mere compensation incentive, to seriously consider participation.

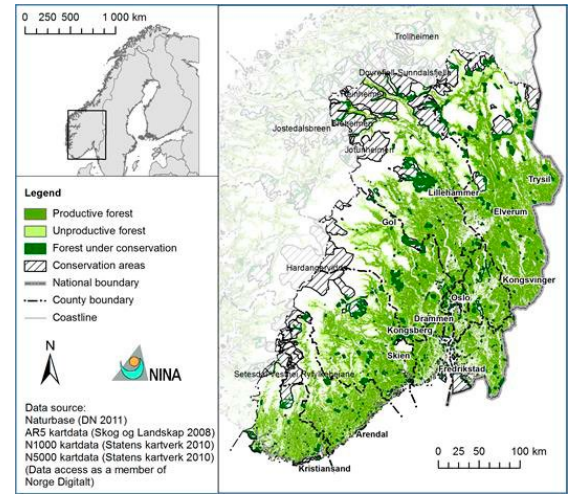

Photo: Study area (southern Norway)

Research finding in brief

Our econometric analyses suggest that forest owners' expectation of sustainable non-timber income from reserve-related commercial activities over and above the compensation payment itself, attitude towards conservation regulations, and the percentage of mature forest have strong and robust effects on the likelihood of their participation. Interestingly, our results are confirmed by the thinking of the public committee behind the new Nature Diversity Act in Norway from June 2009. This committee recommended stimulating future conservation by allowing and providing support to income-generating activities both within and around forest reserves. Results of the practical implementation of this intention remain to be seen, but our study confirms that it may indeed be a good idea if long-term biodiversity conservation is to be substantially increased.

Policymix approach

This study does not conduct a standard policymix analysis as such, but results suggest that for the main conservation instrument in Norway to become more effective, it should perhaps be combined with regulations that allow or stimulate to a larger degree than today commercial opportunities in and around reserves that at the same time do not compromise conservation objectives. This may enhance uptake rates compare to any one instrument implemented in isolation.

Reference:
Mitani, Y. and H. Lindhjem (2014) "Forest owners' participation in voluntary biodiversity conservation in Norway: What does it take to forego forestry for eternity?"... Resubmitted and under review, Revised April 2014.

Website:
Full text available from
www.lindhjem.info

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Assessment of conservation cost-effectiveness

Technical Brief

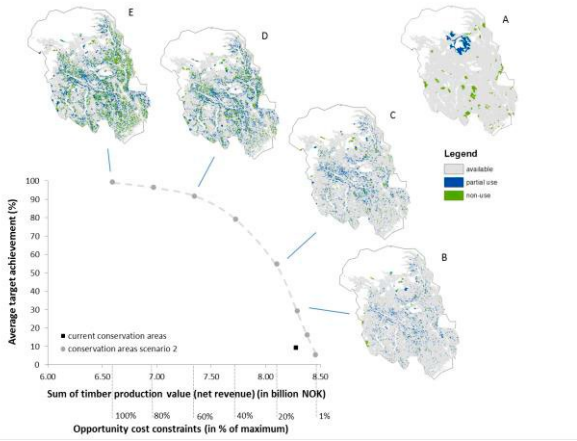
Keywords	**Norway, Brazil, São Paulo, Costa Rica, Portugal**, WP3, NINA, FUNDAG, CENSE-UNFL, CATIE, WP 3, Impact evaluation (Step 3 a), Impact evaluation (Step 3b), **Biodiversity & ecosystem impact**, Final outcomes, Local administrative area, **PA Enforcement**, **AEM**, **PES**, **Tradable Rights & Offsets**

Main research question

Typical characteristics of the conservation problem are multiple goals and a spatial structure of conservation features, ecosystem services and of the costs to protect them.

Policymix approach

POLICYMIX uses Conservation Planning Tools (CPTs) to assess cost-effectiveness of policy instruments. CPTs have been designed to solve a resource allocation problem aiming to optimize conservation target achievements while taking into account costs in a spatially explicit context and grounded in conservation criteria supported by ecological knowledge. Particularly suitable to the conservation problem is that CPTs 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 of the conservation targets. Although used in many conservation planning problems, CPTs have not been explicitly used as a methodology to assess cost-effectiveness of policy impacts. Both *ex-post* analysis and prospective, *ex-ante*, analysis for instrument design or improvement can be conducted with CPT methods. In particular, the use of Marxan with Zones enables the joint analysis of several policy instruments, the policy mix. There are some caveats with the use of CPTs, some of them can, at the same time, provide insights about the conservation problem, including implicit assumptions, uncertainty and knowledge gaps. For instance, the analysis is based on a selection of indicators of biodiversity conservation and ecosystem service value that need to have a spatial representation and area coverage. Also, there must be an agreement among actors about how much of these biodiversity features and ecosystem services should be protected or maintained, and about the degree to which individual instruments – e.g. areas with full protection, or partial use areas of different kind will contribute to biodiversity persistence.



Forest conservation-timber production possibility frontier (PPF). The maps indicate current (A) and predicted (B-E) partial and non-use areas for forest conservation. Location of these solutions is indicated in the trade-off between net revenues from one ecosystem service (timber production) and average biodiversity and other ecosystem service conservation target achievement, along a range of opportunity costs constraints (Schröter et al. forthcoming).

Reference:

Rusch, G. M., D. N. Barton, P. Bernasconi, Z. Ramos-Bendaña and R. Pinto 2013. Best practice guidelines for assessing effectiveness of instruments on biodiversity conservation and ecosystem services provision. POLICYMIX - Technical Brief 7. 14 pp.

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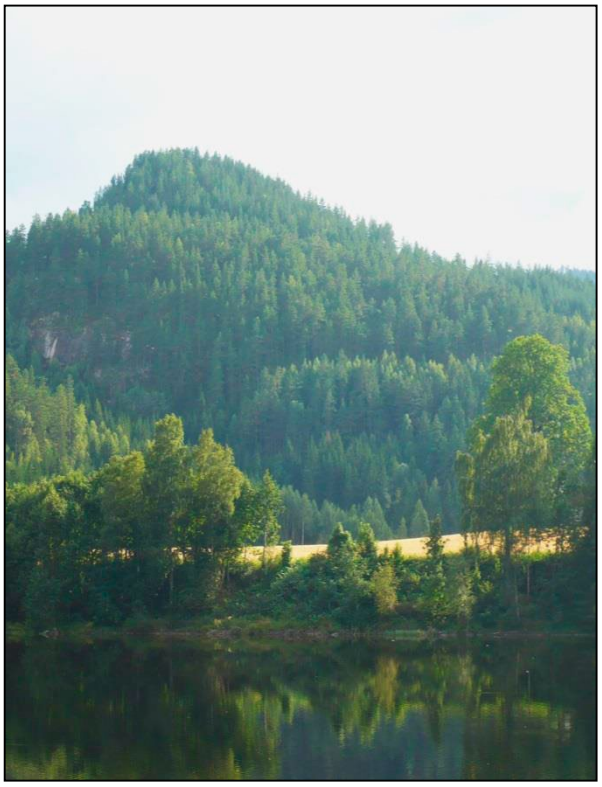
Accounting for capacity and flow of ecosystem services for Telemark, Norway Published paper

Keywords	Norway, NINA, WP9, Challenges, context and gaps, Ecosystem service values, Modelling, Ecosystem service needs, spatial ecosystem service accounting

Main research question

How can we spatially quantify both capacity and flow of multiple ecosystem services for a hemiboreal region?



Research finding in brief

We conceptually distinguish capacity to provide ecosystem services from the actual flow of services, and empirically assess both by means of different spatial models, developed with various available datasets and methods. Capacity and flow differ both in spatial extent and in quantities. A balance between capacity and flow can be used as a parsimonious estimation of over- or underuse of the respective service.

Policymix approach

A spatial accounting approach for multiple ecosystem services is the basis for development of policy instruments. Ecosystem accounting can deliver information about over- or underuse of ecosystems

Reference:
Schröter, M., Barton, D.N., Remme, R.P., Hein, L., 2014. Accounting for capacity and flow of ecosystem services: A conceptual model and a case study for Telemark, Norway. Ecological Indicators 36, 539-551.

