

Intermediaries within the governance structures of payments for ecosystem services: Cost-effectiveness and environmental effectiveness from an institutional economic perspective

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Preface

The research for this dissertation has been conducted within the junior research group “CIVILand” that had been funded by the Federal Ministry for Education and Research (BMBF) through the social-ecological research program (grant no. 01UU0911). CIVILand examined how payments for ecosystem services (PES) can be developed and implemented to preserve biodiversity and ecosystem services (ES) in Germany, Great Britain and the United States of America, with a particular focus on civil society actors. The mentioned social-ecological research program fosters interdisciplinary research, i.e., the problem-oriented scientific cooperation of researchers from different natural and social sciences. Such cooperation helps to overcome sectoral thinking within separated disciplines and to collaboratively solve societal challenges. This interdisciplinary character is, of course, also reflected in this thesis: I have been trained as an economist and with this thesis I aim at earning a doctorate at the Institute of Environmental Planning at the Faculty of Architecture and Landscape Science of the Leibniz-University of Hanover. Correspondingly, the chosen research approach of the dissertation lies at the interface of economics and environmental planning. As emphasized in the title of this dissertation, the theoretic fundamentals of the thesis are based in institutional economics. The relevant economic theories and concepts that are applied within this dissertation are explicated in a separate chapter in the framework text surrounding the five publications.

Abstract

The dissertation focuses on expedient involvement by intermediaries for the implementation of payments for ecosystem services (PES). The work consists of five peer-reviewed papers published in international journals and the framework text.

Economic instruments for the governance of natural resources have been considered as a new and innovative policy instruments over the past decades. In recent years, PES have received increasing attention in academia and at the policy level. However, conceptually PES appears to be a rather loose and multi-faceted term, and there are many different conservation approaches bundled under this “label”. Within the international literature, there is an ongoing discussion on what constitutes a genuine PES case (and what not).

The first publication of this dissertation is a review paper and provides a structured overview on the diverse conservation approaches published under the PES terminology within the international literature. The paper shows that PES are commonly imbedded in a complex institutional setting with actor constellations that do not resemble simple free market-based buyer and seller relations. There are only very few studies that describe contractual and conditional payments between private ES beneficiaries and landholders/land users for the adoption of practices that secure ES. Most existing PES cases are based on governmental governance structures, where public funds are distributed to land users for the adoption of certain land use practices that are assumed to provide certain ecosystem services (ES) or other less specified environmental benefits including biodiversity. At the point of retrieving the literature for the review paper in 2011, the PES concept had more policy relevance in so-called developing countries, and in particular in Latin America, than in industrialized countries. The agri-environmental measures (AEMs) of the European Union (EU) or United States (US) have been underrepresented within the international PES literature, unless being in place for longer than many PES programs in e.g. Latin America. This, as mostly a terminology referring to ‘non-commodity output’, ‘multifunctionality of agriculture’ or ‘agri-environmental payments or measures’ rather than to ‘payments for ecosystem or environmental services’ has been used in the EU or US, at least at the point of writing the review. Within the first publication I therefore argue that a pooling of AEMs and PES research schools and

a stronger consideration of the respective PES and AEMs research results should be promoted, in particular as research across continents often focuses on comparable implementation difficulties.

The remaining four publications focus on non-governmental intermediaries within governmental PES governance structures in Germany. Large-scale governmental PES programs have frequently been criticized for low levels of cost-effectiveness and environmental effectiveness. Low levels of cost-effectiveness are often the result of high transaction costs (TCs). Environmental effectiveness of PES in turn can be influenced – among others – through spatial targeting of PES and participation of land users. This dissertation considers that intermediaries can influence both, cost-effectiveness and environmental effectiveness of PES.

Publication two devises an analytical framework as a tool for assessing the potential of intermediaries to improve the cost-effectiveness and environmental effectiveness of PES implementation. The framework is based on institutional economic theory and assess how and for which activities intermediaries can influence private and public TCs, as well as participation levels within PES, and spatial targeting of the diverse measures. In general, the framework as a tool can be applied to different PES cases and governance structures, in order to assess the potential influence of an intermediary on the performance of PES. Within the paper, the framework is exemplary applied to a particular intermediary – namely the German Landcare Associations (LCAs) – in the context of agri-environmental measures (AEMs) implementation in Germany. The paper discusses the relevant organizational design characteristics of LCAs that enable him/her to improve the implementation of governmental PES programs.

Publication three analyses empirically how intermediaries can improve the problem of transacting AEMs. The paper is organized as a case study analysis with LCAs as the intermediary. Based on an online survey, the paper identifies a few but severe institutional challenges and constraints that adversely affect AEMs implementation as faced by the intermediary. The paper also investigates the current and prospective future involvement of LCAs in the context of AEMs implementation and discusses how these can contribute to alleviating the identified adverse institutional framework conditions. The results of the paper underline the need to provide agri-environmental advice and assistance to improve the effectiveness of AEMs implementation. The paper also discusses that intermediaries could be officially commissioned with and remunerated for their service provision.

Publication four analyses empirically the involvement of LCAs in the context of AEMs implementation in Germany. The paper examines how the involvement of intermediaries influences land users' decision making process to participation in and actual adoption rates of AEMs. The work also assesses if and how the intermediary pursues a spatial targeting of AEMs and thereby boosts the environmental effectiveness of measures. The results indicate that the provision of deliberate agri-environmental advice and assistance helps to improve the effectiveness of public PES programs. However, it is important to consider who provides such services. Locally embedded and committed

intermediaries that hold local social and trustworthy networks appear to be well-suited for such services and should be considered as an active component within PES implementing governance structures.

Publication five considers that the ES concept should be further integrated into agri-environmental policies in general and into the AEMs in particular. The paper elaborates that locally embedded civil society actors are important for supporting the integration of the ES concept into AEMs.

The framework text surrounding these five publications introduces the PES concept and guides to the overall research aim of investigating how intermediaries can improve the cost-effectiveness and environmental effectiveness of PES implementation. The assessment of the intermediary's involvement is based on institutional economic theory. The framework text therefore provides a brief explication on the fundamentals of the institutional economic schools and their respective theories and emphasizes the relevance of this lens for analyzing intermediary involvement within natural resource governance. Finally, the accumulated research results of the individual five papers are discussed and concluded jointly in the framework text.

Kurzfassung

Die vorliegende Dissertation untersucht die zweckdienliche Beteiligung von Intermediären an der Implementierung von Zahlungen für Ökosystemleistungen (engl. Payments for Ecosystem Services; im Folgenden deshalb PES). Die Arbeit besteht aus insgesamt fünf peer-reviewed Publikationen, die in internationalen Zeitschriften veröffentlicht wurden, sowie einem Manteltext.

Zur Governance natürlicher Ressourcen haben ökonomische Instrumente als Ergänzung von Ordnungsrecht in den vergangenen Jahren vermehrte Aufmerksamkeit erhalten, dies sowohl auf politischer als auch auf wissenschaftlicher Ebene. Von zentraler Bedeutung sind in diesem Zusammenhang PES. Konzeptionell scheint PES eher ein lockerer und schillernder Begriff zu sein; verschiedene Naturschutzansätze werden unter diesem „Label“ zusammengefasst. In der internationalen Literatur gibt es eine anhaltende Diskussion darüber, was einen echten PES-Fall ausmacht (oder eben was nicht). Die erste Veröffentlichung der vorliegenden Dissertation ist ein Übersichtsartikel (Review Artikel). Der Artikel gibt einen strukturierten Überblick über die verschiedenen Naturschutzansätze, die in der internationalen Literatur unter der PES-Terminologie veröffentlicht werden. Der Artikel zeigt auf, dass PES in der Regel in ein vielschichtiges institutionelles Umfeld eingebettet sind, mit komplexen Akteurskonstellationen, die in der Regeleben nicht auf marktwirtschaftlichen Käufer-Verkäufer-Beziehungen basieren. Es gibt nur sehr wenige Fallstudien, die Verträge bzw. Zahlungen zwischen privaten Akteuren untersuchen, die der klaren und vertraglich festgelegten Bereitstellung von Ökosystemleistungen dienlich sind. Die meisten publizierten PES Fälle basieren auf staatlichen Governancestrukturen. Öffentliche Gelder werden dafür genutzt, finanzielle Anreize für Landnutzer zu schaffen, und diese für die Bereitstellung von Ökosystemleistungen bzw. für die Einführung von Landnutzungen, die gewisse Umweltleistungen erbringen, zu honorieren. Als ich im Jahre 2011 die Literatur für den Review-Artikel ausgewertet habe, hatte das PES Konzept in den sogenannten Entwicklungsländern – und insbesondere in Lateinamerika – eine größere politische Relevanz als in den klassischen Industrieländern. Der Artikel zeigt auf, dass die Agrarumweltmaßnahmen (AUM) der Europäischen Union (EU) oder der Vereinigten Staaten (USA) in der internationalen PES Literatur unterrepräsentiert sind und dort kaum Beachtung finden. Dies ist ein interessantes Ergebnis, da viele dieser AUM deutlich älter sind als die PES Programme in Latein Amerika und auf sehr vergleichbaren Governancestrukturen

basieren. In dem Review-Artikel argumentiere ich, dass dies unter anderem durch die Nutzung unterschiedlicher Begriffe und Terminologien verursacht wurde. In den USA und der EU wurden – zumindest zum Zeitpunkt als der Artikel geschrieben wurde – vor allem Begriffe wie „non-commodity output“, „multi-functionality of agriculture“ oder „agri-environmental payments“ verwendet und eben nicht „payments for ecosystem services“. Ich schlussfolgere, dass eine stärkere Verknüpfung der unterschiedlichen Forschungsgemeinschaften und eine stärkere Berücksichtigung der jeweiligen Ergebnisse zu PES und AUM zu Synergien führen würden. Dies nicht zuletzt, da die gesetzten Forschungsschwerpunkte über die Kontinente hinweg sehr vergleichbar sind und ähnliche Umsetzungs- bzw. Implementierungsschwierigkeiten im Fokus stehen.

Die übrigen vier Publikationen der Dissertation konzentrieren sich auf nicht-staatliche Intermediäre innerhalb der staatlichen PES-Governancestrukturen in Deutschland. Die großen staatlichen PES-Programme werden häufig für eine geringe Kosteneffizienz und Umweltwirkung kritisiert. Eine geringe Kosteneffizienz ist häufig das Ergebnis hoher Transaktionskosten (TCs). Die Umweltwirkung der PES Programme und Maßnahmen kann wiederum durch eine verbesserte Teilnahme von Landnutzern bzw. durch eine räumliche Ausrichtung der Maßnahmen (spatial targeting) beeinflusst werden. Die Dissertation untersucht, ob und wie Intermediäre sowohl die Kosteneffizienz als auch die Umweltwirkung von PES beeinflussen können.

In der zweiten Veröffentlichung wird ein analytischer Rahmen als Instrument zur Erfassung und Bewertung des Potenzials von Intermediären zur Verbesserung der Kosteneffizienz und Umweltwirkung von PES erarbeitet. Der analytische Rahmen basiert auf der Institutionenökonomik (sowohl klassische als auch Neue Institutionenökonomik) und untersucht, wie Intermediäre die Implementierung von PES unterstützen können. Der institutionelle Rahmen zielt darauf ab, zu bewerten, wie Intermediäre sowohl Transaktionskosten, als auch die Teilnahme von Landnutzern sowie die zielgerichtete Vermittlung der PES Maßnahmen, verbessern können.

Generell kann der analytische Rahmen als Instrument auf verschiedene PES-Fälle und unterschiedliche Governancestrukturen angewendet werden, um zu untersuchen und zu bewerten, welchen potenziellen Einfluss ein Intermediär auf die Performance von PES hat. In der zweiten Publikation wird der Rahmen exemplarisch auf einen bestimmten Intermediär – nämlich die deutschen Landschaftspflegeverbände (LPV) – und auf die Umsetzung von AUM in Deutschland angewandt. Der Artikel diskutiert auf theoretischer Ebene, welche institutionellen Eigenschaften der LPV von Bedeutung sind, um die Umsetzung staatlicher AUM zu verbessern.

Die dritte Veröffentlichung untersucht als empirische Fallstudie, welche institutionellen Herausforderungen und defizitäre Rahmenbedingungen die Umsetzung der AUM in Deutschland negativ beeinflussen. Ebenso wird in dem Artikel das momentane und potentiell künftige Engagement der LPV in der Umsetzung der AUM erhoben, um zu diskutieren, wie die LPV als Intermediär die genannten Herausforderungen und schlechten Rahmenbedingungen abschwächen bzw. verbessern können. Ein Schwerpunkt der Publikation liegt dabei auf dem Problem der Transaktionskosten. Die Ergebnisse des Artikels unterstreichen die Relevanz der Naturschutzberatung im Kontext der AUM-Um-

setzung. In dem Artikel diskutiere ich, das Intermediäre, die eine Naturschutzberatung anbieten, hierfür einen offiziellen Auftrag erhalten sollten und für diese Arbeit auch durch (öffentliche) Gelder entlohnt werden sollen.

Die vierte Publikation untersucht empirisch wie die LPV in Deutschland an der Umsetzung von AUM involviert sind und welche Effekte sie auf die Umweltwirkung der AUM haben. Der Artikel untersucht, ob und wie die Unterstützung der LPV als Intermediär den Entscheidungsfindungsprozess der Landwirte an AUM teilzunehmen beeinflusst und ob die Unterstützung der LPV zu einer verbesserten Annahme der AUM führen. Ebenso wird geprüft, ob und wie die LPV versuchen, eine räumliche Ausrichtung der AUM zu begünstigen. Die Ergebnisse zeigen auf, dass eine gezielte Naturschutzberatung dazu beiträgt, die Wirksamkeit der AUM zu verbessern. Der Artikel liefert Hinweise, dass es von Bedeutung ist, wer diese Beratung anbietet. Lokal anerkannte und engagierte Intermediäre, die auf lokaler Ebene über funktionierende, vertrauenswürdige soziale Netzwerke verfügen, scheinen für solche Dienste gut geeignet zu sein und sollten aktiv in den Implementierungsprozess der AUM eingebunden werden.

Die fünfte Publikation ist ein Viewpoint Paper und diskutiert, dass das Konzept der Ökosystemleistungen stärker in die Agrarumweltpolitik im Allgemeinen und in die Ausgestaltung der AUM im Besonderen integriert werden sollte. In der Publikation wird erörtert, dass lokal eingebettete zivilgesellschaftliche Akteure wichtig sind, um die Integration von Ökosystemleistungen in die gemeinsame Agrarpolitik der EU zu unterstützen bzw. zu fördern.

Der Rahmentext, der diese fünf Publikationen ummantelt, führt zunächst das PES Konzept ein und erläutert in diesem Kontext die generellen Forschungslücken, die diese Dissertation schließen möchte. Wie bereits erwähnt, basiert insbesondere die Untersuchung des Potenzials von Intermediären die Umsetzung der AUM zu verbessern auf institutionenökonomischen Theorien. Der Rahmentext wird auch dazu genutzt, eine kurze Einführung in die Theorien der klassischen Institutionenökonomik, der neuen Institutionenökonomik, sowie der vergleichenden Institutionenanalyse zu geben und zu erläutern, weshalb diese Theorien auch für die Untersuchung von Intermediären im Kontext der PES Implementierung genutzt werden können. Abschließend werden die kumulierten Forschungsergebnisse der fünf Publikationen gemeinsam diskutiert und konkludiert.

Keywords

- Governance of ecosystem services
- Agri-environmental measures
- Governance structures

Schlagwörter

- Governance von Ökosystemleistungen
- Agrarumweltmaßnahmen
- Governancestrukturen

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List of Abbreviations

AEMs	Agri-Environmental Measures
AUM	Agrarumweltmaßnahmen
CAP	Common Agricultural Policy
CIE	Classical Institutional Economics (or Classical Institutional Economic Theory)
ES	Ecosystem Services
EU	European Union
LCAs	Landcare Associations
LPV	Landschaftspflegeverbände
MEA	Millennium Ecosystem Assessment
NIE	New Institutional Economics (or New Institutional Economic Theory)
PES	Payments for Ecosystem Services
P1	First Publication
P2	Second Publication
P3	Third Publication
P4	Fourth Publication
P5	Fifth Publication
TCs	Transaction Costs
TEEB	The Economics of Ecosystems and Biodiversity

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1 Introduction

1.1 From Ecosystem Services to Payments for Ecosystem Services

The concept of ecosystem services (ES) has been discussed in science since the late 1970s (Ehrlich and Ehrlich, 1981, de Groot 1987; cf. also Jetzkowitz 2011). From the 1990s onwards the concept has received increasing attention in the literature (cf. Gomez-Baggethún et al., 2010). The publishing of the Millennium Ecosystem Assessment (MEA, 2005) and ‘The Economics of Ecosystems and Biodiversity’ (TEEB) reports (e.g. TEEB, 2010) helped to further the recognition of the concept and to move it out of science. The concept is reaching the policy arena (Schleyer et al., 2015, Matzdorf and Meyer, 2014), also efforts to bring the concept to the practice-oriented planning level are proceeding (Albert et al., 2016, Galler et al., 2016, Haaren et al., 2016; Spangenberg et al., 2014; de Groot et al., 2010). The ES concept depicts in a utilitarian manner the benefits people and societies obtain from ecosystems – and it clearly shows that the wellbeing of humankind depends on functioning ecosystems ensuring a flow of ES (Loreau, 2014, Gomez-Baggethún et al., 2010). In this regard, Gretchen Daily (1997: 3) describes ES as “the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life”. The MEA differentiates for four main classes of ES – being supporting services, provisioning services, regulating services, and cultural services (MEA, 2005). Changes in the supply of ES are caused through diverse direct factors (such as e.g. timber logging, fertiliser use, fishing etc.) and indirect factors (demographic-, economic-, socio-political-, scientific-, or cultural changes etc.) (cf. Corbera, 2011).