Website:
http://dx.doi.org/10.1016/j.ecolind.2013.09.018

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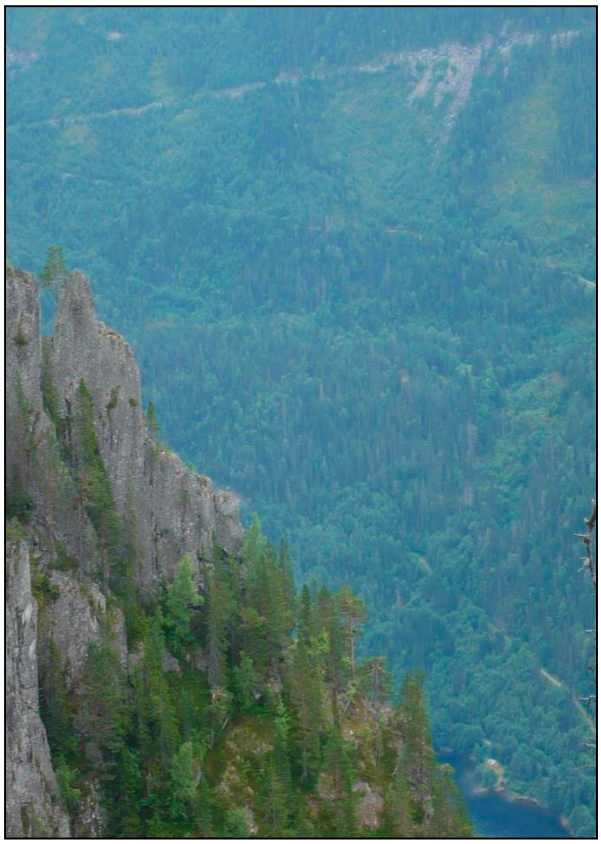
A policyscape for conservation of biodiversity and ecosystem services Submitted manuscript

Keywords	**Norway**, NINA, WP9, Scenario analysis (Step 3b), **Policy instruments, Biodiversity and ecosystem impact**, **Ecosystem service values**, **Modelling**, Implementation process, Outputs, **Ecological fiscal transfers, protected areas, PES**

Main research question

How does a policyscape for biodiversity conservation change if ecosystem services, different levels of opportunity costs of conservation, and uncertainty are considered?



Research finding in brief

We created a site prioritisation scenario with MARXAN with Zones. Incorporating ecosystem services had a remarkable effect on the allocation of policy instruments (policyscape) . Opportunity costs of conservation increased by 6.6%, while area protected in partial use zones increased by 36% and area protected in the non-use zone increased by 3.2%. Reducing the conservation budget also had an effect on the policyscape. The average achievement of conservation targets decreased with decreasing cost thresholds following a concave curve.

Policymix approach

Our results can inform policy-makers on a near-optimal allocation of a conservation budget among two different levels of area protection. This can be used for allocating ecological fiscal transfer to municipalities to cover their conservation burden.

Reference:
Schröter, M., S. Blumentrath, G. M. Rusch, D.N. Barton, B. Nordén (submitted), Incorporating ecosystem services, opportunity cost levels and uncertainty into a policyscape for biodiversity conservation.

Website:
Forthcoming at http://policymix.nina.no/

or journal DOI

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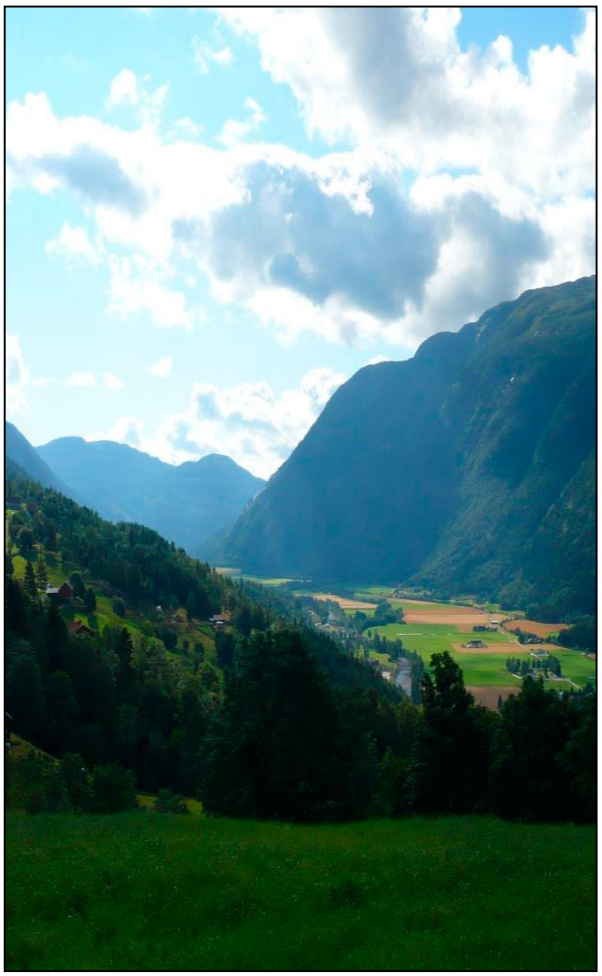
Best practice of spatial modelling for ecosystem accounting Submitted manuscript

Keywords	Norway, NINA, WP9, Challenges, context and gaps, Ecosystem service values, Modelling, Ecosystem service needs, REDD+, Ecological fiscal transfers, Protected area enforcement, PES (public, private)

Main research question

What have we learned from spatial modelling of ecosystem services in support of ecosystem accounting and other policy rationales? How can best practice of ecosystem accounting as a trade-off between accuracy and modelling feasibility be delineated?



Research finding in brief

We analyse the trade-offs between accurately representing spatial heterogeneity of ecosystem services and the practical constraints of modelling ecosystem services based on 29 applied spatial models. We propose that in best practice for ecosystem accounting an approach should be adopted that provides sufficient accuracy at acceptable costs given heterogeneity of the respective service. Furthermore, we suggest that different policy applications require different accuracy and different spatial modelling approaches.

Policymix approach

We propose different overlapping niches for policy rationales which can be supported by spatial ecosystem services models. Niches indicate the reliability range for the respective policy rationales. Ecosystem accounting can potentially support land-use planning or zoning by identifying areas critical for ES provision (priority setting). Ecosystem accounting can also potentially support the targeting of Payment Schemes for ecosystem services (instrument design). Furthermore, ecosystem accounting has its own niche in terms of monitoring changes in ecosystem capital and contributing to a better understanding of the link between ecosystem capital and economic activity.

Reference:
Schröter, M., R. P. Remme, E. Sumarga, D.N. Barton, L. Hein (under review), Lessons learned for spatial modelling of ecosystem services in support of ecosystem accounting. Under review in Ecosystem Services.

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Biodiversity and zero return forestry areas

Manuscript

Keywords	Norway, NINA&NMBU, WP3, impact evaluation, biodiversity and ecosystem impact, voluntary forest conservation (PES), Infer, Test ,

Main research question

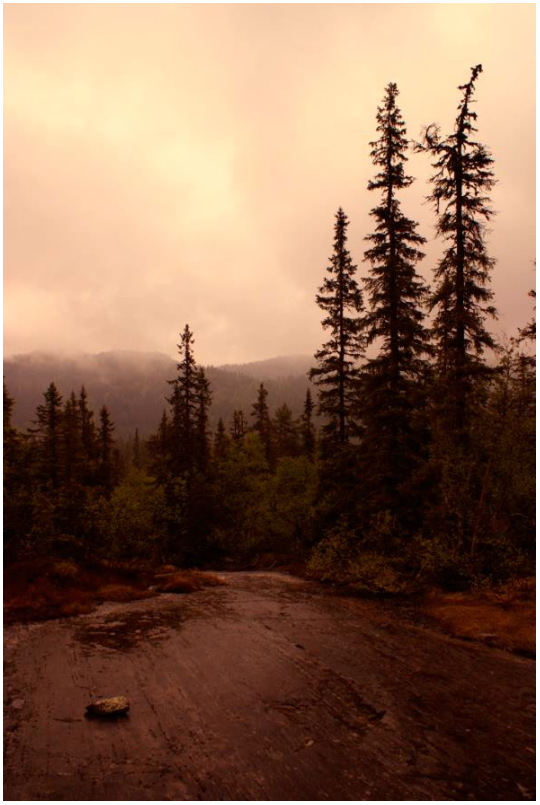
To what extent is forest biodiversity coincidental with areas of low or zero economic returns to forestry? How much of Norwegian forest is in such 'win-win' areas where forest conservation set-asides can be made on low forestry productivity land? What are the limitations?

Research finding in brief

Cost-effectiveness can be improved by targeting forest with low profitability for timber harvest, as it contains similar proportions of many important habitats.

Policymix approach

Why is this a policymix analysis? If biodiversity set-asides can be located in forest areas with low relevance for forestry, e.g. low profitability for timber or biofuel harvesting, without compromising the biodiversity aspect, there is a large potential for reducing the trade-off between economic activities and forest biodiversity protection.