The results of the MEA highlight that “approximately 60% (15 out of 24) of the ecosystem services examined during the Millennium Ecosystem Assessment are being degraded or used unsustainably” (MEA 2005: 1). Thus, even though national and international efforts for the sustainable management of natural resources have moved up on the political agenda – at least since the United Nations Conference on Environment and Development in Rio de Janeiro in 1992 – many of the most pressing environmental problems have not been solved so far, rather many of them even aggravated. As a consequence, the classical – mostly regulative – policy instruments were criticised heavily for missing effectiveness. Economic (or market-based) instruments for the governance of ES and biodiversity as a complement or even substitute for regulative policy interventions have been considered as a new and innovative governance approach.

Regulative instruments aim to influence directly the behaviour of individuals through command and control, permits, and technical prescriptions (Schmitt and Schulze, 2011; Rogall, 2008; Boecher and Toeller, 2007; Costanza et al., 2001; Michaelis, 1996). Economic instruments, in contrast, aim to influence the behaviour of individuals indirectly, by changing their decision making based on economic grounds (Rogall, 2008; Michaelis, 1996). Next to taxes and tariffs, positive financial incentives paid to land users and or land owners have become a central policy instrument. The fundamental assumption underlying most of these economic instruments is that neither the degradation nor the provisioning of ES changes is accounted for in markets, resulting in the problem of externalities. Externalities occur when one person's behaviour affects the well-being of another person and the relevant costs or benefits are not reflected in market prices. Consequently, externalities are one cause of market failure, which in turn is a situation where markets alone fail to provide for an efficient allocation of resources (Rogall, 2008; Mankiw, 2009, Costanza et al., 2001). In the case of positive financial incentive instruments, the externality becomes internalized by paying land users or land owners for the provision of the ES (de Groot et al., 2010, Engel et al., 2008). At an international level, these positive financial incentives are discussed as payments for ecosystem services (PES), which "work by changing incentives rather than by making explicit rules or directives" (Jack et al., 2008: 9466). PES are considered as one option to affect the drivers of ecosystem change, and in particular the direct drivers (Corbera, 2011).

1.2 Defining Payments for Ecosystem Services

PES appear to be a multi-faceted term, with different conservation approaches being bundled and co-existing under this concept. A seminal definition has been proposed by Wunder (2005: 3), defining PES as "(1.) a voluntary transaction where (2.) a well-defined ES (or a land-use likely to secure that service) (3.) is being 'bought' by a (minimum one) ES buyer (4.) from a (minimum one) ES provider (5.) if and only if the ES provider secures ES provision (conditionality)". Wunder emphasized that the "core idea of PES is that external ES beneficiaries make direct, contractual and conditional payments to local landholders and users in return for adopting practices that secure ecosystem conservation and restoration" (Wunder, 2005: 1); thus, he explicitly refers to privately negotiated PES deals between affected individuals (including affected economic actors). The idea behind this concept is simple and rooted in the understanding that most ES exhibit the characteristics of public goods (Jenkins et al., 2010), resulting in the above mentioned problem of externalities (Rogall, 2008, Costanza et al., 2001). In the context of environmental degradation (or degradation of ecosystems) and the proceeding loss of ES, the PES logic as defined by Wunder (2005) is grounded in the Coase Theorem (Mauerhofer et al., 2013; Engel et al., 2008). The Coase Theorem, put forward by economist Ronald Coase (1960) suggests that private economic actors can solve the problem of externalities among themselves. Whatever the initial distribution of rights, markets will always solve the problem of externalities and allocate resources efficiently if private parties can bargain without costs over the allocation of resources (Mankiw, 2009). No gov-

ernmental intervention is needed to obtain an optimal allocation of resources. In the PES literature, these private deals between affected parties are therefore frequently referred to as the “Coasean market solution” (c.f. Vatn, 2010) or Coasean PES.

The PES definition and conceptualization of Wunder has, however, been criticized for being too narrow and prescriptive and thus for excluding many PES that rely on different (economic) principles (Muradian et al., 2010; Kosoy and Corbera, 2010). Many PES cases involve considerable governmental intervention; examples include tradable permits, compensation payments for legal restrictions, or governmental PES programs, such as the agri-environmental programs and measures (AEMs) in the European Union (EU) (Matzdorf et al., 2014; Matzdorf et al., 2013; Vatn, 2010; Jack et al., 2008). The AEMs and the payment programs of the Farm Bill of the United States are the largest PES programs in the world (Scherr et al., 2007). However, in practice many PES do not pay for the provision of a clearly defined ES – unless the ES is the rationale for the payment from the (theoretic) PES perspective. Rather, payments are often linked to a certain land use practice that is considered to provide a certain ES. In many cases payments do not even consider clearly defined ES but rather rest upon the delivery of certain – often even undefined – environmental benefits or landscape management practices. Consequentially, other – commonly broader – PES definitions were proposed, which also include large-scale governmental programs that do not necessarily focus on a particular ES provision, but which rather consider the provision of positive external effects (public goods) in general. Jack et al. (2008: 9465) emphasized that “PES schemes rely on incentives to induce behavioural change and can thus be considered part of the broader class of incentive- or market-based mechanisms for environmental policy”. Muradian et al. (2010: 1205) define PES as “a transfer of resources between social actors, which aims to create incentives to align individual and/ or collective land use decisions with the social interest in the management of natural resources” – and have thus a very broad understanding of PES. Corbera et al. (2009: 745), who define PES as “new institutions designed to enhance or change natural resource managers’ behavior in relation to ecosystem management through the provision of economic incentives”. This broader perspective on PES is adopted within this dissertation. This definition allows including governmental PES programs that use economic incentives to influence the decision making of land users and land owners, such as the AEMs of the EU.

1.3 Performance Parameters of Payments for Ecosystem Services

Performance parameters of PES that are frequently emphasised and discussed in the literature can be divided into three broad categories, namely (1) cost-effectiveness of PES, (2) environmental effectiveness of PES, and (3) equity considerations of PES (Jack et al., 2008, Corbera et al., 2007).

Cost-effectiveness is the extent to which a PES has achieved a given outcome at lower costs compared with alternatives. “An assessment of cost-effectiveness takes the benefits arising from the activities [...] as given and asks whether these could have

been produced at lower cost compared with alternatives” (IEG, 2007: 65). The cost-effectiveness of PES is heavily influenced by transaction costs (TCs). “To be cost-effective, a policy must achieve the same level of environmental benefits at a lower cost than other possible policies. The costs of a PES scheme, from a social perspective, include not only direct implementation costs, but also the transaction costs of the program [...]” (Jack et al., 2008: 9466). Closely related to the concept of cost-effectiveness is the concept of efficiency. Whereas the concept of cost-effectiveness takes the outcome of a PES as fixed, the concept of efficiency considers these as being variable. “Efficiency is the extent to which the program has converted or is expected to convert its resources/inputs [...] economically into results in order to achieve the maximum possible outputs, outcomes, and impacts with the minimum possible inputs. [...] An assessment of efficiency relates the results of a program to its costs” (IEG, 2007: 65).

Environmental effectiveness commonly means efficacy and refers to the degree to which the intended ecological aim of a PES has actually been achieved, i.e. the degree to which environmental benefits have been provided.

Equity focuses on just and sustainable outcomes. Yet there is no clear-cut definition on equity (McDermott et al., 2013). Frequently concepts such as justice, fairness or equality are used almost interchangeably (Brown and Corbera, 2003, Pascual et al., 2010).

The degree to which any of these PES performance aspects are achieved “depend on the design characteristic of a PES scheme and the context in which it is implemented. Variations in the structure of PES schemes include the form of the incentive payment, which services are provided, who the providers are, who the implementers and intermediaries are, whether incentives are given to individuals or communities, the eligibility rules for participation, and how the payments are funded.” (Jack et al., 2008: 9466). In this context, especially large-scale governmental PES programs are frequently criticized for low levels of cost-effectiveness and environmental effectiveness (Uthes and Matzdorf, 2013; Mettepenningen et al., 2011; 2013; Kleijn and Sutherland, 2003; Hanley et al., 1999). The low environmental effectiveness of governmental payments becomes in particular an issue if contrasted with the more direct user-financed private PES deals (Engel et al., 2008, Matzdorf et al., 2013). Low levels of cost-effectiveness are influenced by high TCs (Vatn, 2001). Questions on how to improve the performance of the mentioned PES aspects have captured the interest of science recently. It appears that cost-effectiveness and environmental effectiveness of PES can be influenced – both, positively and/or negatively – through a variety of factors. Within the international PES discourse, the diverse factors are analysed through different perspectives, including miscellaneous contract design characteristics e.g. input vs. output oriented payment schemes and/or spatial targeting of PES (Uthes et al., 2010; Zabel and Roe, 2009; Haaren and Bathke, 2008); auctions (Rolfe and Windle, 2011; Baylis et al., 2008; Bertke et al., 2008; Pascal and Perrings, 2007); targeting of single ES vs. focusing on biodiversity (Galler et al., 2015), institutional structure analysis or governance structure analysis (Wunder et al., 2008).

1.4 Intermediaries within Payments for Ecosystem Services

The performance of PES is also influenced through the involvement of the diverse actors within the PES facilitating governance structure. Commonly, the facilitation and implementation of PES is based upon the interaction of many actors (Corbera et al., 2009, Wunder et al., 2008). The diverse actors within the PES governance structure have different roles and responsibilities, including buyers or financiers of the ES, sellers or providers of the ES, diverse governmental and non-governmental bodies at different levels to shape the institutional environment within which the PES takes place, actors developing and designing the PES program or scheme, intermediaries providing information, advice and assistance on the schemes and implementation and so on (Schroeter et al., 2015, Carius, 2012). Recently, one particular actor has captured the interest of research – namely the intermediary. Intermediaries are those “actors who take on roles that connect and facilitate transactions between buyers and sellers” (Huber-Stearns et al., 2013: 105), i.e. actors who mediate the exchange between the ES buyers and ES sellers (Matzdorf et al., 2014). Intermediaries can stem from civil society (either individuals or non-governmental organisations), social entrepreneurs, for-profit actors, governmental organizations, or organizations operating between policy and science (cf. Matzdorf et al., 2014). Intermediaries can adopt various roles and responsibilities within PES programs. In general, there is the recognition that intermediaries are “key in understanding the performance of PES. [...] The use of] intermediary agents to steer the transfer of resources between buyers and providers is [...] an important subject for research which has not yet been sufficiently addressed in the literature” (Muradian et al., 2010: 1205). In particular, there is a knowledge gap with respect to how intermediaries can influence the performance of PES such as the cost-effectiveness and environmental effectiveness of PES (Jack et al., 2010). For example, it is likely that large-scale PES programs, which are designed and developed at a centralized level will benefit from intermediary involvement at the local level. Thus, “centralized decision makers inevitably lack the knowledge of local circumstances that would be required to make the best decisions, limiting opportunities for micro-flexibility” (Farley et al., 2010). Intermediaries who are organised and committed at the local level with personal local ties might help to overcome this problem of distance in diverse regards (cf. Matzdorf et al., 2014). However, so far there have hardly been any empirical findings on the involvement and influence of intermediaries within such PES deals. This research gap is also one the starting point for the dissertation at hand.

1.5 Research Objectives and Research Approach

The thesis aims to provide findings on two research gaps, i.e. the research objective of this thesis is principally twofold. Figure 1 displays how the research objectives are tackled within five individual but consecutively written peer-reviewed papers.

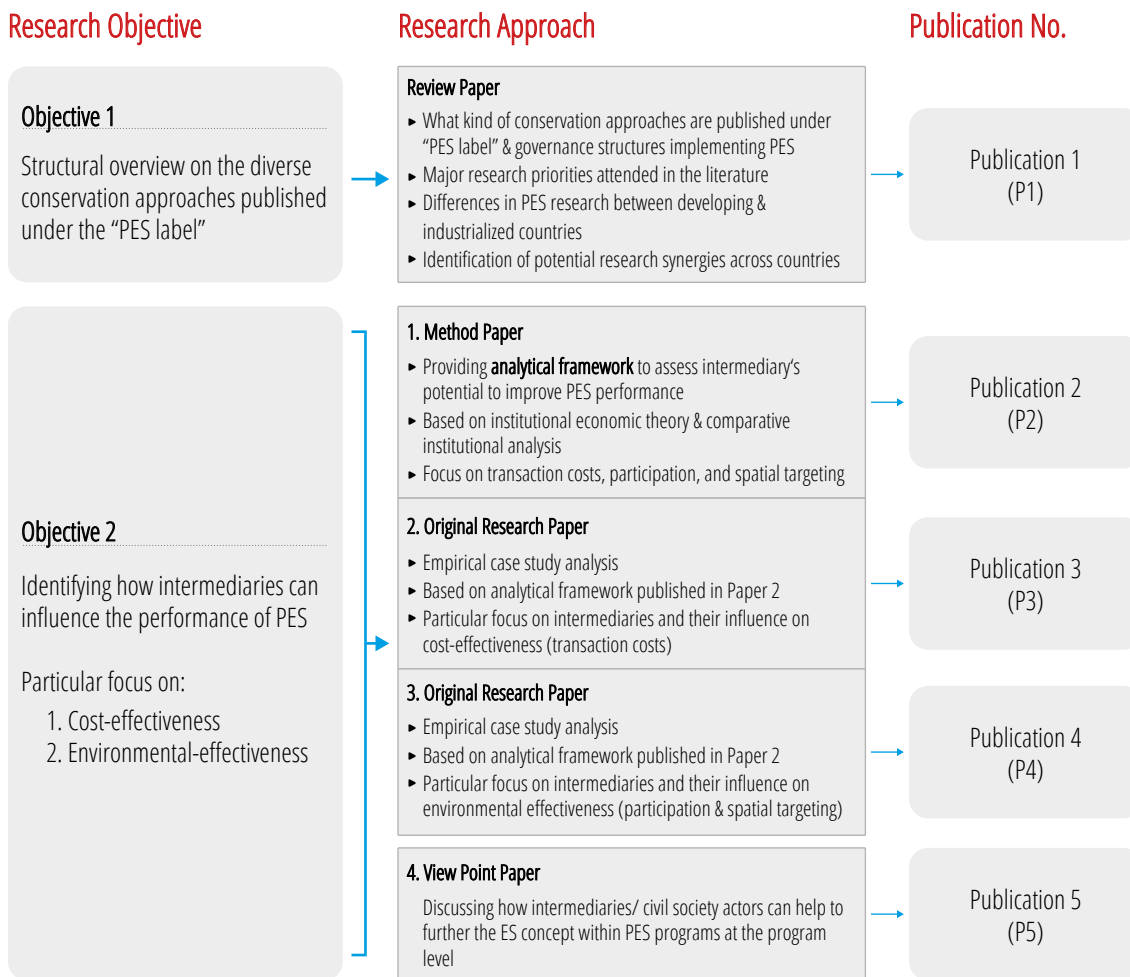


Figure 1: Paper contributions to research objectives.

Firstly, and in particular when starting with this dissertation, many different PES cases had been published and discussed under the PES terminology. The above mentioned heterogeneity in PES definitions led to the subdivision of 'genuine PES' and 'PES-like' approaches in the literature (cf. Muradian et al., 2010; Vatn, 2010). PES appeared to be a conglomeration of diverse nature conservation approaches. However, a clear overview on what kind of conservation approaches are being published under the 'PES-label' had been missing. The thesis aims at closing this research gap by providing a structured overview on the broad PES discourse with review-paper (P1). The reference material of the review paper covers 457 articles that had been obtained through a structured literature search from the "ISI web of knowledge" database in May 2011. The review paper analyses empirically what kind of conservation approaches are published under the PES terminology, what kind of governance structures implement these conservation approaches, and which research foci and priorities exist with respect to PES. In addition, the review paper looks if there is a difference between PES labelled incentive programs in developing countries and in industrialized countries.

Second, the thesis contributes to gaining a better understanding on how intermediaries can influence the performance of PES. The thesis helps to close this research gap as it provides insights on how intermediaries can influence the cost-effectiveness and environmental effectiveness of PES at the theoretical and empirical level.

To provide findings on the second research gap I particularly address the two broad research questions:

- 1) How can intermediaries influence the cost-effectiveness of public PES programs?
- 2) How can intermediaries influence the environmental effectiveness of public PES programs?

These two research questions are tackled in particular in publications P2, P3 and P4. To analyse if and how intermediaries can influence these two performance parameters, I developed and applied an analytical framework. The analytical framework is published in publication P2 and has been based on the understanding that there is plenty of literature (1) on TCs in the context of PES and PES implementation, (2) on factors influencing farmers' participation in PES, and (3) on the importance of spatial targeting of PES on the one hand, while there is insufficient knowledge on how intermediary actors within PES implementing governance structures can influence these factors, on the other hand. The framework adds to the literature by bringing these aspects together. The framework is based on institutional economic theory and the idea of comparative institutional analysis. So far, institutional economic theory has mainly been applied to analyse how e.g. diverse rules or institutional structures influence the performance of PES. Applying institutional economic theory to analyse the involvement of intermediaries and their influence on PES performance has not been done so far and represents thus a new approach within the broad PES discourse. The institutional economic approach is suitable to analyse the various roles and responsibilities of the many and diverse actors that are involved within PES governance structures and how they can influence the performance of PES.

The influence of intermediaries on the performance of PES is then analysed empirically as a case study analysis. The chosen case study considers a governmental PES governance structure – namely the agri-environmental measures (AEMs) in Germany. Agricultural lands are highly important areas for the maintenance and generation of biodiversity and ES beyond the production of marketable provisioning services such as food, feed, fuel, and fibre. AEMs are in general a central policy instrument to foster the provision of public environmental benefits in terms of ES and biodiversity (Naturkapital Deutschland – TEEB DE (2016)). Considerable public funds are allocated to these programs, not least as there is an increasing need to preserve and enhance the ecosystems and their respective ES and biodiversity. In Europe, the Pillar 2 of the Common Agricultural Policy (CAP) which finances among others also AEMs, is equipped with approximately 95.6 billion Euros for the period 2014-2020 (European Commission, 2013). Consequentially, considering and analysing how the implementation of these public PES programs can be supported and enhanced is very important and topical. It is of societal interest, that the public money is spent as effective and efficient as possi-

ble. Deficiencies in the current implementation of PES offer the potential to improve the performance of PES. These large-scale governmental programs are designed at a centralized level and involve a certain degree of bureaucracy. The individual PES measures are commonly neither adapted to the very local conditions, nor do the centrally-organized decision-makers know the exact social, economic, and environmental conditions and circumstances. A locally operating intermediary has been hypothesized to improve the performance of such governmental PES, not least as they might alleviate diverse challenges arising with distance. I therefore chose the German Landcare Associations (LCAs) as an exemplary intermediary to assess the influence of intermediaries on cost-effectiveness and environmental effectiveness. LCAs are locally organised groups focusing on nature conservation activities. Based on the analytical framework developed in P2, I assess empirically how the intermediary influences the cost-effectiveness (in particular publication P3, but also publication P4) and environmental effectiveness of PES (in particular publication P4, but also publication P3). The results of the papers P3 and P4 emphasize which PES facilitation transactions can be improved by incorporating a non-governmental intermediary within the governance structure.