Reference:
Sverdrup.Thygeson et al. (forthcoming) Spatial overlap between zero forestry return areas and high biodiversity value in Norwegian forests

Website:
Forthcoming at http://policymix.nina.no/

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Transaction and compliance costs in Costa Rica's PES

Manuscript

Keywords	Costa Rica, NINA&CATIE, WP7 – case study, Impact analysis Institutional fit, Implementation process, PES

Main research question

What is the size of transaction and implementation costs of PES for protection and for reforestation.

Research finding in brief

'PES for reforestation' is similar to a forestry subsidy, roughly covering costs of implementation with little additional payment to compensate for opportunity costs. PES for protection contracts exceed participation costs and are partial compensation for opportunity costs of alternative land-uses. Perceptions of transaction- and compliance costs seem to be an impediment to many potential PSA participants, in particular smaller farmers.

Policymix approach

We estimated transaction and compliance costs relative to the payment level of PSA in Costa Rica for the two contract modalities of 'forest protection' and 'reforestation'; together with other factors that could potentially affect the participation, and thus the success, of PES schemes.

Reference:
Rugtveit, S.V., D. N. Barton, S. Navrud, A. Chacón Cascante (2013) Transaction and compliance costs of payments for ecosystem services in a public-private benefits framework - a case study from Peninsula de Nicoya, Costa Rica. Submitted to Ecosystem Services

Website:
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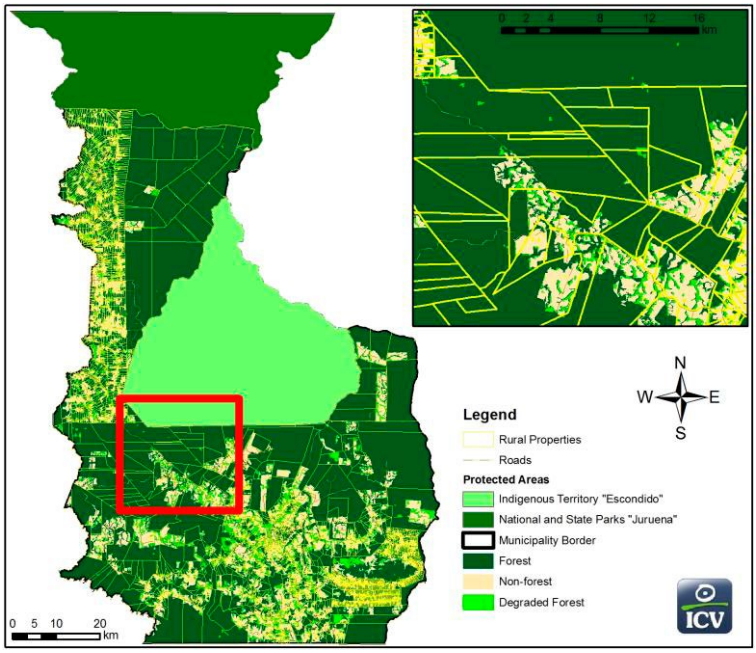
The effectiveness of the Environmental Reserve Quota (CRA) for on-farm forest conservation in Cotriguaçu, Mato Grosso, Brazil

Keywords	Brazil, Northwest Mato Grosso, Amazon, REDES, WP3, tradable development rights, private forests, effectiveness, land use policy, modelling,

Main research question

Could TDR with protected area caps on private lands be an effective instrument to keep Amazon forests standing?



Research finding in brief

The Brazilian Forest Code requires that private landowners in the Amazon biome protect at least 80% of remaining forests. The same law was recently revised to permit landowners within the same biome and state to trade surplus or deficit reserves among themselves, through a TDR mechanism called Environmental Reserve Quotas (CRA). We found that surplus forests on lands held in Cotriguaçu, a municipality in Northwest Mato Grosso, were sufficient for all local landowners to achieve environmental compliance, thus facilitating local trades.

Policymix approach

This study aims to provide information for landowners and policymakers, to better take into account the value of the standing forest, and to achieve local environmental compliance and reduce pressures for additional deforestation. Satellite imagery and property mapping were overlaid to identify forest reserve surplus and deficit at a property level in Cotriguaçu. The results indicate that landowners could engage in local trading, as permitted by the national Forest Code, to fully satisfy Legal Reserve requirements. However, the existence of an excess of surplus forests in this region indicates that such trades would occur at low forest prices. Only low opportunity cost land uses (e.g., livestock ranching) would be compensated at such price levels. But since the law provides for trading within a vast area replete with surplus forests, trades would be generally cheaper than if they were confined to local areas with high biodiversity value. Broader land use management strategies and policy instruments for biodiversity conservation were found to be complementary with trading.

Reference:
Andrade, J. et al., compensation for Legal Reserves in Northwest Mato Grosso: a policymix to reduce deforestation

Website:
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PES and Fisheries Co-Management in Brazil

Published paper

Keywords	**Brazil**, REDES, WP2, challenges, context and gaps, **institutional fit**, **PES**, co-management, coastal protected areas, private use rights over fisheries

Main research question

A policymix made up of public PES to compensate for coastal resource co-management by artisanal (small-scale) fishers would be less costly, more effective and more equitable than just or only ? no-catch restrictions to protect stocks and conserve protected biodiversity.

Research finding in brief

Artisanal fishers could be able to ?protect threatened coastal resources against overfishing if given co-management roles.

Policymix approach

The study analyzes potential for joint PES and co-management schemes, given the context of conflict between coastal resource protection and fisheries production.

Canoes of artisanal fishers in the municipality of Paraty, Ilha Grande Bay, SE Brazil.

Summary

Artisanal (small-scale) fisheries in Brazil respond for more than 50% of national fish production. Taking into consideration the occurrence of conflicts between protected areas and artisanal fishers, as well as between artisanal and industrial fishers, suggestions involving policimix approaches are given based on payment for environmental services. We show, that in SE Brazil, at Ilha Grande Bay, after 413 interviews with artisanal fishers in 34 artisanal fishing communities, as well as 5 meetings in 2009, that fishers´ current use of the marine space is threatened by both protected areas and industrial fisheries. In that sense co-management processes, such as fishing agreements (FAs) associated to co-management, based on payment for environmental services (PES) could be a policimix strategy. This approach could be, at least partially, operationalized through the already existent 'defeso system' (a system in which government pays for fishermen to stop fishing during certain periods) making a step forward to fishers towards fishery management, stimulating and rewarding fishermen within conservation processes.

Reference:
Begossi, A., May, P. H., Lopes, P. F., Oliveira, L.E.C., Vinha, V. and Silvano, R.A.M. 2011. Compensation for environmental services from artisanal fisheries in SE Brazil: Policy and technical strategies. Ecological Economics, 71:25-32.

Website:
doi:10.1016/j.ecolecon.2011.09.008

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The effect of forest proximity on biological control of pasture in Northwest Mato Grosso, Brazil

Keywords	Brazil, Northwest Mato Grosso, Amazon, REDES, WP3, cattle ranching, pasture pests, biodiversity and ecosystem impact, biological control valuation, land use policy.

Main research question

Could biological control services provided by forest proximity in pastures be a significant incentive for landowners to keep the forest standing?

Research finding in brief

Economic losses associated with spittlebugs – the primary pest affecting grasses in Tropical America – threaten cattle ranching profitability in the Amazon. The planned maintenance of forest patches within pasture dominant landscapes could effectively control spittlebug populations and thereby enhance farm incomes.

Mosaics of pasture and forest bring greater profits to cattle by biological control. Cotriguaçu, Brazil.

Policymix approach

This study provides information for landowners and policymakers, to motivate them to take into account the value of the forest in agroecosystem management in Northwest Mato Grosso. Pest control of pasture is analysed, as an important ecosystem service provided by the forest for cattle ranching in the municipality of Cotriguaçú where it is the principal economic activity. The value of biological control, and means to improve its benefits, were assessed by the correlation between forest proximity and spittlebug (Homoptera: Cercopidae) infestation level on pastures – studied by field sampling and statistical analysis – and its estimated economic loss – based on values obtained through interviews with ranchers. We derived scenarios at different scales (farm and municipality) regarding cost-effectiveness of biological control strategies within the productive landscape as an incentive for forest conservation by estimating the value of this service, compared with the opportunity cost of conserving the remaining forest. These benefits were considerably greater than the opportunity costs of converting the forest to additional pasture. We found that biological control was optimized within a matrix including a series of forest patches of different sizes, with good connectivity between them to allow the movement of spittlebug's natural enemies in the landscape. Moreover, connectivity with large patches of forest should be favored, as they are the main source of natural enemies. Broader land use management strategies and policy instruments for biodiversity conservation were found to be complementary to such a matrix.

Reference:
Del Arco, P., May P. H., Rusch, G.. 2013. The effect of forest proximity on biological control of pasture in Northwest Mato Grosso, Brazil: an economic analysis for land use policy. ESEE Conference, Lille.

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The effectiveness and fairness of the "Ecological ICMS" as a fiscal transfer for biodiversity conservation in Mato Grosso, Brazil

Keywords	Brazil, REDES, WP5, WP6, ecological fiscal transfers, ICMS-E, Northwest Mato Grosso, Brazil, social impact, effectiveness, fairness

Main research question

What is the role of the Ecological ICMS (ICMS-E) in promoting local biodiversity conservation and social equity in Mato Grosso?

Research finding in brief

The ICMS-E – a state-to-municipal level Ecological Fiscal Transfer (EFT) instrument in operation for over 20 years in Brazil – has been considered a valid instrument to promote conservation. However, despite contributing revenues superior to predominant forest destructive land use practices, the ICMS-E has not stimulated additional biodiversity protection in NW Mato Grosso. More effective conservation can be attained by promoting local institutional innovation, to encourage the allocation of additional EFT revenues to strengthen municipal environmental governance.

Policymix approach

We selected two municipalities – Juína and Cotriguaçú – to evaluate the current and potential role of the ICMS-E in inhibiting further biodiversity loss at the forest frontier. We assess the role of this economic instrument in a policy mix for regional land use and municipal governance. Qualitative interviews with local stakeholders focused on: (i) distribution criteria; (ii) allocation of benefits; (iii) institutional arrangements; (iv) positive and negative aspects of the instrument; and (v) costs of implementation. The field research allowed an in-depth examination of how the ICMS-E is being implemented in the municipalities and the role that different actors and institutions play in this process.

Since ICMS-E revenues are not earmarked, additional revenues generated by the existence of protected areas are used for general purposes, such as road maintenance. The research showed that the ICMS-E can play a more effective role in biodiversity conservation if the municipality has a legal environmental framework that includes programs and policies for conservation; environmental councils; environmental funds that will receive a significant amount of ICMS-E resources; and informal practices of participation that include NGOs and interested parties for decision making. Revenues strategically distributed to address needs of proactive private landowners and indigenous communities can stimulate additional protection. Access to information and capacity building are important tools for building consensus regarding better allocation of ICMS-E revenues and to proactively reinforce biodiversity conservation at the Amazon frontier.

Reference:
May P. H., M. F. Gebara, G. Lima, C. Jordão, P. Nogueira, M. Grieg-Gran. 2013. The effectiveness and fairness of the "Ecological ICMS" as a fiscal transfer for biodiversition conservation. A tale of two municipalities in Mato Grosso, Brazil. Paper presented at ESEE Conference, Lille.

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

Published paper

Keywords	Brazil, Mato Grosso, REDES, CATIE, WP5, WP6, Impact evaluation, Biodiversity and ecosystem impact, Social impact, Institutional fit, Implementation process, Outputs, AEM

Main research question

How have integrated conservation and development pilot projects (ICDPs), promoted for biodiversity conservation on family farms in northwest Mato Grosso (NW MT), impacted ecosystem services, socioeconomic conditions and institutional arrangements?

Research finding in brief

Comparison of forest cover dynamics indicated that more forest area was conserved in agrarian reform settlements with sustained exposure to ICDP interventions over a 15-year period. The *Vale do Amanhecer* agrarian reform 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. In this settlement, environmental licensing and sustainable forest product marketing outcomes supportive of local livelihoods were achieved by integrating social organization with support for material and institutional infrastructure. The particular combination and sequence of ICDP interventions produced synergies between cooperative social organization, state-administered policy instruments and alternative market chains. Considering individual family farms participating in ICDPs across the case study region, agroforestry farm rents were considerably enhanced in comparison to a smallholder farm baseline of mixed beef and dairy.

Policymix approach

The ICDP approach to biodiversity conservation has been criticized due to a lack of empirical evidence demonstrating ICDP impacts. With attention to such critiques, we determined to conduct an interdisciplinary evaluation of the outcomes of ICDPs and respective Agro---Environmental Measures (AEMs) in NW MT. Our case study evaluated ecological, economic and institutional variables on family farms of between 50---100 hectares in agrarian reform settlements, based 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.

While for individual participating farms we detected ICDP influences for all three criteria, the specific temporal sequence of ICDP interventions in the Vale do Amanhecer settlement was observed to create critical synergies between the national Brazilian forest code, state administered environmental licensing, product certification, and public and private financing and tax relief for cooperative industries for Brazil nut derived products. In other settlements, the lack of these synergies led farmers to capitulate to dominant economic forces in the region promoting land use change, which practically nullified ICDP demonstration effects at the scale of the landscape. In regions subject to adverse political economic conditions, the viability of REDD+ or other 'policyscapes' may be a function of the management of institutional and market synergies, which involve interfaces between formal and informal institutions and the rapid evolution of 'rules in use' on forest frontiers.

Reference:
J. Vivan (*in memoriam*), R. Davenport, P.C. Nunes, R. Abad, P.H. May, D.N. Barton, L.P. Amaral. 2013. Pilot projects and agro-environmental measures in northwest Mato Grosso, Brazil: impacts and lesson for REDD+ policy "mixes." Paper presented at ESEE Conference, Lille.

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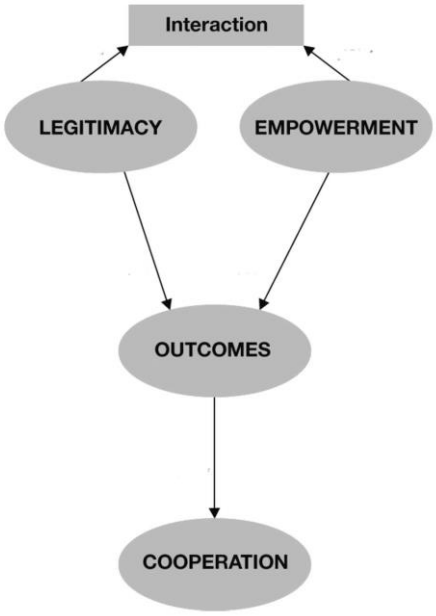
Legitimacy and empowerment

Published paper

Keywords	Finland, SYKE, WP5, WP7, Challenges, context and gaps, Social impact, Institutional fit, Extension, Explore, Test

Main research question

What is the role of legitimacy, empowerment and the expectation of positive outcomes of forest conservation in fostering willingness to cooperate with environmental officials in voluntary nature conservation?



Research finding in brief

The views of 965 forest owners in Southern Finland, where national forest conservation policy has been recently discussed and renewed, were analysed by structural equation modelling of questionnaire responses. Based on the models, perceived legitimacy and empowerment predicted the forest owners' willingness to cooperate with environmental officials in nature conservation via the expectation that nature conservation would lead to positive outcomes. In addition, a significant interaction between legitimacy and empowerment was found: forest owners' empowerment perceptions increased the willingness to cooperate only among those owners who perceived the legitimacy of nature conservation to be low.

Policymix approach

The findings have theoretical and practical implications for research on legitimacy and empowerment as well as the application of nature conservation policies.

Reference:
Paloniemi, R., Vainio, A. 2011. Legitimacy and empowerment: combining two conceptual approaches for explaining forest owners' willingness to cooperate in nature conservation', Journal of Integrative Environmental Sciences, 8: 2, 123 — 138

Website:
http://dx.doi.org/10.1080/1943815X.2011.576682

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Institutional adaptation integration of conservation into forestry Published paper

Keywords	Finland, SYKE, WP6, WP7, Challenges, context and gaps, Institutional fit, Policy instruments, Resources, Implementation process, Protected area enforcement, Extension, Infer, Test

Main research question

How are forest biodiversity conservation decisions, and the actors making them, influenced by policies and other signals from the society?

Research finding in brief

Public and private sector organizations managing non-industrial private forests have recognized the social demand for integrating biodiversity conservation into management. In response, the organizations have developed conservation competences, and forestry professionals are in favour of conserving biodiversity.
However, biodiversity conservation is integrated to forest management so tightly that it can be said to be subsumed by mainstream forestry. Biodiversity conservation has not become an area of differentiation or strategic specialization in the organizations.

The forestry sector should harness the capacity of the actors to take up additional tasks, fine-tune their practices, and meet the set standards as well as share practices.

Policymix approach

An analysis of policy implementation and organizational adaptation advances the understanding of institutional adaptation in a policymix context that conditions the behavior of public and private actors.

Reference:
Primmer, E. 2011. Analysis of institutional adaptation: integration of biodiversity conservation into forestry, Journal of Cleaner Production, 19:16, 1822-1832.

Website:
http://dx.doi.org/10.1016/j.jclepro.2011.04.0

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PES Evolution and institutional constraints on new policy Published paper

Keywords	Finland, SYKE, WP7.4, Challenges, context and gaps (Step 1 & 2), Institutional fit, Implementation process , PES (public, private)

Main research question

How does the pre-existing institutional basis influence the design and implementation of new biodiversity and ecosystem services policies?