In addition, publication P5 adds as a view point paper and emphasizes why and how civil society actors can help to further the ES concept within public PES programs. It sheds a broader perspective on what non-governmental intermediaries can add to public PES programs and their respective governance structures. The paper discusses at the program level how civil society actors can help to further the ES concept within PES programs.

This framework text provides the linking element between the individual papers and helps to discuss the accumulated results of the separate papers together and to derive overall policy recommendations. Therefore, the framework text is organized as follows:

Section two gives a brief excursion to the fundamentals of the institutional economic schools and their respective theories. Providing an understanding of these theories is important, as it explains what the adoption of the institutional economics lenses can add to the research on intermediaries within PES deals. Section two also explains the concept of comparative institutional analysis. Section three explains how the separate research aims are tackled. Within section three I explain in detail how the theoretical institutional economic concepts (as outlined in chapter two) are applied within this dissertation. I.e. I highlight and explain how the concepts relate to intermediary involvement in PES implementation and PES performance. Section four displays the individual peer reviewed publications. Section five discusses the synthesized results of the individual papers, whereas section six provides a short conclusion on the main findings.

2 Background: The Institutional Economic Approach to PES

As mentioned, the theoretical background of this thesis is based substantially on institutional economics. The institutional economic approach to PES focuses on governance structures and the various separate components that together resemble the governance structure. In this regard, the diverse PES programs and schemes can be classified according to the PES facilitating governance structure (cf. Matzdorf et al., 2013). This institutional economic approach helps for instance to categorize the various rules underlying the diverse PES contracts, helps to compare distinct institutional structures and/or governance structures according to certain criterions with each other, or – and being most importantly for this thesis – it helps to analyse the separate roles, responsibilities and influences of the many and diverse actors involved in PES facilitation. The institutional economic perspective thus aids to elaborate on how intermediaries can influence the performance of PES. In the following, I therefore highlight the diverse institutional economic concepts, definitions and theories that are relevant for this dissertation. Most of these concepts are highly complex, involve a considerable degree of abstraction and theoretical fundamentals, and many scholars even use the terminology ambiguously. Correspondingly, within the broad field of institutional economic theory, there are no universally accepted and adopted definitions for the concepts of “institutions”, “institutional structure” and “governance structure”. Rather, different institutional economists appear to define these concepts diversely or even contradictory. Sometimes authors adapt and change their own definitions over time (as they most likely gain a better understanding on this issue with the accumulation of more knowledge and discussions over time). To overcome this difficulty, a consistent definition of the terms and institutional economic concepts used and applied in this thesis is elaborated in the following subchapter:

2.1 Institutions, Institutional Structures and Governance Structures

Oscar Williamson – an institutional economist awarded with the Nobel Memorial Prize in Economics for his analysis of economic governance – uses the term governance structure to refer to the alternative modes that an economic corporation can adopt for managing and facilitating transactions. He emphasizes that the “economics of governance makes three basic governance structure distinctions: classical markets

(simple spot-market exchange), hybrid contracting (of a long-term kind), and hierarchies (firms, bureaus)” (Williamson, 2005: 7, cf. also Williamson 2010). In the context of natural resources governance, the institutional economist Arild Vatn adopted a comparable perspective and emphasized that there are “three main types of governance structures: a) hierarchies, b) markets, and c) community management” (2010: 1246), whereas hybrid governance structures exist as mixed forms between these ideal types. In later articles, Vatn (2015 cf. also Vatn and Vedeld 2011 and 2013) defined governance structures more precisely, furthermore his later definition separates for the concepts of (i) institutional structure and (ii) governance structure. In addition, community management was specified as being community cooperation. The institutional structures facilitate human coordination - again being market or market-based economic instruments (facilitating voluntary transaction), hierarchy (as a system of command, imposed e.g. by governments), or community cooperation. The governance structures in contrast are broader than institutional structures and consist of two elements, namely “[1] the type of actors involved, characterized by their goals/ motivations, capacities, rights and liabilities; [2] The institutional structures facilitating the interaction between the actors” (Vatn, 2015: 275). The definition of institutions, institutional structure and governance structure as adopted within this dissertation rests considerably on this definition of Vatn. Within this framework text, I amended the Vatn definition and I define these institutional economic concepts in the following ways:

2.1.1 Institutions

Institutions are defined in accordance with Vatn (2010) and Corbera et al. (2009). Institutions are “solutions to collective choice problems” (Vatn, 2010: 1245). They are the “formal and informal rules which regulate what to do and not to do in a given situation” (Corbera et al., 2009: 745). Thus, on the one hand, institutions can be depicted as the PES contract itself - in terms of being “new institutions designed to enhance or change natural resource managers’ behaviour in relation to ecosystem management through the provision of economic incentives” (Corbera et al., 2009: 745). Institutions are e.g. the contractual design characteristics – i.e., the rules underlying the payment as defined in the contract. On the other hand, however, the concept of institutions also includes the norms and informal rules which are not formally defined in a contract or law – but which are commonly adhered to by society (Vatn, 2005). This way, institutions are also the social conventions or informal norms that are present in societies and which are underlying any (economic) activity.

2.1.2 Institutional Structure

The institutional structure is the structure that facilitates the transactions. Thus, I use the concept of institutional structure to refer to what Williamson calls governance structure. Hence, the institutional structure determines whether the maintenance and preservation of ecosystems and their respective ES including biodiversity is facilitated by the market (through e.g. a payment), by hierarchy (command and control), by cooperation or by some hybrid form. In the case of hierarchy (i.e. governmental command

systems) the payment of the PES contract is then only a “carrot” to stick to the rules, to accept the legal regulation imposed and to compensate for any incurred losses due to land use changes imposed by the regulation.

2.1.3 Governance Structure

As emphasized, the definition of governance structures put forward in this framework text borrows substantially from Vatn (2015) and Vatn and Vedeld (2013, 2015) and the respective definitions as cited above in section 2.1. I amend the Vatn definition on governance structures, mostly to become more precise on how governance structures relate to the concepts of institutions and institutional structure. I define governance structures to be consisting of (1) the various actors involved, characterized by their diverse motives, roles, responsibilities, capacities and competencies, rights and constraints¹, (2) the institutions in place, i.e. the formal and informal conventions, norms, and rules such as the PES contract and its respective contract design characteristics, and (3) the institutional structure (market, hierarchy, cooperation or some hybrid form) that facilitates the transaction as defined in the contract between the diverse actors involved.

This definition is put forward as it appears to be most adequate to separate and analyse individually how PES performance is related to the role, responsibility and influence of the various involved actors on the performance of PES.

2.1.4 Classification of Payments for Ecosystem Services Governance Structures

Analysing the performance of PES from an institutional economic perspective involves looking at how institutions, institutional structures and/or the various involved actors can facilitate the entire transaction process and investigating how certain items (including the diverse actors) of the governance structure impact on the PES performance criteria. It is therefore important to be precise on the considered governance structure. A classification of different PES governance structures has been brought forward by Matzdorf et al. (2013). This classification helps to briefly illustrate the governance structure that is analysed within this dissertation, as depicted in Figure 2. The classification rests upon the market-based and hierarchy-based institutional structures. Broadly four distinct PES governance structures can be differentiated for, namely the Coasean-based PES governance structure, the Pigouvian-based PES governance structures, PES as compliance payments, and PES as compensation payments (Figure 2). These governance structures differ with respect to the roles and responsibilities of the involved actors and the underlying institutional structure. In this regard, PES can be differentiated for resting on (1) a market-based institutional structure in the sense that government does not intervene legislatively in either ES demand or ES supply, and (2) PES that rather rest on hierarchical institutional structures, i.e. PES that are based on government intervening legislatively in either ES demand or supply. Thus,

¹ Constraints is analogous to responsibilities and competencies and refers to what particular actors cannot do. A non-governmental intermediary, for instance, cannot perform any tasks that rest upon sovereign powers.

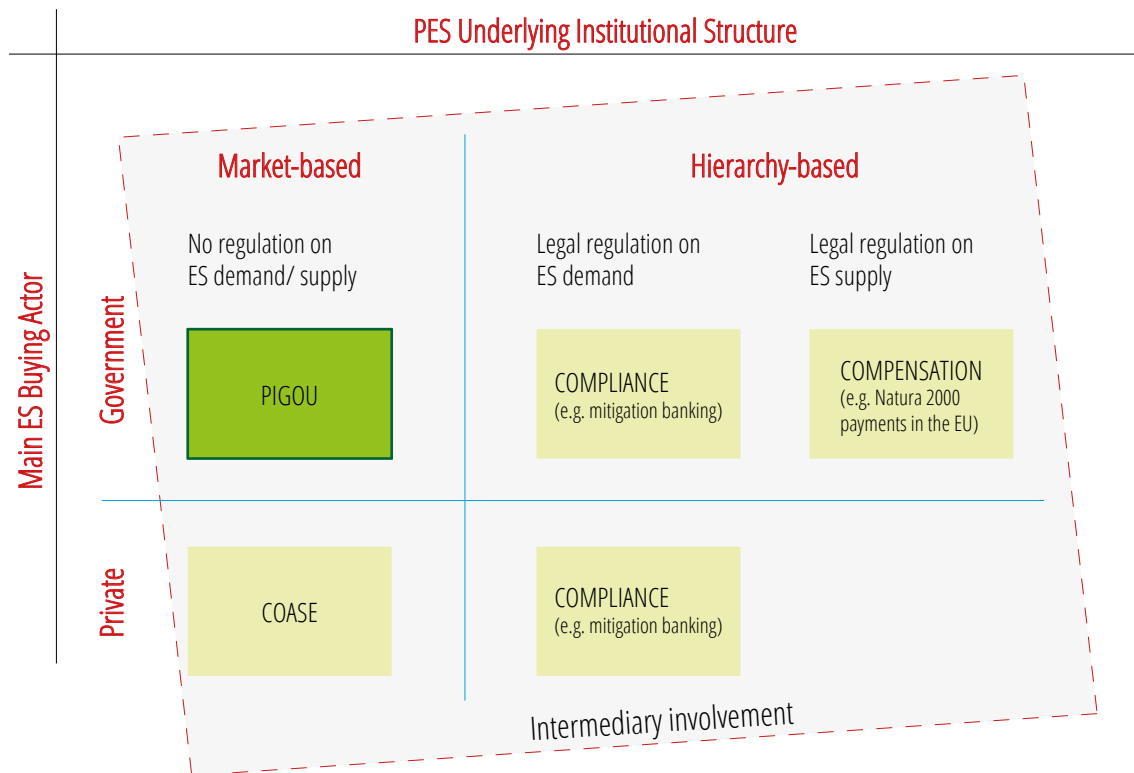


Figure 2: Typology of PES governance structures, based on Matzdorf et al., 2013.

hierarchy-based payments are included in the visualization of common PES governance structures, as regulatory law either enforces ES buyers to make payments for the provision of ES – as in the case of the compliance payments; or payments go along with legal obligations forcing land users to provide ES – as in the case of compensation payments.

The vertical axis in Figure 2 displays the main ES buying actors (or financiers): These are commonly either governmental actors or private (non-governmental) actors. However, as emphasized, PES governance structures can – and often do – consist of more actors than the main ES buying and selling actors. Intermediaries are often present to ensure a smooth transfer of resources, interaction, and cooperation between the contracting actors. Within Figure 2, I depicted intermediary involvement as a structure that underlies and supports the market-based or hierarchy-based institutional structures of PES. Intermediaries can support the implementation of PES. The dotted lines of the grey square in Figure 2 furthermore indicate that intermediary involvement can happen, however must not happen.

The dissertation at hand focuses on those PES schemes where government is not involved legislatively – hence on those PES that adopt market-based payment approaches. Furthermore, the focus is on those PES governance structures where government represents the main ES buying actor. This governance structure is depicted in the upper left quadrant of Figure 2, which is the Pigouvian approach to PES. The respective governance structure is depicted in a darker green colour in the Figure 2. To avoid any confusion, market-based payment approach does not mean that the price level

paid for the provision of ES is set by negotiations in a market place. Rather, the price level is mostly fixed by the diverse governmental PES programs and schemes. The term market-based rather refers to the fact that the adoption of these PES programs is voluntary and that the payments for ES provision do compete (at least to a certain extent) with the land user's opportunity costs. Hence, it is to a certain degree a market-based decision whether a PES contract is signed or not.

As emphasized before, the focus of analysis rests, however, not on the main buyer or financier of the ES, but rather on an intermediary helping with the facilitation of the PES, i.e. the intermediary involvement that supports the respective institutional structure (cf. the light grey square in Figure 2). In line with the institutional economic theories, intermediaries can influence the cost-effectiveness and environmental effectiveness of PES by reducing the public and private TCs of PES implementation as well as improving the spatial targeting and adoption of PES measures. I will therefore briefly outline the two major institutional economic schools and their respective view on the roles of institutions for the facilitation of transactions.

2.2 The Classical and the New Institutional Economics

The theories and approaches covered within institutional economics are commonly differentiated for and separated into the two fields of 1) the 'Old' or 'Classical' Institutional Economic theory (CIE), and 2) the New Institutional Economic theory (NIE). These two approaches differ mainly in how they perceive the purpose and role of institutions, institutional structure, and governance structure. Both theories are briefly summarized in the following two sub-sections:

2.2.1 The Classical Institutional Economists

The 'old' or 'classical' institutionalists emerged in the late 19th and early 20th century. The main foundation for the classical institutional economics was laid by Thorstein Veblen and John R. Commons, who criticized the prevailing neoclassical core of economics (Vatn, 2017, Buchholz, 2007). The core of the neoclassical economic model – as developed from the 1870s onwards – is based mainly on the concept of (i) rational choice as maximizing individual utility, in accordance with (ii) stable or at least given preferences – being the essence of self-contained individualism. Choices are rational if preferences are rational and choices are based on what is preferred most by an income-constrained individual in order to maximize own utility. This is the concept of the 'homo oeconomicus', being humans acting as rational and narrowly self-interested individuals with the attempt to maximize own utility as a consumer and economic profits as a producer (Mankiw, 2009). The classical institutional economic approach opposes these two pillars of the neo-classical economic model, mainly because the neo-classical model rejects any rationalities or reasons for actions other than maximizing own individual utility. Furthermore, changes in preferences cannot be explained by the neo-classical model. Veblen therefore emphasized that economist should integrate

ideas and theories from sociologists, anthropologists, and psychologists in order to develop better theories matching and reflecting the real world. Veblen understood that people and their economic behaviour are embedded in institutions – being understood as the social conventions, formal and informal norms and sanctioned rules underlying any (economic) activity - and that therefore economics cannot be separated from the social science. The focus of the classical institutionalists as put forward by Veblen rests on how the institutional environments within which individuals live impact and shape their behaviour, i.e. the effect institutions have on forming individuals and their respective preferences. Accordingly, institutions do “not only define the social environment within which the individual is choosing. They also constitute the individuals themselves and their interest.” (Vatn, 2005: 61).

2.2.2 The New Institutional Economists

The New Institutional Economic (NIE) perspective in contrast emerged in the 1960s and 1970s. The NIE approach accepts the core of the neo-classical economic model (or at least does not challenge the core as the CIE do). The starting point is rather based on the standard application area of the neoclassical economic theory, that is: (i) no transaction costs and (ii) private property rights for all goods being exchanged in markets. A seminal work of Ronald Coase postulated that in world with (i) zero TCs and (ii) clearly defined, assigned, and enforceable property rights, bargaining and trade in a market economy will lead to an efficient allocation of resources. Given these two conditions, any external effects are internalized efficiently and trade will lead to an optimal allocation of resources – no governmental intervention is needed to overcome the problem of externalities (Williamson, 1985). As already described in section 1.2 of this framework text, this postulation became well-known as the Coase Theorem. The concept of TCs has been considered within economic theory only recently, therefore, fundamental insights have been worked out only recently (Wang, 2003) – in particular with regards to environmental policies (Garrick et al., 2013). However, the notion that firstly, TCs do exist and that these can be considerable, and secondly, that property rights are not always well-defined, assigned and/or enforceable led then to the formation of the NIE school. New institutionalists do consider institutions, which are defined as the “rules of the game in a society or, more formally, [...as] the humanly devised constraints that shape human interaction” (North, 1990: 477). NIE consider institutions mainly as a driver to reduce the costs of exchange – which are the TCs or the “costs of running the economic system” (Arrow, 1969: 1). The focus of the NIE thus rests on the efficiency criterion, often expressed in cost-effectiveness. The major role of institutions is to establish a stable and functional structure to facilitate human interaction and economic transactions. If the transfer or exchange of resources is costly, then the issue for NIE became which institutional structure can provide exchange at the lowest (transaction) costs. TCs arise on behalf of all parties who are involved in the context of natural resource governance. Commonly they are differentiated for private TCs (TCs arising on behalf of private actors) and public TCs (arising on behalf of public actors). Dahlman (1979) established a functional taxonomy of TCs, differentiating for (1) search and information

gathering activities, (2) bargaining and decision-taking activities, and (3) policing and enforcement activities. However, Dahlman (1979: 147) emphasizes that there is only one type of TCs, namely “resource losses incurred due to imperfect information”. By citing Coase, Dahlman reasons that “in order to carry out a market transaction it is necessary to discover who it is that one wishes to deal with, to inform people that one wishes to deal and on what terms, to conduct negotiations leading up to a bargain, to draw up the contract, to undertake the inspection needed to make sure that the terms of the contract are being observed, and so on” (Dahlmann 1979:147, by citing Coase 1960).

In short, the major difference between the ‘old’ or ‘classical’ and the ‘new’ institutional economists rests on their respective critique towards the neo-classical economic model and on their approach towards the role of institutions. CIE challenge the core of the neoclassical economic model and emphasize the role of institutions in shaping the (economic) behaviour of individuals through the social capacities of institutions. The NIE challenge the application area of the neo-classical economic model and focus on institutions and institutional structure in order to reduce TCs. Whereas the “new institutional economics sees no relationship between institutions and the individual per se” (Vatn, 2005: 91), the “classic view stresses the role of the collective and the effects institutions have on forming the individual” (Vatn, 2005: 97).

2.2.3 The Comparative Institutional Analysis

However, the differences between these two institutional economic schools is not always as clear cut as outlined and some scholars integrate aspects of the CIE and the NIE in their theories and research. The most prominent example is most likely Oliver Williamson, who includes the concept of bounded rationality (opposing the core of neo-classical economics) and the acceptance of positive TCs (challenging the application area of neo-classical economics). Although Williamson’s transaction cost economics (TCE) is commonly attributed to the NIE school, he borrows at least some considerations from the CIE school. In accordance with the NIE school, Williamson’s theory is based on the findings of Coase (1937), emphasizing that the coordination of economic activity via the market incurs TCs. According to Coase’s influential article “The nature of the firm” (1937), the costs of transacting via the market can even exceed the benefits of transacting – i.e. the market fails in allocating resources efficiently – in the worst case no transacting occurs at all. As a consequence, other institutional structures² might occur to facilitate transactions more efficiently³. Williamson has advanced on Coase’s transaction cost approach and developed the “discriminating alignment” hypothesis, emphasizing that the institutional structure that facilitates transactions has to match the characteristics and attributes of the transaction so as to minimize TCs (Williamson, 1975, 1985, 1998). According to Williamson, the overall level of TCs is

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- 2 The concept of institutional structure is only vaguely defined within the broad field of institutional economics. Section 2.1 of the frame text highlights diverse definitions. Williamson rather uses the term governance structure to refer to the various contractual arrangements, and not institutional structure.
 - 3 Coase explains why firms rather produce in-house than purchase production inputs on the market.

influenced by four major groups of determinants, being (1) the behaviour of the involved actors, (2) the attributes of the transaction, (3) the governance structures, and (4) the institutional environment in which transaction takes place. These determinants are somehow interlinked with each other, in the sense that the governance structure or the institutional environments influence the behaviour of the involved actors. Comparative institutional analysis was brought forward to make recommendations about the design of institutional structure and the most adequate modes of governance, where “classical market contracting is located on the one extreme, centralized hierarchical organization is located on the other; and mixed modes of firm and market organization are located between” (Williamson 1985: 41ff). Accordingly, governance structures, institutional structures, and their institutions need to be designed in such a way that they allow economizing on TCs.

The operationalization of TCs is a challenging task. Even though many authors manage to assess TCs quantitatively, commonly these numbers have to be interpreted with considerable caution and are frequently considered as rather being rough estimates than reliable numbers (Monsees, 2008). In the context of comparative institutional analysis, however, the problem of measuring TCs is overcome as there is no need to directly measure and quantify TCs. For a comparative institutional analysis it is sufficient to identify for relative differences in TCs between alternative governance structures, i.e. which governance structure causes relatively lower levels of TCs. Hence, as in the research tradition of Williamson’s transaction cost economic theory (Williamson 1975, 1985, 1996, 1998), „transaction costs provide the key to understanding alternative forms of economic organization and contractual agreement. What is important is the cost of conducting transactions in one organization or contractual form relative to others.” (Wang, 2003: 4).

3 Operationalization of Research Objectives

3.1 The Application of Institutional Economic Theory and Comparative Institutional Analysis

Assessing how intermediaries can influence the performance of public PES rests substantially on institutional economic theory and on the idea of comparative institutional analysis, as described in chapter 2 of this framework text. As mentioned, comparative institutional analysis literally involves a comparison. The act of comparing requires in a first step the definition of certain criteria, characteristics and attributes, which are then – in a second step – compared, differentiated or classified against each other (Monsees, 2008). In the context of this thesis, the act of comparing is done implicitly. This means that I look at how and why the involvement of an intermediary within a given governmental governance structure can influence the performance of PES. Thus, within this thesis the unit of analysis is not the institutional structure (as it is in Williamson’s comparative institutional analysis on TCs). I.e., I do not compare for instance a market-based PES approach with a hierarchy-based PES approach and assess the respective influence on PES performance. Rather, the unit of analysis is the intermediary within given governance and institutional structures and his respective influence on PES performance. Assessing the performance of an intermediary thus requires the comparison of a governance structure without intermediary against the almost same or comparable governance structure with the intermediary. The two governance structures can be depicted as below in Figure 3. Whereas the “GS with intermediary” is the unit of analysis, the “GS without intermediary” is the implicit or indirect benchmark or reference. Implicit or indirect benchmark or reference, as I do not directly compare these two different governance structures, but as I rather elaborate directly on the intermediary and on how he or she can influence the performance of PES within the given governance structure. The idea is to assess the characteristics and qualifications as well as roles and responsibilities an intermediary needs to exhibit to influence the performance of PES. The performance of PES refers to the cost-effectiveness and environmental effectiveness of PES:



Figure 3: Governance structure with and without intermediary.

3.1.1 Determinants of Cost-effectiveness

As emphasized in Section 1.3 of this framework text, cost-effectiveness considers whether given benefits of a PES are provided at lowest costs. Within this dissertation, cost-effectiveness is assessed through the concept of TCs. The concept of TCs has been described briefly in chapter 2.2.2 of this framework text. I consider TCs to be variable. The overall level of public and private TCs within PES is influenced through a broad set of factors or determinants. Again, these factors have been identified through a literature review and are summarised and discussed in detail in publication P2 and P3, but also in P4.

3.1.2 Determinants of Environmental Effectiveness

I consider that the environmental effectiveness of PES is influenced firstly through appropriate participation on behalf of land users (cf. also Mettepenningen et al., 2013, Prager and Posthumus, 2010; Ducos et al., 2009; Defrancesco et al., 2008). This is a very facile finding, however it is nevertheless a very basic requirement for any PES program or scheme. PES “measures may have a high efficiency regarding ecological goals but if farmers are not willing to adopt the prescribed measures there will be no impact. A similar effect can be expected if farmers enrol but do not implement measures in an appropriate way” (Prager and Freese, 2009: 1155).

Environmental effectiveness of PES is secondly influenced through a spatial targeting of measures. Spatial targeting improves environmental effectiveness if it helps to bring conservation efforts to the most relevant areas, and if the most relevant conservation approaches for a particular area are targeted to that region (Wünscher et al., 2008; Van der Horst, 2007).

Whether both, appropriate participation and spatial targeting (can) take place is influenced through various factors. These factors have been identified through a literature review and are summarised in detail in publication P2 of this dissertation. How intermediaries can influence these factors is elaborated in publication P2 mostly at the theoretical level, and in publications P3 and P4 with empirical data.

As in the research tradition of comparative institutional analysis, the influence of intermediaries on environmental effectiveness and cost-effectiveness is not assessed in absolute numbers (i.e., not quantitatively). Rather, I analyse whether intermediary involvement helps to increase cost-effectiveness and environmental effectiveness of PES implementation as compared to PES implementation without intermediaries. I.e. I look if intermediary involvement leads to relatively lower levels of TCs and/ or relatively higher levels of environmental effectiveness. The word relatively implies that I implic-

itly compare the effect of intermediary involvement to a governance structure without intermediary involvement. Intermediaries are considered to influence certain factors (determinants), which in turn influence the cost-effectiveness (via public and private TCs) and the environmental effectiveness (via participation and targeting) of PES. The determinants of cost-effectiveness and environmental effectiveness that can be influenced by an intermediary have been reviewed in publication P2.

3.1.3 Application of Institutional Economics

Based on the institutional economic theory and the idea of comparative institutional analysis, I elaborate and assess the respective characteristics and qualifications that an intermediary should exhibit to influence the determinants of cost-effectiveness and environmental effectiveness and thus the performance of governmental PES. The theories of the NIE and CIE help to analyse which roles and responsibilities an intermediary should adopt and which characteristics and qualities an intermediary should bring along to improve the performance of PES.

Both institutional economic theories, the CIE and the NIE, are considered in the analysis and discussion on intermediaries and their influence on cost-effectiveness and environmental effectiveness in a governmental PES program in Germany (cf. publication P2).

Regarding the influence of an intermediary to improving the cost-effectiveness of PES, it is mainly the concepts of the NIE theory with its explicit focus on TCs that has been adopted. In particular, the transaction cost theory as put forward by Williamson has been used in this dissertation. As explained above, the concept has been used to assess the influence of intermediaries on certain determinants of public and private TCs. I.e., the concepts of the NIE are used to analyse the intermediary as a means to reduce TCs. I consider that the intermediary can impact on the various determinants of TCs (cf. in particular publication P2 and P3, but also P4).

Furthermore, the concepts of the CIE are useful to elaborate on an intermediaries potential to shape the social environment within which PES are transacted. The idea is that individuals who are involved in PES governance structures – and in particular ES providers (land users) – exhibit certain preferences, in this regard preferences towards nature conservation and PES adoption. Even though income derived from land use practices is a very important (if not the central) component determining which land use practices are employed, other rationalities are assumed to co-exist. These rationalities can be influenced by the social environment within which individuals are behaving. Preferences are a central element determining land users decisions towards the adoption of PES. Intermediaries within governmental PES governance structures are considered to shape or influence this social environment and hence the preferences of land users towards nature conservation and PES and also the adoption of PES (cf. publications P2 and P4).

3.2 Case Study Approach

To gain a better understanding on the involvement of an intermediary supporting the facilitation of governmental PES, the research involves a case study approach. Within the case study I look at the German Landcare Associations (LCAs) and the implementation of AEMs in Germany.

LCAs are locally based groups that are led by professional field managers. LCAs commonly focus on a diverse set of activities fostering species and habitat protection, conservation of agricultural lands, and are frequently involved in areas where conflict occurs, such as the implementation of the Water Framework Directive of Natura 2000 management areas. LCAs often provide a collaborative approach towards the implementation of nature conservation measures and have good access to local farmers. LCAs exhibit certain characteristics that are likely to influence the social environment within which farmers are operating and that help to influence the determinants of TCs of PES implementation.

In particular publication P2, but also paper P3 and P4 describe LCAs and their respective characteristics in detail.

4 Peer-reviewed Publications

4.1 Paper 1 (P1)

Schomers, S., Matzdorf, B., 2013. Payments for ecosystem services: A review and comparison of developing and industrialized countries. *Ecosystem Services* 6, 16-30.

2016 Impact Factor: 4.072; 5yr Impact Factor: 5.866

Citations as per 31 March 2018: Scopus: 131 citations; Google Scholar: 223 citations

4.2 Paper 2 (P2)

Schomers, S., Sattler, C., Matzdorf, B., 2015. An analytical framework for assessing the potential of intermediaries to improve the performance of payments for ecosystem services. *Land Use Policy* 42, 58-70.

2016 Impact Factor: 3.089; 5yr Impact Factor: 3.527

Citations as per 31 March 2018: Scopus: 13 citations; Google Scholar: 27 citations

4.3 Paper 3 (P3)

Schomers, S., Meyer, C., Matzdorf, B., Sattler, C. Facilitating governmental payments for ecosystem services through local intermediaries: An institutional analysis in Germany. (currently "under review" at Journal: *Environmental Policy and Governance*).

4.4 Paper 4 (P4)

Schomers, S., Matzdorf, B., Meyer, C., Sattler, C., 2015. How local intermediaries improve the effectiveness of public payments for ecosystem services programs: The role of networks and agri-environmental assistance. *Sustainability* 7, 13856-13886.

2016 Impact Factor: 1.789; 5yr Impact Factor: 1.850

Citations as per 31 March 2018: Scopus: 4 citations; Google Scholar: 9 citations

4.5 Paper 5 (P5)

Meyer, C., **Schomers, S.**, Matzdorf, B., Biedermann, C., Sattler, C., 2015. Civil society actors at the nexus of the ecosystem services concept and agri-environmental policy. *Land Use Policy*.

2016 Impact Factor: 3.089; 5yr Impact Factor: 3.527

Citations as per 31 March 2018: Scopus: 2 citations; Google Scholar: 4 citations



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Payments for ecosystem services: A review and comparison of developing and industrialized countries



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ABSTRACT

Payments for ecosystem services (PES) received a lot of academic attention in the past years. However, the concept remains loose and many different conservation approaches are published under the 'PES label'. We reviewed 457 articles obtained in a structured literature search in order to present an overview of the PES literature. This paper (1) illustrates the different analytical perspectives on PES concepts and types, (2) shows the geographic focus of PES research and (3) identifies the major foci of the overall PES research. The paper finally (4) identifies differences and similarities in conservation programs and main research topics between developing and industrialized countries to (5) disclose potentials for research synergies, should research experiences in the two types of countries be exchanged more deliberately. We demonstrate that only few publications describe Coasean PES approaches. The majority of research refers to national governmental payment programs. The overall design of national PES programs in Latin America resembles the design of those in the US and EU considerably. Programs in the US and EU have been in place longer than most of the frequently published Latin American schemes. However the former are hardly considered in the international PES literature as research is usually published under different terminologies.

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1. Introduction

In the Millennium Ecosystem Assessment (MEA) ecosystem services (ES) are broadly defined as “the benefits people obtain from ecosystems” (Millennium Ecosystem Assessment, 2005: V). Changes to ecosystems and degradation of ecosystem services are increasing at an alarming rate (Millennium Ecosystem Assessment, 2005). From an economic perspective, degradation occurs as many ES exhibit the characteristics of public goods, resulting in externalities. “As public goods, ecosystem services have been traditionally underprovided due to their lack of value in the marketplace” (Jenkins et al., 2010: 1060). Thus, society fails to establish institutions that internalize the value of services provided by intact ecosystems (Pattanayak et al., 2010). Payments for Ecosystem Services (PES) are discussed as a novel conservation approach and “probably the most promising innovation in conservation since Rio 1992” (Wunder and Wertz-Kanounnikoff, 2009: 576) as it attempts to overcome the problem of externalities (Engel et al., 2008). Van Hecken and Bastiaensen (2010a: 785) pointed out that the conceptual basis for PES can be found within neoclassical environmental economics, “where

environmental degradation is ascribed to the chronic failure of markets to internalize environmental externalities and to free-riding induced by the public-good nature of ecosystem services. Hence, the PES philosophy argues for the internalization of environmental externalities through the creation of markets and quasi-markets”. Private actors are assumed to “put in practice the Coase theorem” (Engel et al., 2008: 665), meaning that the problem of externalities can best be overcome through private negotiations between affected parties. I.e., beneficiaries of sound environmental practices providing and/or sustaining valuable ES pay land stewards for adopting land use practices that are assumed to provide the demanded and contracted ES. The payment is the carrot motivating land users to comply with environmentally sound land use practices.

In the last decade, both, the concept of ES and PES received more and more attention among scientists. The historical development of the ES concept and its incorporation into markets and payment schemes was depicted by Gomez-Baggethun et al. (2010). Jack et al. (2008) summarize literature on how the environmental socio-economic and political context influences the outcomes of PES schemes.

However, PES remains a multi-faceted term with many diverse definitions coexisting. A seminal definition is given by Wunder (2005: 3) focusing on market transactions and construing PES as “(1.) a voluntary transaction where (2.) a well-defined ES (or a land-use likely to secure that service) (3.) is being ‘bought’

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by a (minimum one) ES buyer (4.) from a (minimum one) ES provider (5.) if and only if the ES provider secures ES provision (conditionality)". This definition has been criticized for being too narrow and thus excluding many payment schemes that do not comply with these criteria. In particular the voluntary aspect of the transaction has been questioned—at least from the buyer's side. Many PES cases rather involve governmental intervention and public payment schemes (Vatn, 2010). Wunder's definition, relying on the Coasean conceptualization of markets, led to the subdivision of 'genuine PES' and 'PES-like' approaches (Muradian et al., 2010; Vatn, 2010). Consequently, Muradian et al. (2010) elaborated a definition, focusing rather on the public good character of most ES and the resulting externalities that shall be internalized within PES. "PES ought to be the creation of incentives for the provision of such goods, thereby changing individual or collective behavior that otherwise would lead to excessive deterioration of ecosystems and natural resources. Therefore, it may be convenient to define PES as a transfer of resources between social actors, which aims to create incentives to align individual and/or collective land use decisions with the social interest in the management of natural resources" (Muradian et al., 2010: 1205). This definition does not exclude governmental payment schemes, which are frequently referred to as the Pigouvian conceptualization of PES (Vatn, 2010). Also Vatn has a wider understanding of PES as opposed to Wunder's definition where payments are linked to markets. Vatn clearly differentiates PES from the ecosystem/environmental services markets concept: "... markets demand payments. However, also hierarchies and communities may use payments—e.g. in the form of state taxes and subsidies or community compensations. Hence, I find it productive to make a distinction between the wider concept of payments for environmental services (PES) and the narrower concept of markets for environmental services (MES)" (Vatn, 2010: 1247).

Many different PES cases have been published and discussed in the past decade.

The objective of this paper is to answer the following questions:

- (1) What kinds of conservation approaches are found under the "PES label" and what is their economic conceptualization?
- (2) Which are the major research priorities in the PES literature?
- (3) Is there a difference between PES labeled incentive programs in developing countries and industrialized countries in terms of types and challenges?
- (4) Is there potential for research synergies, if PES research in developing and industrialized countries is exchanged more deliberately?