Research finding in brief

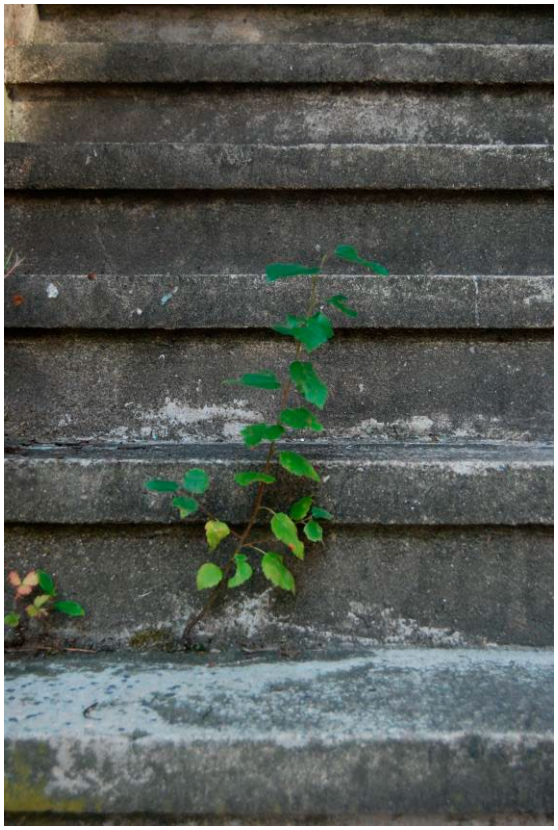
Previous policies, administrative practices and shared meanings set the scene for a new policy instrument.

The policies that seemingly take effect through formal regulative institutional changes are conditioned by less explicit normative and cultural-cognitive institutions.

Administrative and professional rigidities can be broken with a light policy experiment but for longer term governance development, radical institutional changes are necessary.

Policymix approach

An analysis of the sequence in which a policymix has been developed is essential for understanding how a new policy instrument would fit the existing mix.



Reference:
Primmer, E., Paloniemi, R., Similä, J., Barton, D.N. 2013. Evolution in Finland's forest biodiversity conservation payments and the institutional constraints on establishing new policy. Society & Natural Resources 26(10), 1137-1154.

Website:
DOI: 10.1080/08941920.2013.820814

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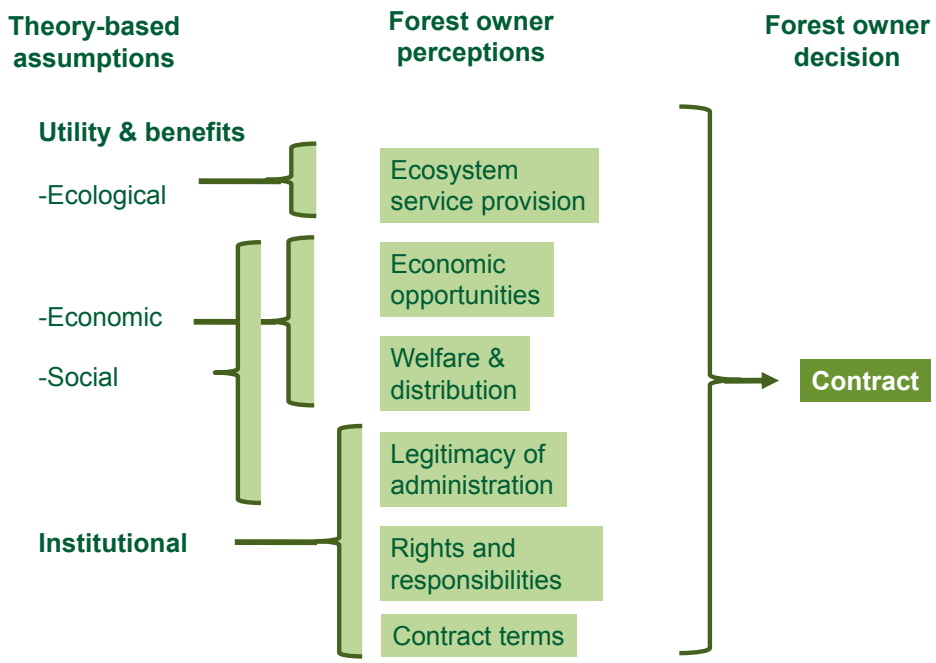
Forest owner perceptions: Not crowding out but staying out Published paper

Keywords	Finland, SYKE, WP6, WP7, Challenges, context and gaps, Institutional fit, Policy instruments, Resources, Implementation process, PES (public, private), Explore, Test



Main research question

Do perceptions identified by theory influence voluntary contracting for forest biodiversity conservation in the past or in the future? How are conservation decisions influenced by signals from the society?

Research finding in brief

The perceptions that related to past contracting differed notably from those that explained future intentions to contract. Most consistently, perceptions about favourable ecological impacts were positively related to past contracting, while social and moral normative perceptions had a negative effect. In other words, those who would conserve nature for altruistic reasons tended not to have entered a contract but rather stayed out. Local and social welfare expectations increased the willingness to contract in the future.

Policymix approach

The analysis highlights the importance of normative conservation justifications as well as the expectations regarding non-economic benefits and welfare impacts for PES design and analysis.

Reference:
Primmer, E., Paloniemi, R., Similä, J., Tainio A. 2014. Forest owner perceptions of institutions and voluntary contracting for biodiversity conservation: Not crowding out but staying out. Ecological Economics 103, 1-10.

Website:
http://dx.doi.org/10.1016/j.ecolecon.2014.04.008

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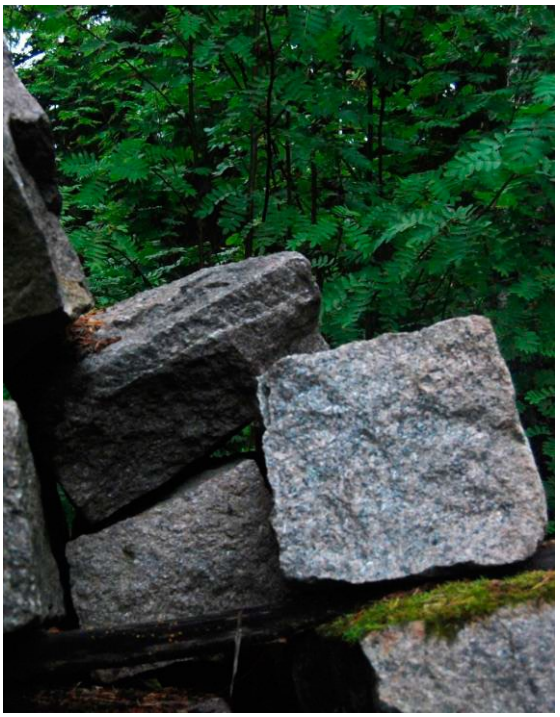
Economic Instruments and EU State Aid Regulation Published paper

Keywords	Finland, SYKE, WP6, WP7, Challenges, context and gaps (Step 1 & 2), Institutional fit, Goals, Institutional fit, PES (public, private), Explore, Infer

Main research question

How do state aid rules constrain the economic incentives to provision of public goods on private lands in the European Union?



Research finding in brief

Many environmental services are not traded in markets but are rather public goods and their supply cannot easily be motivated by the market forces.

Governments are responsible for providing public goods but competition rules restrict the use of economic instruments that can be considered state aid.

Subsidies and tax reliefs can be discriminatory , which constrains the application of these incentives . Instead, other instruments such as environmental taxes, fees and charges, are generally in line with the competition principles of state aid law.

Policymix approach

The analysis of state aid principles and their influence on the application of different economic instruments demonstrates the limitations and opportunities of a policymix.

Reference:
Raitanen, E., Similä, J., Siikavirta, K., Primmer, E. 2013. Economic Instruments for Biodiversity and Ecosystem Service Conservation & the EU State Aid Regulation. European Environmental & Planning Law 10(1), 6-28.

Website:
DOI: 10.1163/18760104-01001002

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European state aid and nature conservation law, REDD+ and economic instruments Project Report

Keywords	Brazil, Finland, Germany, SYKE, WP6, Challenges, context and gaps, Institutional fit, Policy instruments, Resources, Implementation process, Trade policy , REDD+, Protected area enforcement, PES (public, private), Agro-environmental measures, Explore, Infer

Main research question

How do international institutions and national conservation policies influence each other and the use of economic instruments in conservation policy?

Research finding in brief

REDD+ and EU regulations shape national policies and governance experiments, which feed back to high level policies. In addition to the technical coordination between international and national policy mechanisms, also the principles of developing instruments are negotiated at multiple levels.

Although the most market-like and ad hoc arrangements receive heightened attention, they face the biggest challenges in monitoring and achieving targeted outcomes and co-benefits.

Instruments merely simulating markets but taking the form of subsidies are significantly constrained by international and EU competition laws.

Policymix approach

The analysis of multiple policies interacting across governance levels pays attention to synergies and conflicts between different policies and infers explanations for institutional fit and misfit.

Reference:
Similä, J., Primmer, E. (Eds.) 2012. Legal analysis of the relationship between European state aid and nature conservation law, and economic instruments for biodiversity protection. POLICYMIX Report Issue 7/2012 .

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Biodiversity Protection and Compliance in Private Forests Published paper

Keywords	Finland, SYKE, WP6, WP7, Challenges, context and gaps, Impact evaluation, Biodiversity and ecosystem impact, Institutional fit, Policy instruments, Protected area enforcement , Infer, Test

Research question

What drives non-compliance in biodiversity conservation and how can regulation enhance compliance?

Research finding in brief

Knowledge, information and coordination are the most important bottlenecks for enhancing habitat conservation.

The low level of non-compliance in Finnish non-industrial private forests is largely explained by institutional factors. These include the decision-making procedures, the strong role of professional forestry organizations and the certification system established in response to international markets.

We propose to build on a cooperative strategy by improving and sharing a knowledge base; maintaining the existing deterrence, and applying smart regulation by engaging with new third parties.

Policymix approach

Compliance in one policy area relies on a general institutional context, which partly rests on other policy instruments. Analyzing compliance in habitat conservation requires the understanding of other biodiversity protection instruments.

Reference:
Similä, J., Pölönen, I., Fredrikson, J., Primmer, E., Horne, P. 2014. Biodiversity Protection in Private Forests: An Analysis of Compliance. Journal of Environmental Law 0, 1–21.

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doi: 10.1093/jel/eqt029

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Understanding landowners' objections towards afforestation Project Report

Keywords	Germany, UFZ, WP5, Impact evaluation, Ecosystem service values, policy instruments, implementation process, Agri-environmental measure

Main research question

In this study we conduct qualitative interviews to better understand why German landowners are reluctant to participate in afforestation schemes.

Research finding in brief

Funding for afforestation is regarded unprofitable compared to revenue gained from agricultural production.

Further issues that demotivate participation were very heterogeneous between respondents. These included:

1) larger farms can more easily plant forests, because they still have sufficient land left for agricultural land uses.

2) Since farms in the region rent a large share of their farmland, they have no right to plant forest on rented land.

3) The long-term commitment was regarded as negative, especially since farmers have the costs now while the benefits will accrue to future generations.

Policymix approach

The main focus was to identify issues causing reluctance to participate in agri-environmental measures. The study looked at farmers' needs and potential conflicts of these needs with forest law. One prominent objection of the AEM was that farmers do not have the opportunity to return to agricultural land-use after the contract ends. If the AEM design were to be adjusted according to this finding, there would be a conflict with forest law prohibiting any forest to be felled.

Reference:
Bittner, S. and Lienhoop, N., 2013: Understanding non-participation of farmers in agri-environmental schemes for afforestation. The case of West Saxony.

Website:
Forthcoming at http://policymix.nina.no/

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Ecological Fiscal Transfers in Germany from theory to possible outcomes

Study Report

Keywords	**Germany**, UFZ, WP7, scenario analysis, **Policy instruments**, **institutional fit**, **Ecological fiscal transfers**, **Protected areas**, Explore

Main research question

Ecological Fiscal Transfers (EFT) address conservation performance of states with regard to fiscal capacity and resource endowments. What effects are to be expected?

Research finding in brief

EFT represent a re-allocation of financial resources, that require no more money, increase expanse of protected areas, and benefit sparsely populated, economically weak states.

Depending on the design, EFT may represent a land-sparing approach, leading to more protected areas in sparsely populated states but do not help realizing habitat networks among all states.

Policymix approach

The applied microeconomic model clarifies the theoretical functioning of ecological fiscal transfers. The derived outcome of the model reveals potentials but also limits of ecological fiscal transfers. This indicates which conservation policy goals can be addressed by EFT and which goals have to be addressed by other instruments in a broader policy mix.

Reference:
Droste, N., Ring, I., Schröter-Schlaack, C., Lenk, T. Ecological Fiscal transfers in Germany. Discussion paper draft.

Website:
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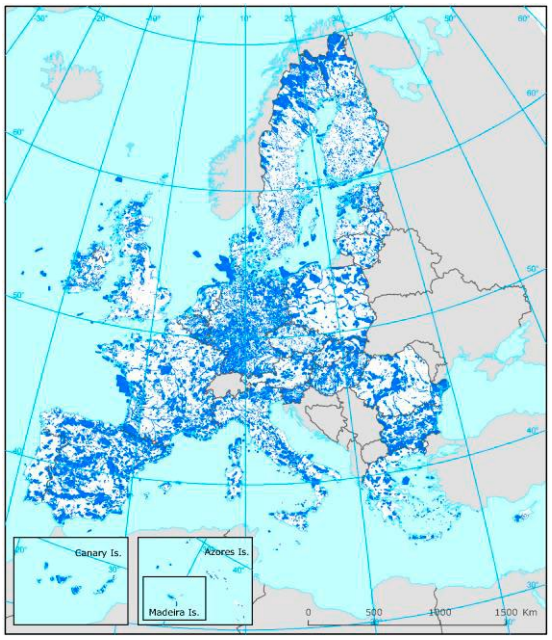
MBIs in EU Biodiversity Policy

Published paper

Keywords	EU, Germany, UFZ, WP6, Challenges, context and gaps, Policy instruments, Institutional fit, Trade policy, Ecological fiscal transfers, PES (public, private), Agro-environmental measures , Protected areas, Tradable rights & offsets

Main research question

Which scope does EU biodiversity policy provide for the introduction of market-based policy instruments (MBIs) by the EU and its member states? In which ways have institutional constraints and opportunities shaped the design of MBIs in existing policies? Which implications does this have for the introduction of additional MBIs to improve the cost effectiveness of the policy mix for biodiversity conservation?



Distribution of Natura 2000 sites across EU member states; source: www.eea.europa.eu

Research finding in brief

- Within the framework of Natura 2000, the role of MBIs is limited. The focus is on ecologically effective command-and-control (CAC) instruments, which contribute a reliable basis to the biodiversity policy mix. Limited funding, however, constrains the pursuit of this objective.
- Beyond these CAC instruments, the distribution of authority between the EU and its member states gives each of them different comparative advantages to increase the cost effectiveness of the biodiversity policy mix through MBIs.
- Examples of factors shaping this distribution of authority are (1) the member states' fiscal sovereignty, which increases their freedom to introduce negative incentive MBIs and limits the EU's authority to do so, and (2) state aid law, which constrains the member states' possibilities to introduce positive incentive MBIs in favour of coordinated schemes on the EU level.

Policymix approach

The analysis deals with policy mixes in two regards: Firstly, it analyzes, how new MBIs would fit into an existing institutional environment, and how this environment has shaped the design of MBIs in the past. Secondly, in evaluating the resulting instrument combinations, the analysis specifically considers the complementary roles, which MBIs and CAC instruments can have within a policy mix. Within the overall project, the analysis had the role of scoping the general legal constraints which recommendations developed in other parts of the project might face within the EU.

Reference:
Klassert, C., und Möckel, S. (2013). Improving the Policy Mix: The Scope for Market-Based Instruments in EU Biodiversity Policy. Environmental Policy and Governance (EPG) 23: 311-322.

Website:
http://onlinelibrary.wiley.com/doi/10.1002/eet.1623/abstract

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Agri-environmental policy valuation for afforestation measures in Germany Project Report

Keywords	Germany, UFZ, WP4, Impact evaluation, Ecosystem service values, policy instruments, implementation process, Agri-environmental measure

Main research question

Explore the conditions under which German landowners in regions with limited forest cover would be willing to afforest.

Assess the demand for different contract alternatives and thereby identify the institutional-economic aspects that hamper and/or motivate landowners' to enrol in afforestation schemes.

Research finding in brief

- While there is no interest in the existing agri-environmental measure (AEM) for afforestation, a choice experiment reveals considerable interest in afforestation among farmers.
- According to the CE and qualitative interviews, a number of contract design features other than money are important.
- Most of these features could be introduced at relatively low cost, thus increasing the efficiency of the scheme.

Policymix approach

Agri-environmental measures are the only incentive-based policy instrument for afforestation in Saxony, but do not receive attention by landowners. Various other regulatory instruments are in place, but do not lead to afforestation either. AEM are not in conflict with other environmental schemes available to farmers, but the sheer amount of funding opportunities make the AEM less predominant and attractive. We also look at how a new design of the AEm would conform with other policy instruments, such as forest law.