This paper is organized as follows. Section 2 explains how the literature for the review was selected and sorted followed by a brief overview of how the PES concept has accumulated over time and where PES field research has been conducted geographically. Section 3 summarizes the various PES case studies described in literature, sorted (i) according to their underlying economic conceptualization and (ii) regarding their geographic origin. It also gives a first comparison of PES in developing and industrialized countries. Section 4 highlights the diverse research priorities found within PES literature and compares findings in developing and industrialized countries. The discussion (Section 5) focuses on potential research synergies between developing and industrialized countries. We will highlight in particular potential synergies if the long standing research on agri-environmental incentive programs in industrialized countries (frequently not labeled as PES) is considered. Section 6 finally concludes our results.

2. Method and material

2.1. Collecting and sorting literature

The reference material used covers 457 articles and was obtained through a structured literature survey of the "ISI Web of Knowledge"¹ database (all years). Literature survey was executed in May 2011. All possible combinations of the terms "payment(s)", "ecosystem service(s)", "environmental service(s)", "ecological service(s)" and "PES" were entered in the literature search. No other search terms were considered. Terms such as agri-environmental schemes, agri-environmental measures or agri-environmental programs etc. were not included in the literature search as the aim is to clearly identify conservation approaches and research priorities attended under the PES terminology. The references were exported to our database; double entries and material not related to PES were excluded. Any statistical findings and our result section are based on this dataset. However, for the discussion we included some more recent papers and papers currently not considered in the PES discourse but which are likely to enhance this discussion.

Papers were sorted according to continents and countries where the PES research was focused on. Thereafter, papers were successively classified into one of three categories, depending on their respective content: (1) papers briefly describing a PES case study (2) papers discussing overall PES concept from a theoretical/conceptual perspective² and (3) basic research (helpful for PES implementation).³

Papers of the third category were not further considered in this review as these did not actively add to the international PES discourse. Papers of the first and second category were analyzed for their major research priorities (to be discussed in Section 4).

Additionally papers of the first category were further sorted and categorized according to their underlying economic conceptualization: (a) PES case studies reflecting the Coasean conceptualization, (b) PES case studies reflecting the Pigouvian conceptualization and (c) PES case studies reflecting a mixture of these two ideal types (see for instance Vatn, 2010).

Sorting of case studies according to their underlying economic concept was done by us. However, differentiating PES cases accordingly has been proposed frequently in the literature (Vatn, 2010; Engel et al., 2008).

2.2. Temporal and spatial dissemination of the PES concept

Fig. 1 depicts the accumulation of PES publications over time. All articles were published between 1974 and 2011. However, until 2004 a total of only 41 papers were found. The bulk of papers were published from 2004 onwards; the increase in publications from 2004 onwards exhibits an almost exponential growth rate.⁴

The geographic distribution of PES research, i.e. the continents and countries where PES case studies and basic research

¹ Next to the Web of Science, the following databases were included in the WoK search: Biological Abstracts CABI, and Food Science and Technology Abstracts.

² This category comprises e.g. papers discussing PES from a theoretical institutional economic perspective and/or papers elaborating on the potential of PES to be used as a poverty alleviation lever.

³ This category comprises e.g. papers assessing biomass production and carbon sequestration potential of certain plants and trees or land use practices; papers assessing the relationship between forestation and habitat fragmentation and impact on sediment production; forest and watershed interactions; leaf area index measurements; etc..

⁴ Note that publications in 2011 decreased because only articles published until May 2011 are included!

18

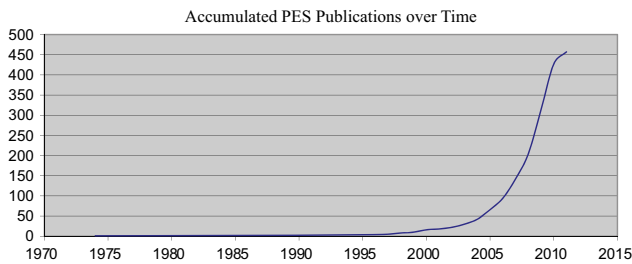
S. Schomers, B. Matzdorf / *Ecosystem Services* 6 (2013) 16–30

Fig. 1. Accumulated PES publication over time in the ISI web of knowledge ($n=457$).

Source: own illustration.

Geographical distribution of overall PES publications

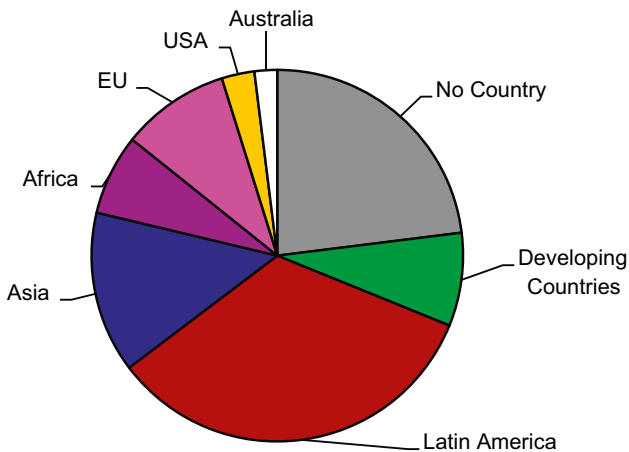


Fig. 2. Geographic distribution of overall PES publications ($n=457$).

Source: own illustration.

supporting PES are located, emphasizes the importance of developing countries in general and Latin America in particular (see Fig. 2). We did not look at the geographic distribution of authors and research institutions.

Approximately one fifth of all publications do not refer to any country; most of these are conceptual papers about ES, ES valuation and various conceptual and institutional economic discussions about PES. The majority of publications refer either to developing countries⁵ generally or to Asia, Latin America or Africa particularly. Remarkably, one third of all publications focus on Latin America (where studies about governmental PES schemes in Costa Rica and Mexico and the Regional Integrated Silvopastoral Ecosystem Management Project (RISEMP) scheme in Costa Rica, Nicaragua and Colombia together account for two thirds of all Latin American articles).

Approximately 15% of all published articles within the PES literature refer explicitly to the EU, US or Australia; most of these papers report on agri-environmental programs (AEP).

When looking at publications that describe a PES case study in detail, it becomes obvious that the Pigouvian conceptualization is by far the most dominant approach (Fig. 3). In particular the Costa

⁵ We sorted papers to this category if authors either explicitly referred to developing countries in general or described briefly research in more than one developing country.

Economic conceptualization of case studies

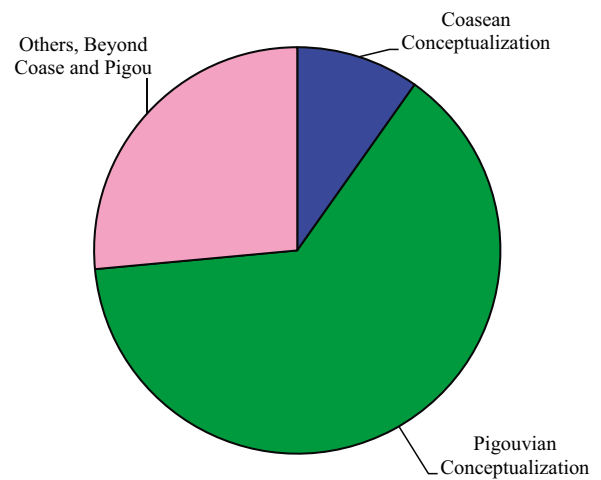


Fig. 3. Economic conceptualization of PES case studies ($n=102$).

Source: own illustration.

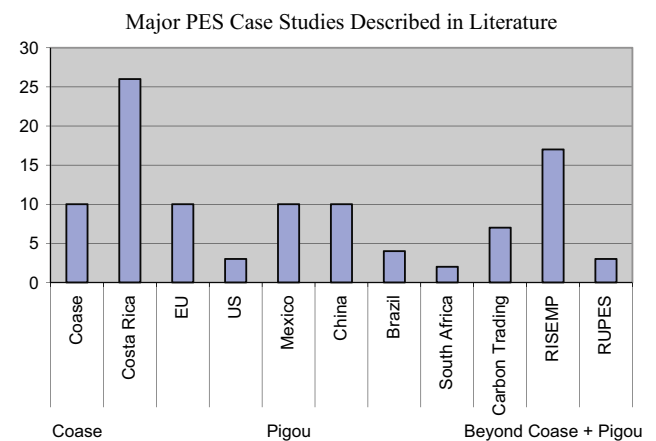


Fig. 4. Major PES case studies described in literature ($n=102$).

Source: own illustration.

Rican program is analyzed and described in detail, as can be seen in Fig. 4.

3. Economic conceptualizations of PES

3.1. Coasean conceptualization

A common conceptual approach underlying PES is based on Coasean 'market' economics. The Coase Theorem argues that – given low to no transaction costs and clearly defined and enforceable property rights – no governmental authority is needed to overcome the problem of internalizing external effects. Rather private 'market negotiations' among social actors will lead to an optimal allocation of resources regardless of initial allocations, as the beneficiary will compensate the provider for the externality. According to Coase (1960) there is no reason to assume that governmental intervention will perform better or produce more efficient outcomes than leaving the distribution of resources to the market. He restricts the task of government to the initial

allocation of property rights and to warranting a legal environment where property rights are enforceable.

Engel et al. (2008) point that proponents of this approach emphasize positive effects on economic efficiency and environmental effectiveness as compared to Pigouvian 'governmental' approaches. Coasean PES approaches are "likely to be efficient, as the actors with the most information about the value of the service are directly involved, have a clear incentive to ensure that the mechanism is functioning well, can observe directly whether the service is being delivered, and have the ability to re-negotiate (or terminate) the agreement if needed" (Engel et al., 2008: 666).

Pure Coasean PES examples are hardly described in literature. Coasean PES examples generally refer to cases where benefits from ES management are provided at local scales. In the French Vosges Mountains the water bottler Vittel has been running a PES scheme with 27 dairy farmers since 1993. Farmers are paid for re-converting to extensive farming practices to maintain high water qualities. Wunder et al. (2008) argue that the program is complex and goes far beyond simple market transactions.

Benefits from upstream–downstream watershed management activities also accrue at local scales. Downstream water users commonly pay upstream land stewards for land use changes that are assumed to increase both, water quality and quantity. Watershed PES schemes are found in the literature, however not all of them comply with the Coasean perspective, as municipalities are often involved to varying degrees in setting up and running the scheme. The Paso de Caballos River Basin in Nicaragua fits the Coasean conceptualization. Upstream landowners are paid by private downstream households for reforestation and conservation efforts. Private households created a Water Committee and negotiated individual contracts with upstream land users (Corbera et al., 2007). The *Escobas River Basin* example also fits the Coasean PES conceptualization. The major downstream beneficiary of upstream forest conservation efforts is a local hydroelectricity and water company that benefits from continuous water flows and reduced sediment loads. Payments are made by the company, which increased the water tariff to water users (Corbera et al., 2007). A comparable approach is seen with the Cidanau River, where a state-owned water company signed contracts for watershed conservation with upstream farmers. International agencies such as the World Agroforestry Centre and the International Institute for Environment and Development were also involved in supporting the scheme (Leimona et al., 2010).

The Pimampiro PES scheme in Ecuador relies on the local municipality, charging an obligatory water fee to downstream water-using households. The fee is paid via a water fund to upstream landowners, who are contractually committed to halting deforestation and allowing some degraded lands to naturally regenerate and thus reverse agricultural expansion (Quintero et al., 2009; Wunder and Alban, 2008). Since the water fee is obligatory, the voluntary aspect as emphasized in the Wunder definition is lacking. It conflicts with the Coase Theorem, as the municipality collects and distributes payments on behalf of the main beneficiaries; contracts are not negotiated privately among relevant stakeholders.

In Bolivia a PES scheme for watershed management and migratory bird conservation in the cloud forest of Los Negros Valley was initiated in 2003. Watershed management targets on curbing upland deforestation to overcome the growing problem of water scarcity. However, upstream landowners are not paid directly by local downstream irrigators, but rather by the municipality of Pampagrande. The international conservation donor, US Fish and Wildlife Fund, paid the PES start-up costs and payments for biodiversity conservation, particularly bird protection. What is remarkable is the in-kind payment mode of this part of the PES

scheme, which transfers beehives and apicultural training to program participants (Asquith et al., 2008).

PES schemes borrowing from the Coasean conceptualization are also found in the context of wildlife conservation. A community-based ecotourism program in Cambodia targets highly threatened bird species. The scheme links generated revenues from bird-watching tourism to long-term species conservation. Villagers are paid for ceasing to hunt birds (Clements et al., 2010). PES schemes to promote wildlife conservation are also described in the literature for savannah ecosystems in Africa. Tourism operators contract areas mostly from Maasai pastoralists via conservation concessions or land lease contracts. Annual payments are made to residents of the areas. Formal agreements exclude agricultural cultivation, permanent settlements, charcoal burning and unlicensed hunting within the areas. Aim of payments is to halt and reverse the great increase in land accession for agriculture and cattle farming. Wildlife habitat loss and illegal hunting is assumed to have caused a substantial decrease in resident wildlife and migratory wildebeest populations (Nelson et al., 2010).

Interestingly, other publications found describe studies assessing the possibility of implementing a Coasean based PES scheme in the future (Fisher et al., 2010; Baltodano and Alpizar, 2006; Calles and Piedra, 2005). This could imply that the Coasean PES concept is likely to gain in importance in the future.

3.2. Pigouvian conceptualization

Governmental payment programs are commonly referred to as the Pigouvian concept of PES (Vatn, 2010; Pattanayak et al., 2010; Van Hecken and Bastiaensen, 2010a, 2010b). We will therefore use this as one category of PES. However, to be accurate in definitions, we would like to point out that governmental payment approaches rather follow the environmental pricing and standards procedure (Baumol and Oates, 1971). The Pigouvian conceptualization is based on the "Pigouvian philosophy of taxing negative or subsidizing positive externalities within existing product markets" (Van Hecken and Bastiaensen, 2010b: 422). The Pigouvian technique requires that the payment equals the marginal net benefit that it is supposed to generate. The environmental pricing and standards procedure, in contrast, "begins with a predetermined set of standards for environmental quality and then imposes unit taxes (or subsidies) sufficient to achieve these standards" (Baumol and Oates, 1971: 51). Consequently, a uniform set of payments reflects the price for the provision of public goods. The pricing and standards procedure provides ES at lower costs than the Pigouvian approach, however it will not lead to a Pareto-optimal allocation of resources (Baumol and Oates, 1971).

Also van Hecken and Bastiaensen emphasize that governmental PES schemes diverge from classical Pigouvian subsidies, as payments are not necessarily linked to a commodity which is assumed to provide the beneficial externality. Rather, the ES itself is converted into a tradable commodity (Van Hecken and Bastiaensen, 2010a; Kosoy and Corbera, 2010). Within governmental PES schemes the state is considered as a "third party acting on behalf of service buyers" (Engel et al., 2008: 666). The main difference between Coasean and Pigouvian PES schemes is thus the directness of transfer: in the former the direct beneficiary pays the service provider, buyers in the latter case are not the direct users. Consequently Vatn (2010) emphasizes that the delineation between these two types of PES schemes is often characterized by different exclusion cost structures: Coasean PES schemes frequently pay land stewards for the provision of ES that are characterized as club goods. Beneficiaries of such ES exist only at local scales and can therefore be directly identified. Pigouvian

PES schemes rather focus on the provision of public goods. Beneficiaries cannot be excluded at all or at reasonable costs.

Governmental financial incentive programs are discussed under the PES label for Costa Rica, Mexico, the EU member states, the US and China. Even though Australia has comparable national programs to those in the US or European Union (EU), hardly any information was found in the literature under the PES label. Australian programs are therefore not further considered, with its potential to enrich the international PES noted only briefly in the discussion section.

Even though China's governmental conservation instruments are published under the 'PES label', key governance characteristics are distinct from other national PES programs. Brazil does not currently have a national PES program. However a proposal for such a program is being developed to be submitted to Brazil's Ministry of the Environment. South Africa has a governmental program that is mentioned within the PES discourse: the Working for Water program (WfW) focuses primarily on relieving people of poverty and unemployment. Conservation of hydrological functions and biodiversity within mountain catchments is only secondary. PES programs and schemes are described in more detail below.

3.2.1. Costa Rica

Costa Rica's national PES program – called 'Pagos por Servicios Ambientales (PSA)' – was established in 1996 and implemented in 1997 (Sanchez-Azofeifa et al., 2007; Rodriguez, 2002). The program was based on existing political support and a system of payments for reforestation and forest management developed in the 1970s (Araya, 1998; Pagiola, 2008). The PSA program targets four ES: (1) greenhouse gas mitigation; (2) hydrological services; (3) scenic beauty and (4) biodiversity (Sanchez-Azofeifa et al., 2007: 1166). Private forest landowners are paid either for forest conservation or reforestation "with the aim of integrating environmental considerations in landscapes outside protected areas" (Pagiola, 2008: 716). Initially landowners were also paid for sustainable land management but this measure was removed from the PSA program in 2000.

Payments are the same across the country, varying only between conservation and reforestation contracts (Pagiola, 2008). Approximately 95% of enrolled areas are contracted under forest conservation agreements; by the end of 2005 about 10% of all forested land in Costa Rica was enrolled in the PSA program. The program is criticized for a lack of targeting, for distributing undifferentiated payments that do not consider opportunity costs and for a lack of additionality, i.e. paying for services that would have been provided anyway (Sanchez-Azofeifa et al., 2007; Daniels et al., 2010). This is reflected in the fact that at the national level almost all forests would have been preserved without payments (Pfaff et al., 2008; Robalino et al., 2008; Daniels et al., 2010). Additionality is neither part of the PSA program nor explicitly mentioned in the Forest Law 7575, under which the PSA program was enacted (Daniels et al., 2010). Pagiola argues that "in a sense, the PSA program was a quid pro quo for legal restrictions on clearing" (Pagiola, 2008: 718), as an official ban on forest clearing coincided with the enactment of the PSA program. Without payments, landowners' opposition against legal restrictions could have been higher. This implies that a regulatory mechanism has become effective and that land users could voluntarily file for monetary compensation for compulsory land use changes. Thus this program conflicts heavily with the voluntary criteria of Wunder's PES definition (Wunder, 2005) and also with the 'creation of incentives' under the PES definition by Muradian et al. (2010).