Reference:
Lienhoop, N., Brouwer, R., 2013: Agri-environmental policy valuation: Farmers' design preferences for afforestation schemes. Submitted to Land Use Planning

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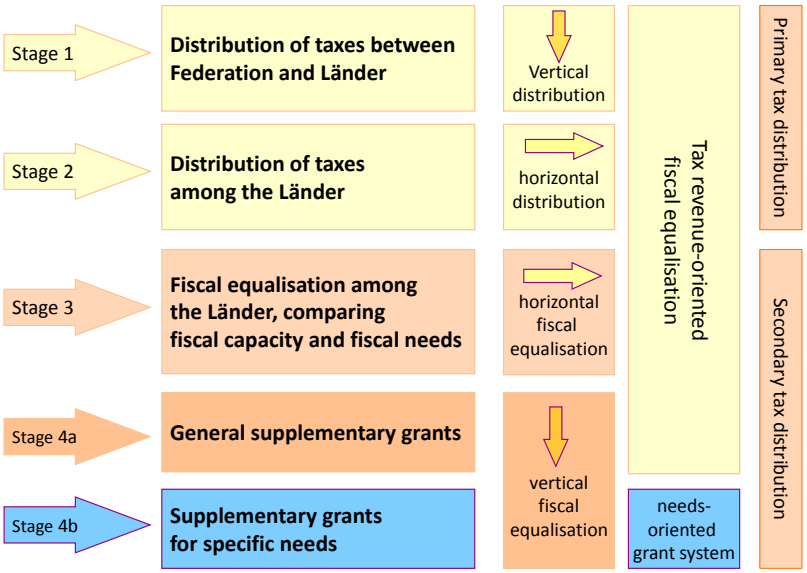
Legal analysis of ecological fiscal transfers

EurUP 2013, 85-94 and Policy-Mix Report 1/2013

Keywords	Germany, UFZ, WP6, The role of ecological fiscal transfers, legal analysis, institutional fit, constitutional law

Main research question

Due to German Constitution the protection of nature, landscape and water bodies is a compulsory task of the German Länder. The Länder require an appropriate fiscal distribution of public revenues in order to fulfil their duties. This paper discuss' different options to ensure appropriate consideration of fiscal demands from nature conservation activities within the German fiscal transfer system from federal to state level.



Research finding in brief

Both the vertical and horizontal tax distribution at the primary level (stages 1 and 2 of Figure 1) are only of limited suitability for the integration of ecological indicators into the fiscal equalisation mechanism. While Articles 106 III and 107 I German Constitution grant the legislator scope for decision-making regarding the vertical distribution of the value-added tax between federal level and Länder (stage 1), its primary target is to ensure that all Länder get the funds necessary to fulfil their public functions. However, environmental and nature conservation issues cannot be considered without an amendment of the German Constitution, making them less feasible for implementation. A more promising avenue might be to integrate ecological indicators at the horizontal equalisation among the Länder on the third level (Article 107 II 1 German Constitution) or at the fourth level of the fiscal equalisation (Art. 107 II 3 German Constitution), which regulates that the Federation provides grants to financially weak Länder from his own funds to assist them in meeting their general fiscal needs (supplementary federal grants).

Policymix approach

Fiscal transfers – a main source of income to German Länder – could become a crucial building block of a nature conservation policy mix in Germany. By acknowledging expenditures for nature conservation as eligible for fiscal transfers, public resistance against increased conservation and an expanded protected area network could be reduced and new sources of funding for private conservation actions exploited.

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Dr. Stefan Möckel. 2/2013
Zeitschrift für Europäisches Umwelt- und Planungsrecht 2013 (11), p. 85 - 94

Website:
http://www.lexxion.de/zeitschriften/fachzeitschriften-deutsch/eurup/archiv/ heft-22013.html

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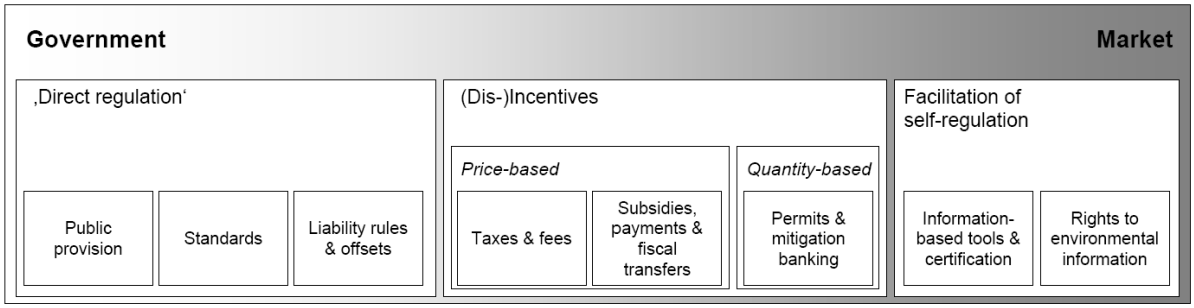
Keywords	UFZ, NINA, SYKE, CENSE-UNFL, IVM-VU, IIED, CATIE, REDES; WP2; Impact evaluation; Policy instruments; Goals, Resources, Institutional Fit, REDD+, Ecological fiscal transfers, Protected area enforcement, PES (public, private), AEM, Tradable rights & offsets

Main research question

The report aim to identify and describe key regulatory and economic instruments for biodiversity conservation; to review existing experience regarding their effectiveness, cost-effectiveness, social impacts as well as institutional requirements; and to assess the role of the selected instruments in a policy mix.

Research finding in brief

We describe and evaluate key policy instruments for the conservation and sustainable use of biodiversity, with a special focus on those suitable for the conservation of forest ecosystem services and sustainable forestry. Building on international experience and literature, the state-of-the-art and knowledge gaps regarding the effectiveness, cost-effectiveness, social impacts and institutional requirements of the following instruments are identified: regulation and planning instruments, tax reliefs for biodiversity conservation, payments for environmental services (PES), REDD and REDD+, ecological fiscal transfers; trading schemes, habitat banking and offsets; and voluntary mechanisms and forest certification schemes.



Continuum of policy instruments for biodiversity conservation.

In the synthesis chapter of the report, we develop a three step-two pathways policy mix analysis framework that was later applied by the case studies of the POLICYMIX project.

Policymix approach

Some policy instruments complement each other and interact synergistically, whereas others may overlap and reduce effectiveness and/or efficiency of the policy set up. Therefore, the role of each of the instruments needs to be specified as a basis for further instrument design and impact evaluation. We propose a three step-two pathways policy mix analysis framework as guidance.

Reference:
Ring, I., Schröter-Schlaack, C. (Eds.) (2011): Instrument Mixes for Biodiversity Policies. POLICYMIX Report Issue No. 2/2011, http://policymix.nina.no.

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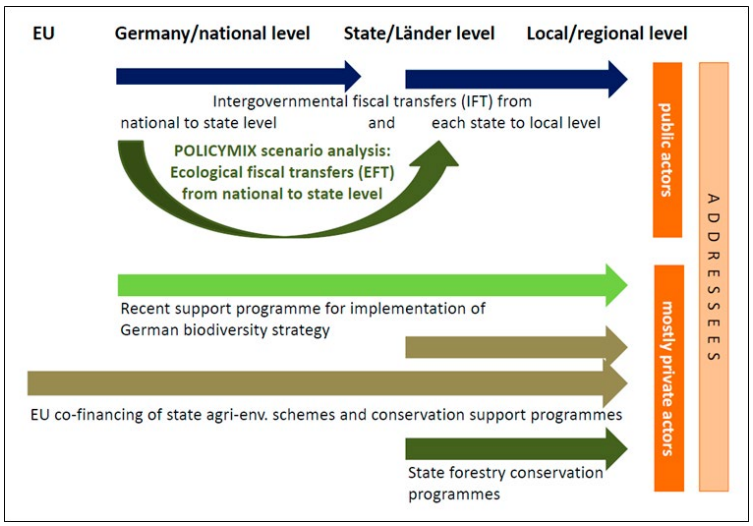
EFT in the German biodiversity conservation policy mix Project Report

Keywords	Germany, UFZ, WP3, WP6; Challenges, context and gaps, Scenario analysis; Policy instruments, Modelling; Institutional Fit; Ecological Fiscal Transfers

Main research question

Research focussed on 1) the creation of sound ecological indicators capable of representing the differences in conservation activities among German states, 2) options for their integration into the existing fiscal transfer scheme, and 3) simulation of ecological fiscal transfers as proposed to showcase potential distribution results.



EFT from national to state level in the context of other biodiversity policy instruments in Germany.