The bulk of program financing comes from a mandatory tax on fossil fuels, raising approximately US\$ 10 million/year (Sanchez-Azofeifa et al., 2007; Pagiola, 2008). Also bi- and multilateral donors such as the Global Environment Facility (GEF), the World Bank, Conservation International or the German aid agency KfW support the program and pay for the preservation of biodiversity and global benefits such as carbon sequestration (Blackman and Woodward, 2009; Pagiola, 2008). Domestic water users pay for water services obtained. In 2005 a mandatory water tariff with a special conservation fee was introduced, representing "a shift from voluntary agreements to compulsory ones" (Pagiola, 2008: 715). Norway purchased carbon offsets worth US\$ 2 million in 2001, which under Kyoto's Clean Development Mechanism (CDM) were only eligible for re- and afforestation activities (Subak, 2000; Corbera et al., 2009).

Even though Costa Rica appears to have the most prevalently analyzed PES scheme, it deviates from the Coasean market conception. It fails Wunder's PES definition as commitment does not appear to be voluntary on the buyer's nor on the provider's side (due to the ban on forest clearing) and does not comply with the criteria of conditionality.

3.2.2. Mexico

Mexico's national PES program – initially called 'Pagos por Servicios Ambientales Hidrológicos' (PSA-H) – was launched in 2003 (Southgate and Wunder, 2009). The program was implemented at the national scale to halt the overexploitation of aquifers. Payments were linked to the conservation of existing forests and distributed according to a uniform payment scheme, differentiating only between cloud forests and other forests (Munoz-Pina et al., 2008). The Mexican PES program distributes payments to private land owners and *ejidos*⁶ (Alix-Garcia et al., 2009).

An obligatory water fee secures the monetary funding for the program, creating a slight link between water beneficiaries and providers. The public good character of water prompted the Mexican government to "opt for a system in which it would act as an intermediary between service providers and users, instead of creating a framework for private transactions between them" (Munoz-Pina et al., 2008: 734).

The program lacks targeting; neither overexploited aquifers nor marginalized communities are targeted explicitly, even though both were planned for initially (Alix-Garcia et al., 2009; Corbera, 2010). As a result, enrolled watersheds were not or only moderately overexploited.

Consequently the cost-effectiveness of the program has been criticized frequently. "It is clear that the payment level was high enough to attract a substantial number of participants, but it would seem that often those who chose to participate had no intention of cutting down the forest in the first place" (Alix-Garcia et al., 2009: 187). I.e. payments could probably have been lower with the same result.

After successful lobbying by peasants and forest-based organizations, the PSA-H program was enlarged to PSA-CABSA in 2004 (Corbera, 2010). PSA-CABSA is a national policy program paying for "(i) carbon fixation by forests to halt climate change; (ii) for rural communities who support biodiversity conservation; and (iii) for the development of agroforestry systems, specifically for shade grown coffee plantations" (Government of Mexico 2003, translated by Kosoy et al., 2008: 2077). Finally, all national forestry programs were merged into one common PES policy

⁶ Ejido is a local land management process, which considers land and forests as common property. Ejidos play a dominant role with 47% of all signed contracts and 93% of enrolled land (Alix-Garcia et al., 2009).

framework, known as *Pro-Árbol* in 2006 (Kosoy et al., 2008; Corbera, 2010).

3.2.3. European Union

Within the EU, the discussion on PES as a mechanism to internalize externalities dates back to the 1970s and thus long before PES implementation in Latin America. The earliest article found within this research was published in 1974, investigating “deficiency payments as compensation for the ecological services of agriculture” in Austria (Kaiser, 1974: 36). In 1988 Giessubel-Kreusch (1988) discussed the “stimulation of environmental protection through payments for positive environmental effects emanating from agriculture”. Pevetz (1992: 886) discussed in 1992 the necessity of considering agricultural policy payments “not merely as a social aid but rather as a payment for genuine ecological services”.

In the 1980s, national PES programs were implemented and coordinated at the individual member state level (Baylis et al., 2006). In 1992 the MacSharry reforms resulted in a coordinated policy at the supra-national level of the EU (Baylis et al., 2008). The regulation EC 2078/92 introduced agri-environmental programs (AEPs) as a supplement to the Common Agricultural Policy (CAP) instruments across the EU member states (Baylis et al., 2008; Baylis et al., 2006). AEPs provide payments to farmers choosing to implement conservation efforts that improve the environment and/or maintain the countryside on a voluntary basis.

Hampicke emphasizes that “in granting payments for ecological services according to new CAP regulations the trend towards rewarding positive environmental externalities has begun” (Hampicke, 1997: 253). However, the introduction of AEPs also induced a controversial discussion on whether AEPs are disguised production subsidies providing a more acceptable way of income transfer to farmers or rather an instrument “to encourage the optimal production of positive and negative externalities” (Baylis et al., 2006: 1).

Farmers within the EU wanting to receive single farm payments from the first pillar need to comply with a certain minimum of Good Farming Practice (GFP).⁷ Beyond the GFP baseline additional payments in form of PES payments can be obtained on a voluntary basis (Baylis et al., 2008). AEPs consist of a variety of different agri-environmental schemes and measures. Depending on the agri-environmental scheme, both, the reduction of negative externalities (e.g. reduction of nitrate and pesticide pollution, conversion of intensive to extensive arable farming land etc.) and the provision of positive externalities are remunerated (Baylis et al., 2008). In the EU, approximately 20% of all farmland “is under some form of agri-environment program to reduce the negative impacts of modern agriculture on the environment, at a cost of about \$1.5 billion” (Scherr et al., 2007: 381). Scherr et al. (2007: 381) emphasize that the “largest public biodiversity PES programs are the agri-environment payment programs in the United States and Europe, which compensate farmers for providing a variety of conservation-friendly land-use and management practices”.

AEPs often lack targeting on important areas. Consequently, unsatisfactory and inefficient results are obtained often (Uthes et al., 2010; Haaren and Bathke, 2008; Bertke et al., 2005; Groth, 2005).

⁷ The actual level of GFP needed to receive cross-compliance payments is set individually by member states. Complying with GFP is voluntary. However, Baylis et al. (2008: 755) note that “it is in reality compulsory because few farmers would be able to continue in business without Pillar 1 payments” (Baylis et al., 2008: 755).

3.2.4. USA

The history of governmental incentives to promote conservation efforts in the US had been in existence longer than in the EU. In the 1930s, the fore-runner of the modern Conservation Reserve Program (CRP) protected soils and attempted to reduce certain crop production to prevent a surplus (Baylis et al., 2008). The 1985 Farm Bill broadened the US agricultural policy to integrate environmental and farm income concerns. Swampbuster and Sodbuster were integrated in the Farm Bill to halt conversion of wetland and highly erodible land to cropland (Baylis et al., 2008). Highly erodible land was taken out of production with the creation of the Conservation Reserve Program (CRP) (Dobbs, 2006).

In 1996, the Environmental Quality Incentives Program (EQIP) was introduced in the Farm Bill and continuously modified in the 2002 Farm Bill with expanded financing and creation of the Conservation Security Program (CSP). EQIP and CSP are AEPs for working lands and are essentially “programs for the Federal government to purchase environmental services from agriculture” (Dobbs, 2006: 16). CSP is the closest program to what ‘multifunctionality’ is in Europe (Dobbs, 2006).

3.2.5. China

In China PES schemes are most commonly described under the term eco-compensation. No clear definition for eco-compensation exists currently. It can be understood as an economic instrument aimed at the provision of public goods. According to Xiong and Wang (2010), it is a public regulation that uses fiscal transfer mechanisms to internalize externalities and to thus correct the distortion between private and social interest. They define eco-compensation as a “fiscal transfer compensation mechanism [...] that increases the cost (or income) of damaging (or protecting) environmental actions through charge (or compensation), and encourage operators to decrease (or increase) due to the external non-economy (or external economy) brought from the damage (or protection) actions so as to achieve the objective of protecting resources” (2010: 390). This complies with the PES definition of Muradian et al. (2010). Either a fee is levied to reduce negative externalities or compensations in different forms are distributed for the provision of positive externalities (Xiong and Wang, 2010; Qiu et al., 2008). The latter complies with the Pigouvian PES conceptualization. However, eco-compensation actually contradicts PES because the payment is in fact a compensation for legal land-use restrictions and thus not an economic incentive to foster land use changes (Mullan et al., 2011). Hence it is rather a program to compensate for regulatory interventions. Zhen and Zhang (2011)⁸ provide a detailed overview of payment programs in China.

The most important eco-compensation regulation is the forest ecological benefit compensation mechanism (Xiong and Wang, 2010). The two major components of China’s six key forest conservation programs, the Natural Forest Conservation Program (NFCP⁹) and the Sloping Land Conversion Program (SLCP¹⁰), are briefly described in the literature (Liu et al., 2008).

3.2.5.1. *NFCP*. The NFCP was initiated as a pilot program in 1998 covering 12 provinces and autonomous regions. By 2000 it was expanded to 18 provinces and regions and thus became one of the largest forest conservation policies in the world (Mullan et al., 2011).

⁸ The literature review of Zhen and Zhang had been published two month after the cut off date for our literature search. It is not considered in the statistical documentation.

⁹ Synonymously referred to as the Natural Forest Protection Program (NFPP).

¹⁰ Synonymously referred to as the Grain to Green Program (GTGP) and the Farm to Forest Program.

Natural forests were to be restored and protected through bans on logging to preserve ecosystem services such as soil erosion, water retention and flood control (Liu et al., 2008). Payments compensate for economic losses due to the legal restriction on logging and remunerate for reforestation and sustainable forest management activities (Mullan et al., 2011). Funding for the program is provided by the central government (81.5%) and local governments (18.5%) (Liu et al., 2008).

3.2.5.2. SLCP. To convert sloped cropland to grasslands or forests, the central government complemented the NFCP with the Sloping Land Conversion Program (SLCP) in 1999 (Gauvin et al., 2010, Weyerhaeuser et al., 2005).¹¹ The overall goal is to further reduce soil and water erosions (desertification) (Bennett, 2008) as well as to alleviate rural poverty in China's most vulnerable regions (Gauvin et al., 2010). In comparison to the NFCP, the SLCP is much broader in its geographic and social scope (Liu et al., 2008). Enrolled participants are compensated according to a two-tiered payment scheme with an in-kind and a cash component. Payments are differentiated between the upper Yangtze River Basin and the upper and middle reaches of the Yellow River Basin. However, Gauvin et al. (2010) demonstrate that cost-effectiveness of the program could be improved by targeting parcels with low opportunity costs and high environmental benefits.

Another example of eco-compensation found within the PES literature is the 'returning farmland to lake' program in Hunan Province, with the objective of expanding 779 km² coverage of wetland for biodiversity protection, climate regulation, recreation and culture and to increase water volume for flood control and drought resistance. The inhabitant resettling plan resettled more than 815,000 people to mostly newly established towns. They were compensated mainly with housing subsidies, tax exemptions and land utilization (Xiong and Wang, 2010).

The Chinese conceptualization of PES thus rather reflects a compensation mechanism for legal restrictions.

3.2.6. South Africa

The South African Working for Water Program (WfW) was established as a governmental program in 1995 and is run as a public poverty relief work program. It is included in the PES discourse because hydrological functions and biodiversity of mountain catchments are targeted and restored. The WfW program does not pay land stewards for land use changes that are assumed to provide or conserve certain ES. Instead unemployed individuals are contracted to clear invasive plant species and to restore natural fire regimes in private, communal or public mountain catchments and riparian zones. Funding for the WfW program comes mostly from public poverty programs and water tariffs (Swallow et al., 2010; Turpie et al., 2008).

In reference to the emphasized PES definitions, the WfW program is not an economic mechanism to internalize externalities by assigning economic values to ES. It is rather a public employment program. Still, it represents a fiscal transfer, which remunerates activities that preserve ES.

3.2.7. Brazil

Brazil currently has neither a national PES program, nor does it recognize the legal concept of ES and their respective economic values (Costenbader, 2009). However, both, a national policy for the conceptualization of ES and a national PES Program are currently under discussion (Farley and Costanza, 2010).

If approved, the Brazilian PES concept will rely on the definition of ES from the Proambiente program (Costenbader, 2009).

Proambiente is based on a "Programme of Socio-Environmental Services" supported by a 'Social-Environmental Fund' to provide payments to small producers for environmental services rendered" (Hall, 2008b). It was developed by civil society organizations (rural unions, community groups and environmental NGOs) in the Amazon region in 2000 and had been transferred from these civil society organizations to the Ministry of the Environment in 2004 (Hall, 2008a). Under the Proambiente program smallholder payment schemes were developed to remunerated farmers for the provision of ecosystem services, such as the "(i) reduction or avoidance of deforestation; (ii) carbon sequestration; (iii) recuperation of ecosystem hydrological functions; (iv) soil conservation; (v) preservation of biodiversity; and (vi) reduction of forest fires" (Hall, 2008a: 1928) and to reduce the loss of ES induced by agriculture (Boerner et al., 2007). The to-be-developed national PES program in Brazil will also include Reduced Emissions from Deforestation and Degradation (REDD) as well as carbon sequestration (Costenbader, 2009).

3.3. Financial Incentives beyond Coase and Pigou

Within the literature other conservation approaches are described that neither fit the Coasean 'market' conceptualization where private negotiations between concerned stakeholders lead to an optimal allocation of resources, nor the Pigouvian conceptualization where governments distribute economic incentives to align individual land use decisions with the social interest.

These are briefly described below.

3.3.1. RISEMP

The Regional Integrated Silvopastoral Ecosystem Management Project¹² (RISEMP) was set up as an action research project in three selected areas in Latin American countries, namely Costa Rica (Esparza), Nicaragua (Matiguás-Río Blanco) and Colombia (Quindío) (Calle et al., 2009; Rios and Pagiola, 2010). The project was funded by the GEF and implemented and researched by the World Bank. RISEMP investigated how PES can be used as a lever to foster sustainable silvopastoral land use practices. Silvopastoral practices frequently require a substantial start-up investment, with a considerable time-lag until return on start-up investment becomes profitable. This hinders the adoption of sustainable silvopastoral practices even though private on-site benefits and profitability increase over the long run (Pagiola et al., 2005a). RISEMP is based on "the hypothesis that a relatively small payment provided early on could 'tip the balance' between current and silvopastoral practices" (Pagiola et al., 2005a: 208). PES provides this payment to finance start-up investment. The aim was to test "(1) the effects of the introduction of PES on farmers' adoption of integrated silvopastoral farming systems in degraded pasture lands; and (2) the resulting improvements in ecosystems functioning, global environmental benefits, and local socio-economic gains resulting from the provision of said services" (Van Hecken and Bastiaensen, 2010b: 426). Since the GEF was the only ES buyer with funds from international institutions, only ES providing global benefits were targeted within the project, namely biodiversity conservation and carbon sequestration (Pagiola et al., 2007). The research methodology to check PES impact "was based on a randomized experimental design with various participant groups receiving different incentives (payment and/or TA) or no intervention (control group)" (Van Hecken and Bastiaensen, 2010b: 426). ES providers were paid for the

¹¹ The SLCP targets all sloped cropland with a slope greater than 15° in western China and with a slope greater than 25° elsewhere in the country (Liu et al., 2008; Weyerhaeuser et al., 2005).

¹² It is also referred to as GEF-CATIE Project.

adoption of certain land use practices that were expected to provide targeted ES. An ‘environmental service index’ (ESI) was elaborated based on indices for biodiversity conservation and carbon sequestration under certain land use practices (Pagiola et al., 2007). Participants signed PES contracts for four years and were paid according to their increase in ESI points relative to their own base line measured prior to project implementation. In contrast to national PES programs in Costa Rica and Mexico, where participants are paid solely for adopting the contracted land use change, RISEMP participants are remunerated according to gained ESI points and thus according to the level of additional ES provided (Pagiola et al., 2007).

If the Worldbank and GEF are considered as institutions that bundle the demand for global ES beneficiaries, RISEMP represents a PES scheme that follows the Wunder definition and resembles the Coasean conceptualization. However, the importance of the institutional set-up and non-economic factors (such as e.g. technical assistance) were included and examined during the project. A major result from RISEMP highlights that both economic and non-economic factors motivated farmers to adopt sustainable land use practices. Consequently, van Hecken and Bastiaensen (2010b: 421) argue “that the actual role of PES is mistakenly understood as a simple matter of financial incentives. [...] PES approaches should be understood as part of a broader process of local institutional transformation rather than as a market-based alternative for allegedly ineffective government and/or community governance”. This again deviates from the ‘market based’ conceptualization defined by Wunder and Coase.

3.3.2. RUPES

The Rewarding Upland Poor for Environmental Services (RUPES) program was established in 2002 and implemented as a joint PES experimental scheme by the International Fund for Agricultural Development (IFAD), the World Agroforestry Centre (ICRAF) and other local, national and international partners (Pascual and Perrings, 2007). It covers six action research sites in Indonesia, the Philippines and Nepal (Van Noordwijk and Leimona, 2010). RUPES aims to conserve local and global ES while simultaneously enhancing the livelihoods of the upland poor (Pascual and Perrings, 2007). Targeted ES include improved watershed management to enhance water qualities and quantities, biodiversity protection and carbon sequestration for voluntary markets (Pascual and Perrings, 2007; Van Noordwijk and Leimona, 2010). Remuneration for ES provision is distributed as rewards (impacting in any currency on the ES supplier’s natural, financial, human, social or physical capital) and direct monetary payments (Van Noordwijk and Leimona, 2010). Rewards include scholarships for local students, provision of technical assistance to local farmers and investment in infrastructure such as roads, electricity or a water pipe system. The range of ES buyers is substantial and includes conservation funds from local governments, private buyers such as the private automotive wheel industry demanding sustainable ‘jungle rubber’ for ‘green vehicles’ and hydroelectric power companies (Van Noordwijk and Leimona, 2010). This part of the RUPES program resembles the Coasean ‘market’ conceptualization as the direct beneficiary of sustainable ‘jungle rubber’ pays the provider. However, it deviates again from the PES conceptualization in that it pays for the provision of an environmental commodity rather than an ES that cannot be transferred spatially.

3.3.3. International carbon trading

Within the literature, international carbon payments are referred to as International Payments for Ecosystem Services (IPES). Farley et al. (2010) argue that IPES are probably the only

mechanism likely to be effective in ensuring the provision of global ES (GES) (Farley et al., 2010). The Clean Development Mechanism (CDM) and Reduced Emissions from Deforestation and Degradation (REDD) are discussed in this context. The CDM, as defined in Article 12 of the Kyoto Protocol, enables industrialized countries to offset their excess greenhouse gas production (GHG) by purchasing carbon credits. Some payments under the CDM are used for restoration of degraded lands and reforestation projects. Maintenance of standing forests (‘avoided deforestation’) is however not part of the CDM (Hall, 2008a). Such a mechanism will likely be included in a post-2012 Kyoto regime under the REDD label, as deforestation and forest degradation are one of the primary causes of carbon emissions on a global scale (Pereira, 2010).

The two major global initiatives promoting the REDD action plans are the United Nations Framework Convention on Climate Change (UNFCCC) and the Forest Carbon Partnership of the World Bank (Chhatre and Agrawal, 2009). As currently discussed under the UNFCCC, REDD “will take the form of national programs in which a country may sell carbon credits either as offsets or to a globally managed forest carbon fund, based on overall reductions in emissions across the country compared to an agreed reference emission level at the end of a given accounting period” (Skutsch et al., 2011: 143). Thus, REDD schemes would likely involve a national level implementation (Wertz-Kanounnikoff et al., 2008).

At present, the REDD mechanism is not yet developed. However, since 2007 more than 100 REDD demonstration activities testing implementation possibilities, scheme design and so on have emerged around the world with more than half located in Indonesia (Madeira, 2009). Furthermore, REDD activities and comparable carbon projects are under way in Latin America and Africa (Costenbader, 2009; Pereira, 2010; Peskett et al., 2011; Wertz-Kanounnikoff et al., 2008). In Brazil such policy initiatives are relevant, especially since deforestation is responsible for three quarters of Brazil’s GHG emissions (Hall, 2008a). The Bolsa Florestal Forest Conservation Grant Program, established under the Amazonas State Law for Climate Change in 2007, remunerates traditional communities and families in ‘sustainable development’ protected areas for signing a Zero Deforestation Agreement, thus halting conversion to crop and pasture areas (Costenbader, 2009; Hall, 2008a, 2008b). The ‘Juma Sustainable Development Reserve Project’ was established under this program. It is referred to as Brazil’s first REDD project because it sells reduced deforestation carbon credits that comply with the Climate, Community & Biodiversity Alliance Standard to the international voluntary carbon market (Costenbader, 2009).

Currently all REDD cases are just demonstration activities, testing scheme design and implementation possibilities. Other carbon projects for the voluntary carbon market were briefly described for Mexico and Belize by Corbera et al. (2007). There is no clear consensus within the literature as to whether REDD will serve as a PES case or not. According to Madeira (2009) REDD can best be described as a mechanism using financial incentives to reduce GHG. However, payments for carbon sequestration are generally linked to carbon emissions emitted elsewhere. Therefore it remains questionable whether this mechanism resembles a PES program in the sense that economic values are linked to ES in order to internalize externalities and to provide ES that would not have been generated or preserved in the absence of the payment. Critics of carbon payments conceptualize the mechanism rather as a modern traffic in indulgences, enabling the buyer to continue business as usual.

3.4. Comparison developing and industrialized countries

It appears that the international PES discourse refers mostly to conservation efforts in developing countries and specifically to

two governmental programs in Costa Rica and Mexico (see Figs. 2 and 4). In particular Costa Rica is considered the pioneer in the use of PES (Rodríguez, 2002). The first article explicitly referring to payments for environmental services' found within this literature review was published in 1998 by Araya (1998) and focuses on Costa Rica. Pagiola (2008) restricts this pioneering role to developing countries in general. Also Wunder (2005: 3) highlights PES as a novel approach and "the most promising innovation in conservation since Rio 1992". However, based on the finding that most approaches even in developing countries resemble Pigouvian conceptualizations (see Fig. 3), the PES approach is not as new as frequently highlighted. As pointed out in Section 3.2.3, incentive payments to foster environmental protection and to stimulate beneficial ecosystem services have been in place in Europe since the 1980s, culminating with the introduction of AEPs in 1992 within the CAP. The history of comparable governmental intervention in the US dates back to even earlier times. The underlying economic concept of AEPs in the US and EU is similar to PES programs in Costa Rica and Mexico and overlaps considerably with many financial incentive approaches around the world. Still, it appears that AEPs in the EU and US are only recently labeled as PES, research results on these programs and schemes are underrepresented in the international PES discourse (see Fig. 4). Only one paper by Wunder et al. (2008) compared selected case studies of governmental AEPs in the US and EU with PES case studies in developing countries. Except for this paper, we hardly found any literature emphasizing the potential to transfer lessons learnt and research results across countries and continents. Hardly any direct links were made between PES research in industrialized and developing countries, and if so only on a very theoretical level (Jack et al., 2008; Sommerville et al., 2009). It appears that there is no direct and continuous exchange of practical PES experience and major lessons learnt, and no mutual learning between industrialized and developing countries.

One major difference between analyzed national PES programs in developing and industrialized countries are the targeted ES. PES programs in developing countries mainly relate to reforestation and sustainable forest management practices to halt deforestation. National PES programs in industrialized countries target mostly ES produced on agricultural plots and working landscapes. However, agroforestry systems and silvopastoral practices receive considerable attention in Latin America. I.e., preservation of ES within agricultural systems are accounted for in Latin America as well.

4. Research priorities

The majority of PES articles appear to discuss the institutional conceptualization and underlying governance structures of PES programs and schemes. Research on how governance structures can be leveraged to boost economic efficiency and environmental effectiveness appears to be of particular importance. In this context many articles emphasize (1) design characteristics of PES contracts (in particular performance payments, auctions, spatial targeting and cost benefit targeting) and (2) factors enhancing PES scheme acceptance. Even though these are related to the overall discourse on institutional concepts and governance structures, we have highlighted the major research findings in a separate sub-chapter for clarity. Finally, many articles discuss equity considerations, however within the PES discourse these are exclusively related to developing countries.

4.1. Institutional conceptualization of PES

According to Vatn (2010: 1245) institutions "can be understood as solutions to collective choice problems", and the respective PES contracts are governance structures shaping those institutions. Corbera et al. (2009) define institutions as "formal and informal rules which regulate what to do and not to do in a given situation" and conceptualize PES as "new institutions designed to enhance or change natural resource managers' behavior in relation to ecosystem management through the provision of economic incentives" (Corbera et al., 2009: 745).

Many articles emphasize (i) the importance of property rights and their distribution and (ii) transactions costs and means to reduce these. Both challenge the feasibility of PES in general and in particular the feasibility of the Coasean approach to PES. However, neither the consequences of property rights distribution nor the determinants and impact of transaction costs were assessed empirically.

Vatn (2010) elaborates on how governance structures relate to (1) the distribution of rights and the rules of coordination and interaction between agents (2) the level of transaction costs and (3) the motivational aspects of PES and their implications (Vatn, 2010). Muradian et al. (2010) explain why and how costly information, uncertain markets, unequal access to resources and the initial allocation of property rights, social embeddedness and perceptions, as well as the role of the intermediary and the institutional environment and cultural setting need to be considered in governance structures. Kemkes et al. (2010) presented a framework to determine how the characteristics of ES – in particular rivalry and excludability – affect the shaping of the respective governance structures and how and where PES can be an effective tool for ES provision. Corbera et al. (2009) present a conceptual approach to assess (1) institutional design, (2) institutional performance (3) institutional interplay as well as (4) capacity and scale of PES. Furthermore they identify factors impacting on the success of natural resources management institutions, such as acceptance of rules by relevant stakeholders or monitoring of compliance.

4.2. Governance structures to lever effectiveness and efficiency

4.2.1. Spatial targeting and cost–benefit targeting

Poor targeting of ES is one of the main reasons for low economic efficiency and environmental effectiveness of PES (Robalino et al., 2008). Spatial targeting improves both, environmental effectiveness and economic efficiency by targeting payments to most vulnerable, degraded or suitable lands. Consequently, ES are either provided at lower costs than elsewhere (Uthes et al., 2010) and/or payments are targeted to parcels with highest degradation risk and thus to areas where they will have the largest impact (Robalino et al., 2008). Targeting payments to areas where they are most needed (Sierra and Russman, 2006) increases environmental effectiveness. Wuenscher et al. (2008) developed a site selection tool for spatial targeting, which takes account of ES provided, degradation risk and participation costs. To empirically test the tool's potential for increasing economic efficiency and environmental effectiveness of PES, data from Costa Rica is used.

Cost–benefit targeting combines spatial targeting either with auctions (as done for instance within the Conservation Reserve Program in the USA) or with performance payments (as done e.g. in Germany: Haaren and Bathke, 2008; Klimek et al., 2008). Cost–benefit targeting is assumed to further improve economic efficiency.

4.2.2. Performance-based payments

Performance-based payments (also ‘payments by results’, ‘result-oriented payments’, ‘outcome-oriented payments’, ‘outcome-based payments’ or ‘success-oriented remuneration’) relate payments to actual ES provision. In contrast to payments prescribing certain actions or inputs, performance payments are likely to improve economic efficiency and environmental effectiveness. Whereas centrally prescribed land use practices are often not tailored and adapted to local needs, performance payments trigger local knowledge and provoke active and innovative land use practices (Groth, 2005). Land stewards will “find the best way of combining inputs in their particular location to meet the overarching goals of generating a desired level of environmental services” (Zabel and Roe, 2009: 126). Service providers commonly know more about needed inputs and land use practices, enabling ES supply at lower costs. Performance payments help to reduce asymmetrically distributed information and improve the cost-effectiveness of ES provision. However, the risk of service provision is transmitted to the service provider, who might consequently charge a risk premium that ultimately increases the payment again (Zilberman et al., 2008).

Performance payments often require only one final inspection visit (Hoft et al., 2010), thus decreasing overall monitoring costs. However, payments must be tied to observable and therefore often distorted indicators (Zabel and Roe, 2009). Consequently, reliable indicators need to be developed; otherwise payments might be distributed despite missing ES provision. Hasund (2011) demonstrates a methodology for indicator development and Hoft et al. (2010) evaluate newly determined vegetation indicators for grazing activities. Zabel and Roe (2009) discuss the economic theory of performance payments and briefly highlight and compare four different payment approaches with various briefly illustrated field examples. Zabel and Roe (2009) disclose that performance based PES schemes do exist around the globe, many of them being however very small. Performance payments appear to be well researched in Germany, where practical experiments for agricultural biodiversity are already in place (Bertke et al., 2003; Hoft et al., 2010). Zabel and Engel (2010) provide a framework to establish a performance based wildlife conservation scheme in India. Their framework is based on “pioneer performance payment scheme for carnivore conservation which is implemented in Sweden” (Zabel and Engel, 2010: 406) and aims at transferring PES experience from an industrialized to a developing country setting. Skutsch et al. (2011) highlight that carbon projects under REDD will be performance based PES schemes.

4.2.3. Auctions

Auctions (also ‘reverse auction’ or ‘procurement auction’) are a contractual design feature that invites potential ES suppliers to submit price offers at which he is willing to sign a PES contract. Bids must be competitive as only reasonable offers might be contracted. Auctions help to reveal private willingness-to-accept (WTA) and private opportunity costs (Ferraro, 2008). It is a mechanism to enhance economic efficiency and environmental effectiveness of PES contracts as informational asymmetries and consequently informational rents are reduced. The cost-revelation mechanism allows for cost savings for the ES buyer as payments are minimized (Pascual and Perrings, 2007; Ferraro, 2008). Given a fixed budget, auctions allow for the maximization of ES conserved. Auctions are used successfully within the Conservation Reserve Program (Baylis et al., 2008) and are currently implemented and tested in field experiments in Germany (Bertke et al., 2008), in Indonesia (Leimona et al., 2009; Jack et al., 2009) and Australia (Rolfe and Windle, 2011). Furthermore auctions are discussed and recommended for carbon payment

schemes in the Amazon (Boerner et al., 2010; Wertz-Kanounnikoff et al., 2008) and to be implemented in Mexico’s national PES program (Alix-Garcia et al., 2009; Munoz-Pina et al., 2008).

A pilot project in Germany currently tests the combination of performance payments with auctions. This is assumed to further enhance economic efficiency (Groth, 2005; Bertke et al., 2008, 2003). However, Schilizzi et al. (2011) show that combining auctions with performance payments can be counterproductive in terms of expected ES output produced, i.e. auctions can reduce environmental effectiveness.

Southgate and Wunder (2009) discuss the use of Vickery auctions to reduce strategic behavior and transaction costs and thus to increase economic efficiency of PES contracts. In a Vickery auction winners do not receive their winning bid, but rather the amount offered by competitors they have underpriced, i.e. winners receive a payment that is slightly above their bid. Vickery auctions are assumed to discourage exaggerated bids, as these only increase payments to competitors.

4.2.4. Enhancing acceptance of PES Instruments

Acceptance of PES by relevant stakeholders is considered important due to the voluntary nature of PES deals—in particular on behalf of ES providers. Acceptance relates mostly to factors influencing scheme uptake, acceptance of and adhering to the rules of the game. Acceptance impacts on economic efficiency and environmental effectiveness. Interestingly, Sommerville et al. (2010) find that the payment is not always the key driver determining acceptance and compliance. Rather, payments increase acceptance of monitoring, which in turn leads to more compliance as the risk of being caught and fined is increased. The perceived fairness and the distribution of benefits and costs also influence acceptance of payments. Chen et al. (2009) observe that next to payment, social norms at the neighborhood level, program duration, household economic and demographic conditions, farm feature and personal characteristics such as age, gender and education also influence PES program re-enrollment in China. Correspondingly, Zbinden and Lee (2005) find that farm features, household economic and demographic conditions significantly influence participation in the Costa Rican program. Gong et al. (2010) analyze the institutional factors beyond the pure financial incentive and find that PES needs to take account of the institutional environment, such as the formal and informal rules that are in place. If the institutional structure fails to guarantee low transaction costs, clearly defined property rights and build strong social capital, participation in the schemes remains low despite available financial surpluses. Also Kosoy et al. (2008) demonstrate (with a particular focus on *ejidos*) that the institutional environment affects participation. Participation is determined, next to financial incentive, by procedural rules, stakeholder interaction and individual characteristics. The ability to account for and exhaust context-related factors and to successfully incorporate these into scheme design influences participation and thus success or failure of PES schemes (Corbera et al., 2007).

4.2.5. Comparison developing and industrialized countries

PES schemes in developing as well as industrialized countries are frequently criticized for the lack of spatial targeting, lack in additionality and lack of distributing discriminative payments tied to opportunity costs. To improve both, environmental effectiveness and economic efficiency of PES, papers elaborating on innovations and technological changes in contract design and factors improving acceptance of PES received considerable attention.

Interestingly and as highlighted above, the US and EU appear to have adopted a pioneering role in practical field experiments

with diverse innovative contractual design features. Auctions are already an inherent part of the CRP in the US and are currently tested in model regions in Germany. Also performance-based payments and performance-based payments combined with auctions are currently being tested in Germany. Spatial targeting and benefit–cost targeting are realized within the CRP in the US and field experiments are being run in Europe. For developing countries, these contract design features are currently discussed only conceptually. Publications on practical implementation experiences for these contract design features in developing countries are still missing and most programs have not incorporated these so far. Countries planning to integrate any of these contract design characteristics in their existing national programs and schemes might benefit substantially from considering experience and major lessons learnt elsewhere.

4.3. Equity

In the context of PES, equity generally consists of three elements, namely (1) equity in access (who participates), (2) equity in decision making (procedural fairness within project framework) and (3) equity in outcome (distribution of project outcomes among stakeholder, in particular economic payments and their perceived fairness). Equity in outcome is determined by equity in access and equity in decision making (Corbera et al., 2007). Pagiola mentions that equity focuses on how the poor in developing countries can be incorporated into PES contracts and comprises factors determining ability, eligibility, willingness to participate and obstacles to participation for poor households (Pagiola et al., 2010, 2008, 2005b).

Within the literature found for this review, the equity discourse focuses exclusively on developing countries and poor land users. Corbera et al. (2007: 368) mention that “equity has been recognized as a key element to be taken into account when designing and implementing [...] PES, specifically if the poor and most disadvantaged are to be involved in these initiatives”.

Many authors highlight the link between poverty, biodiversity hotspots and environmental degradation (Fisher and Christopher, 2007; Sunderlin et al., 2007) and that poor people suffer most from ES loss (Barbier, 2008). Consequently, PES are frequently discussed as a lever for ‘pro-poor’ rural development (Angelsen and Wunder, 2003; He, 2006; Lal, 2009; Pascual et al., 2010; Sand and Scholz, 2009). However, there is a trade-off between equity and environmental effectiveness and economic efficiency of PES, as those individuals supplying ES at lowest costs may not necessarily be poor resource users. Consequently, Farley and Costanza (2010) argue that PES is an economic instrument for aligning marginal costs of conservation closer to marginal benefits and thus a tool for increasing economic efficiency and surpluses. Hence, PES should always prioritize economic efficiency of resource allocation over poverty alleviation. “Using PES schemes to also alleviate poverty might reduce the economic surplus and future scale of PES. The conventional economic wisdom is that greater poverty alleviation could potentially be achieved by redistributing a larger economic surplus” (Farley and Costanza, 2010: 2063). Pascual et al. (2010) oppose this from a conceptual point of view. They argue that the institutional approach determines an optimal equity–efficiency relationship within PES schemes. Rather than focusing exclusively on economic efficiency, it is the equity–efficiency interdependency that “should be considered as a key feature of PES schemes” (Pascual et al., 2010: 7).

Finally van Hecken and Bastiaensen refer to the potential difficulty in Coasean PES approaches where the most direct ES beneficiary are accountable for its provision, rather than the government as an accumulated proxy for all but more remote

beneficiaries. Thus, the costs of funding for ES provision might be burdened disproportionately to poor locals of low income countries. “Expecting poor local people to pay for locally generated ESs makes a dangerously biased and arbitrary abstraction of the ‘joint production and consumption’ nature of different ecosystem benefits” (Van Hecken and Bastiaensen, 2010a: 6).