Research finding in brief

Depending on the indicators chosen, ecological fiscal transfers may also facilitate indirect conservation measures such as avoiding further fragmentation of landscapes by traffic infrastructure development or patchy settlement expansion. Furthermore, ecological fiscal transfers may provide the funds necessary to equip support programmes for conservation activities by private land users. From an institutional perspective it is also important to note that implementing ecological fiscal transfers at state level may also provide an impetus for introducing ecological indicators at other levels of intergovernmental transfers, e.g. fiscal equalisation at municipal level, thereby boosting impacts resulting from ecological fiscal transfers at state level

Policymix approach

Ecological fiscal transfers build on existing protected area regulation in that they use officially designated protected areas as an indicator to allocate fiscal transfers. Hence, they synergistically complement conservation law with an economic incentive that accounts for state conservation costs and spillover benefits related to these protected areas.

Reference:
Schröter-Schlaack, C., Ring, I., Möckel, S., Schulz-Zunkel, C., Lienhoop, N., Klenke, R., Lenk, T. (2013): Assessment of existing and proposed policy instruments for biodiversity in Germany: The role of EFT. POLICYMIX Report Issue No. 1/2013.

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Ecological Fiscal Transfers across Europe

Project Report

Keywords	Portugal, France, Germany, Poland; UFZ, CENSE-UNFL; WP6; Challenges, context and gaps, Impact evaluation; Policy instruments; Institutional Fit; Ecological Fiscal Transfers

Main research question

Although recommended for introduction in a number of European countries (such as Germany and Poland), to date only Portugal and to some extent France have implemented fiscal transfers for biodiversity conservation in Europe. In this paper we 1) analyse this policy instrument by providing a review of existing experience and concepts proposed, 2) identify design features critical for success and 3) develop recommendations for improving existing or introducing new ecological fiscal transfer schemes.

Design feature	Characteristic	PT	FR	DE	PL
Status		Implemented	Implemented	Proposed	Proposed
Date		2007	2003	Since 1996	Since 2012
Type of costs or benefits acknowledged	Management costs			X	X
	Opportunity costs	X	X		X
	Spillover benefits	X	X	X	
Indicators	Quantitative	Size of PAs	Share of PAs as a proportion of total area of jurisdiction	Share of PAs as a proportion of total area of jurisdiction	Under discussion
	Qualitative			e.g., weighted PA categories; fragmentation	
Scale	Small		Only municipalities in national and marine parks		
	Large	All municipalities with any PA category		All regional states or municipalities with any PA category	X
Funds	Fixed budget				Under discussion
	Percentage of total transfers	Along with other indicators	Along with other indicators	Along with other indicators	Under discussion
EFT resources transferred	Low	X	X	X	X
	High				
Type of transfers	Lump sum	X	X	X	X
	Earmarking				

Design features of EFT schemes in Europe

Research finding in brief

We reviewed the state of EFT schemes in four European countries at different stages in the policy cycle and discussed critical design features of the instrument, such as type of costs / benefits considered, indicators, scale of application or funds used. Promising avenues for future EFT design and implementation include transfers based on qualitative indicators, alongside the quantitative PA-based indicators currently in use in Portugal and France. Further challenges lie in addressing the sustained provision of ecosystem services.

Policymix approach

By spotlighting nature conservation as an important public responsibility eligible for fiscal transfers, EFTs may help to mainstream biodiversity conservation in regional state and local development policies. The major drivers of biodiversity loss imposed by local development and related policies, such as habitat destruction through urban sprawl, infrastructure development and land-use intensification, could thus be counterbalanced.

Reference:
Schröter-Schlaack, C., Ring, I., Koellner, T., Santos, R., Antunes, P., Clemente, P., Mathevet, R., Borie, M., Grodzińska-Jurczak, M. (2014): Intergovernmental fiscal transfers to support local conservation action in Europe. Submitted to The German Journal of Economic Geography

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Biodiversity indicators for Ecological Fiscal Transfers

Project Report

Keywords	Germany, UFZ, WP3, Biodiversity and ecosystem impact, Policy instruments, Ecological fiscal transfers, Test

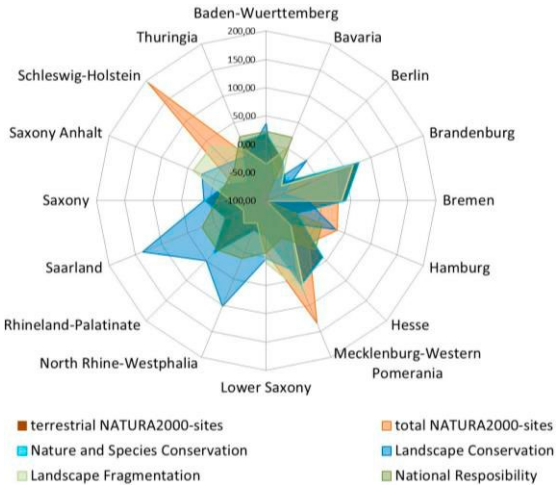
Main research question

This paper seeks to identify appropriate biodiversity indicators to display nature conservation activities of German states in order to acknowledge conservation costs as fiscal needs in the German fiscal transfer system.

Research finding in brief

Area-based indicators (e.g. NATURA 2000-sites) and biodiversity indicators of the German Sustainability Strategy are legally qualified to complement population-indicators as solely applied now for distributing transfers.

A combination of area-based and qualitative (e.g. landscape fragmentation) indicators is crucial to appropriately represent efforts for biodiversity conservation.



Relative position of the values of the applied biodiversity indicators compared to the federal average [%]

Thus for further development it is essential to consider the information needs of policy makers as well as the policy instruments in question.

Policymix approach

Ecological fiscal transfers – as suggested for Germany here – would build upon on nature conservation activities carried out by German states (e.g. share of protected areas on total land, efforts to reduce landscape fragmentation etc.). Hence depending on the indicators chosen, EFT synergistically complement conservation law with an economic incentive that accounts for state conservation costs and spillover benefits related to protected areas and other nature conservation activities.

Reference:
Schulz- Zunkel, C., Schröter-Schlaack, C., Ring, I. & Klenke, R. (2014): Selecting biodiversity indicators for implementing ecological fiscal transfers at state level in GermanySubmitted to Ecological Indicators

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Role of economic and regulatory instruments in the conservation policy mix for the Brazilian Amazon

Published paper

Keywords	**Mato Grosso**, Amazon, Brazil, REDES, WP7, deforestation, **policy instruments**, **ecological fiscal transfers**, **agro-environmental measures(AEM)**, **tradable development rights**, **protected areas**

Main research question

How effective have economic instruments been in combating deforestation in the context of command and control policies in the Brazilian Amazon?

Research finding in brief

The Brazilian Forest Code (FC) requires that private landowners in the Amazon biome protect at least 80% of remaining forests, but until recently the Code was poorly enforced and widely disrespected. Mato Grosso is the state which has historically led the Amazon region both in terms of the relative rate and absolute area deforested. It is also Brazil's principal soybean, cotton and beef producer, and is hence an appropriate object for policy development aimed to slow the pace of forest destruction. Deforestation has been dramatically reduced over the past decade through a combination of regulatory norms and market mechanisms, but the most effective instrument mix is as yet unknown. Mato Grosso led initiatives in the Amazon for environmental licensing and state ecological-economic zoning based on the FC, but now finds itself at a crossroads due both to uncertainty over the underlying regulation and stakeholders' demands for flexibility in land use control to permit further agribusiness expansion into fragile areas. Municipal governments are demonstrating capacity to exercise commitments to meet deforestation reduction targets, through improvements in governance and adoption of better production practices at different scales, including agrarian settlements, colonist estates and medium-large scale ranches as well as Indigenous reserves.

Policymix approach

We conducted a coarse grain analysis of a mix of public policies operating at the federal and state levels in the Brazilian Amazon and in Mato Grosso in particular aimed to reduce deforestation and promote conservation of remaining biodiversity. The study traces the evolution of national and state policy frameworks toward governance over land use change, in the light of past experience and current efforts to alter the requirements of the FC. The study focuses attention on both existing instruments (such as the ICMS-Ecológico, zoning and licensing, agro-environmental measures and certification) and an emerging policymix built upon compensation for forest protection under the FC, allocation of value added revenues based on both protected areas and private land use, and other positive incentives to good forest stewardship. Trial simulations of these measures are identified and presented, as a basis for more in depth fine grain assessment in a series of policy relevant research outputs with a focus on Northwest Mato Grosso.

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May, P.H., Andrade, J., Vivan, J.L., Kaechele, K., Gebara, M.F., Abad, R. Assessment of the role of economic and regulatory instruments in the conservation policymix for the Brazilian Amazon – a coarse grain study.

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