5. Discussion

5.1. PES examples

This review unfolds what kind of financial incentives are currently labeled as PES by scientists, practitioners and national governments. In this sense it demonstrates the political relevance of the PES concept more than the extent of PES implementation. Most conservation approaches researched and published under the PES ‘label’ do not follow a Coasean conceptualization as emphasized by the PES definition by Wunder (2005). As our review shows, most existing PES cases in developing and industrialized countries rather reflect the Pigouvian solution, i.e. governmental incentive programs. Sommerville et al. (2009: 6) pointed out that “whether or not an incentive scheme acts as PES approach may be contingent on how government portrays the policy”. Our results show clearly that the PES concept has more policy relevance in developing countries, specifically in Latin America, than in industrialized countries even though the latter have a longer tradition of different financial incentive and market based instruments. With the arising discussion on ecosystem services at the end of the 90s, the PES concept seemed an eligible approach and label for implementing new financial environmental incentive schemes in countries without prior history of such interventions, e.g. Costa Rica. The favorable international political reception and the scientific interest in the PES concept could have been a relevant driver for a rapid distribution as it supported the acceptance of such schemes.

A closer look at the practical examples shows many similarities across existing governmental PES labeled programs, e.g. in Mexico, Costa Rica, China, and European and US agri-environmental programs. When considering these big agri-environmental programs in the US (Claassen et al., 2008), Europe (Uthes and Matzdorf, 2013) and also Australia (Hajkowicz, 2009), Pigouvian PES are shown to be widespread around the world. The practical PES examples show that pure Coasean approaches currently do not play a significant role. PES are commonly imbedded in a broad institutional setting with an actor constellation that does not resemble simple market-based buyer and seller relations. Even though a considerable institutional diversity in PES labeled programs and schemes exists, many long standing economic instruments such as habitat mitigation banking in the US or Australia are not considered in this discourse. Agri-environmental programs from industrialized countries are hardly found in the reviewed PES literature.

5.2. Conceptualization of PES

In contrast to the marginal relevance of Coasean PES cases found in practice, the Coasean conceptualization received considerable attention from a theoretic perspective. The literature review shows that the most frequently cited definition by Wunder (2005) was a very helpful driver for fruitful academic discussions, in particular with respect to economic efficiency. Pascual et al. (2010) pointed out that the Coasean conceptualization is commonly regarded as the dominant approach to PES. Not surprisingly, both advocates as well as critics of PES commonly refer to Coasean conceptualization.

In this review we differentiated between the Coasean and Pigouvian conceptualization of PES to characterize existing PES cases. Despite the emphasized insignificance of Coasean PES cases in practice and the fact that Pigouvian cases rather follow the environmental pricing and standard procedure (Baumol and Oates, 1971); differentiation of these two categories does not mirror the broad diversity of existing institutional settings. We agree with Van Hecken and Bastiaensen (2010b: 421) who state that “PES is mistakenly understood as a simple matter of financial incentives” and that “PES approaches should be understood as part of a broader process of local institutional transformation rather than as a market-based alternative for allegedly ineffective government and/or community governance”. Well-designed PES programs and schemes can complement regulatory intervention rules rather than substituting these. Well-designed PES programs and schemes help improve economic efficiency and environmental effectiveness of ES provision. However, what is crucial for the success of PES is the interplay of the whole institutional setting (cf. Corbera et al., 2009; Muradian and Rival 2012).

5.3. Pooling PES research of developing and industrialized countries

When comprising the US and EU's experience with governmental PES programs, it appears that the PES concept is neither as new and novel as frequently emphasized nor does Costa Rica hold the pioneering role. Similarities between governmental PES programs in developing and industrialized countries are considerable. Analogies between Pigouvian PES approaches in developing and industrialized countries are frequently larger than analogies between Coasean and Pigouvian PES approaches in the same country. Consequently, it might result in research synergies if PES experience and research results from large governmental programs in the EU and US are considered and integrated more deliberately in the international PES discourse. Our review shows that there is a lack of exchange between research experiences and results across continents and countries. Reasons for that can likely be found in the different histories of financial incentive programs and because of the different political, social and cultural contexts across countries. When comparing PES instruments and the various respective experiences and lessons learnt for transferring research findings across countries, it is important to keep in mind that the institutional environment and the institutional setting of PES matter. From an institutional economics perspective, the importance of clearly defined and enforceable property rights and low transaction costs are emphasized. Even though this is emphasized in particular for the Coasean conceptualization, institutions are important for Pigouvian PES programs too. For developing countries the legal and institutional environment is often regarded as rather weak. The legal framework in the US and EU however is considerably strong, property rights are clearly defined, law is enforceable and these countries are highly monetized, i.e. people are used to receiving monetary payments and incentives. Also there are many cultural deviations between countries and particularly between continents. We argue that these differences between countries should be considered carefully. If the underlying economic concept, the institutional environment and set-up in which the PES approach is embedded is not carefully considered, it might lead to misinterpretations and unintended outcomes when findings on strength, weaknesses, opportunities, pitfalls or any other factor are simply transferred across countries.

To further advance with PES approaches, in particular with respect to issues of defining the commodity (including the use of models), contract design, monitoring and evaluation of PES programs and schemes, it may be helpful if research communities and research results in developing and industrialized countries

will be consolidated. The history of experience and research in governmental PES programs in Australia, the EU and US is much older than elsewhere. Consequently it does not come as a surprise that research appears to be more advanced regarding certain topics in industrialized countries.

Considerable experience and research results exists specifically with regard to innovative contractual design characteristics to enhance economic efficiency and environmental effectiveness, such as performance-based payments (e.g. Matzdorf and Lorenz, 2010; Burton and Schwarz, 2013), auctions (e.g. Latacz-Lohmann and Van der Hamsvoort, 1998, 1997; Claassen et al., 2008; Windle and Rolfe, 2008) and spatial targeting (Uthes et al., 2010, Raymond and Brown, 2011; Schirmer et al., 2012). Also factors impacting on acceptance are well researched in industrialized countries. Attitudinal characteristics of farmers and how these influence scheme uptake are considered by e.g. Falconer (2000). Factors influencing participants' acceptance of schemes are discussed by e.g. Hanley et al. (1999), Sattler and Nagel (2010), Greiner and Gregg (2011) or Lokocz et al. (2011). Key factors influencing the decision to contract for and comply with voluntary payment schemes in the UK are researched by e.g. Hodge and McNally (1998). Hodge (2000) also discusses the importance of the financial incentive and how it influences acceptance.

As emphasized, many publications debate the consequences of (high) transaction costs. Even though transaction costs for governmental PES programs in the EU have been carefully explored beyond pure conceptual considerations, none of these publications were found in the PES literature search. For instance, transaction costs associated with participation in schemes is researched and measured by Falconer (2000). Falconer and Saunders (2002) calculate and compare transaction costs of individually negotiated and standard management agreements. Mettepenningen et al. (2008) analyze the factors influencing public transaction costs and assess them with different quantitative and qualitative techniques. However, the “number of practically relevant approaches that meet the criteria of having low private and public transaction costs while also not causing excessive deadweight costs appears to be smaller than theoretically expected” (Uthes and Matzdorf, 2013: 262).

Also there are many other conservation instruments in the EU and US that remunerate land stewards for the provision of ES that are not considered in the PES discourse and which publications were not found for this review. For instance, compensation pools under Germany's Impact Mitigation Regulation (Wende et al., 2005; Macke, 2009). The US also has a long history of wetland (Bayon, 2004) and conservation banking (Carroll et al., 2008). However, no publications on these approaches were found under the PES 'labeled' reviewed literature even though these kinds of market-based instruments have the same design challenges as PES (e.g. Hallwood, 2007). An overview on the existing international compensation approaches is given by Madsen et al. (2010).

6. Conclusion

PES is a multifaceted term and many diverse conservation approaches are published under this “label”. This review clearly demonstrates that PES most commonly refers to the large governmental payment schemes existing at national levels in both developing and industrialized countries. Practical experience on Coasean PES approaches remains, at least for now, relatively insignificant.

Even though the majority of published PES papers focus on Latin American PES cases, it appears that PES instruments have been in existence far longer than the Costa Rican governmental programs. Agri-environmental programs in the EU and US are

based on the same economic concept. However, experience with and research results of these national programs are hardly considered within the international PES literature. We reason that this is mainly due to the use of different terminologies for governmental incentive programs across countries and continents. PES research on AEPs in the EU for instance commonly refers to 'non-commodity output', 'multifunctionality of agriculture' and 'agri-environment(al) programmes', 'agri-environment(al) measures' or 'agri-environment(al) schemes'.

Given that the EU and US have a longer tradition of national governmental payment programs than for instance Latin American countries, research on these programs is more advanced regarding many institutional design characteristics. We argue that the international PES discourse and in particular practical PES approaches and cases might benefit considerably if this experience is considered more deliberately. This argument holds true, as many research priorities attended in the PES literature overlap across countries. Consequently, we conclude that pooling PES research from developing and industrialized countries and considering comparable research and experience published under different terminologies might result in research synergies for all.

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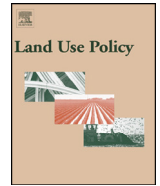
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An analytical framework for assessing the potential of intermediaries to improve the performance of payments for ecosystem services



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ABSTRACT

The use of payments for ecosystem services (PES) to steer land use practices has increased considerably at an international level over past years. An efficient and effective PES implementation strategy often relies on active support from intermediaries. This paper provides an analytical framework for assessing the potential of intermediaries to improve the environmental effectiveness and cost-effectiveness of PES. Cost-effectiveness refers to transaction costs, whereas environmental effectiveness refers to ecological benefits provided. The framework assists in assessing how and for what activities of PES implementation intermediaries can improve performance based on the intermediaries' institutional design. The analytical framework is based on institutional economics and applies mainly the theoretical underpinnings of transaction cost economics (TCE). This paper illustrates an example of the practical application of the framework by assessing the potential of German Landcare Associations (LCAs) to improve the performance of public PES programs. It is emphasized how key institutional design characteristics of LCAs can potentially influence (1) public and (2) private transaction costs as well as (3) participation in and (4) spatial targeting of governmental agri-environmental programs and schemes in Germany. The analytical framework is, however, not restricted to assessing the potential of intermediaries in the large public PES programs of industrialized countries. This paper discusses how the framework can be transferred to smaller private or larger supra-national PES programs and to the contexts of developing countries.

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Introduction

The concepts of ecosystem services (ES) and payments for ecosystem services (PES) have received considerable attention in the past few years, especially since Rio 1992 and the Millennium Ecosystem Assessment (Millennium Ecosystem Assessment, 2005; Gómez-Baggethun et al., 2010). The PES concept is defined only vaguely, with diverse definitions co-existing simultaneously and various conservation approaches being bundled under the "PES label" (Schoomers and Matzdorf, 2013). The majority of PES schemes around the world are governmental payment schemes, being mostly input oriented payment schemes. Thus, land stewards are commonly paid for prescribed land use practices that are assumed to provide certain ES and/or to improve the agricultural biodiversity and landscape of the countryside (Schoomers and Matzdorf, 2013). Agri-environmental payment schemes in the European Union (EU) and the Farm Bill in the US are the largest

PES programs in the world (Scherr et al., 2007). Commonly, PES are developed and implemented in a complex legal and institutional environment. In the EU, most PES programs and schemes are implemented within the Common Agricultural Policy (CAP). The overall framework is set by the EU; the policy design of measures is worked out at the individual member state level. In Germany, precise regulations and measures are executed at the federal state level, i.e., the Länder. Farmers' cooperation and participation in PES schemes is voluntary (Prager and Freese, 2009; Hanley et al., 1999).

Diverse PES schemes are implemented by different governance structures. Frequently, PES implementation is supported by diverse intermediaries adopting various roles and responsibilities (Bosselmann and Lund, 2013; Huber-Stearns et al., 2013; Pham et al., 2010). In the context of large public PES programs, the PES implementing governance structure rarely relies on pure public-private interventions. Diverse intermediaries provide advisory services, with different roles for non-governmental organizations (NGO), private advisory organizations, governmental and semi-governmental entities (Bosselmann and Lund, 2013; Sutherland et al., 2013). Different intermediaries are likely to improve PES performance to various degrees. In this context, PES performance commonly refers to two related but distinct

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concepts: (1) cost-effectiveness and (2) environmental effectiveness (Schomers and Matzdorf, 2013). Environmental effectiveness refers to the extent to which the environmental aim of a PES scheme can best be achieved. Within the literature, environmental effectiveness is commonly assessed by looking at either overall participation rates and determinants influencing participation on behalf of farmers (Mettepenningen et al., 2013; Ducos et al., 2009; Defrancesco et al., 2008; Prager and Posthumus, 2010) or at the ecological impact of the schemes (e.g., Kleijn et al., 2004), in particular how environmental benefits can be raised through e.g., spatial targeting (Uthes and Matzdorf, 2013; van der Horst, 2007; Wünsch et al., 2008).

The cost-effectiveness of PES implementation is discussed within the transaction cost approach (Williamson, 1985, 1998, 2003, 2005). Transaction costs (TC) are defined as those costs arising due to information gathering, contracting and monitoring and controlling of contracts (Dahlman, 1979). TC can be considerable; Rorstad et al. mention that “the costs of managing a policy may be as important as the cost of producing the goods and services” (2007: 1).

Diverse intermediaries can help to improve the environmental effectiveness and cost-effectiveness of PES implementation by assisting and supporting transactions between buyers and sellers. An efficient and effective PES implementation strategy requires a potent management of two distinct and complex systems simultaneously: ecosystems and social systems (including individual decision making). A detailed exploration of the potential of intermediaries to navigate the transfer of ES between stakeholders has not been addressed sufficiently, despite a limited number of publications on the roles and impacts of intermediaries in diverse PES case studies (Bosselmann and Lund, 2013; Coggan et al., 2013b; Huber-Stearns et al., 2013) and the general recognition that intermediaries are “key in understanding the performance of PES” (Muradian et al., 2010: 1205, Sattler et al., 2013). What is missing is a framework for an institutional analysis on how discrete intermediaries within governance structures can improve the environmental effectiveness and cost-effectiveness of PES implementation. Given limited budgets, intermediaries that improve both the cost-effectiveness and environmental effectiveness of PES can help to maximize total ES provision and thus improve the economic efficiency of PES instruments.

To fill this gap, the paper develops and presents an analytical framework for assessing the relative potential of intermediaries to improve PES performance. The framework is based mainly on institutional economic theory.

Overall, the study aims to

- (1) Develop a theory-based analytical framework for assessing how and for which activities intermediaries can improve the environmental effectiveness and cost-effectiveness of PES implementation and thereby
- (2) Provide a tool for an institutional assessment of discrete governance structures that can be used to assess the potential of diverse intermediaries and transferred to different PES settings.

The remainder of the paper is organized as follows. Section “Method” explains the literature and theory-based development of the analytical framework and emphasizes its practical application. Section “Exemplified application of framework” describes a sample application of the framework by using the example of German Landcare Associations (LCAs) as one potential intermediary supporting the transfer of ES between public authorities (ES buyers) and farmers (ES sellers). Section “Discussion and conclusion” discusses the scope of the framework, highlights its transferability to assess the potential of different intermediaries in different

PES settings and reconsiders the preliminary results on the potential of LCAs to improve PES performance in the context of German agri-environmental programs.

Method

Theoretical underpinning of framework

PES performance is frequently measured in terms of environmental effectiveness and cost-effectiveness.

Environmental effectiveness is influenced by (1) overall participation levels within PES schemes and (2) the ecological accuracy of the schemes themselves. Participation is usually positively correlated to environmental effectiveness (Mettepenningen et al., 2013) and is a basic requirement for achieving any effect at all. “Measures may have a high efficiency regarding ecological goals but if farmers are not willing to adopt the prescribed measures there will be no impact. A similar effect can be expected if farmers enroll but do not implement measures in an appropriate way” (Prager and Freese, 2009: 1155). The ecological accuracy of schemes is, for example, influenced by the spatial targeting of schemes (Uthes and Matzdorf, 2013). Overall participation levels and the ecological accuracy of PES schemes (spatial targeting) are influenced by, e.g., the nature and behavior of actors, certain market characteristics, attributes of transactions and governance structure (Mettepenningen et al., 2013).

The cost-effectiveness of PES implementation is influenced by public and private TC. Public and private TC can be considerable, and the overall level of TC is influenced by the attributes of transactions, the nature and behavior of the involved actors, the institutional environment and the governance structure (Williamson, 2003, 2005; Rorstad et al., 2007; Mettepenningen et al., 2011, 2009).

Thus, both the environmental effectiveness and cost-effectiveness of PES implementation is influenced by specific factors. This is the starting point of the analytical framework put forward in this paper. The theoretical underpinnings of the framework are based on transaction cost economics (TCE), as developed mainly by Oliver Williamson (1975, 1985, 1998, 2003, 2005).

According to TCE, different governance structures can solve the problem of TC to varying degrees, depending on how the determinants of TC are influenced by the respective governance structure. TCE and its “discriminating alignment” hypothesis emphasize that governance structures have to match the characteristics and attributes of the transaction so as to minimize TC (Williamson, 1975, 1985, 1998). Within the framework put forward in this paper, we expand TCE and the “discriminating alignment” hypothesis to also include environmental effectiveness and its respective determinants. It is expected that different governance structures will reduce public and private TC as well as increase participation in and the ecological accuracy (spatial targeting) of PES to varying degrees, depending on how well the respective governance structure can influence the various determinants. Consequently, governance structures implementing PES can be analyzed in terms of how well they can influence the determinants affecting environmental effectiveness and cost-effectiveness. The framework proposed in this paper provides a tool to assess qualitatively the potential of intermediaries, as part of a governance structure, to influence the various determinants and hence the environmental effectiveness and cost-effectiveness of PES implementation.

The framework is a theory-based procedure for elaborating key institutional design characteristics of intermediaries and for relating them to the various determinants affecting environmental effectiveness and cost-effectiveness. Thus, the framework helps to map which activities of PES implementation can be supported well by the corresponding intermediary and which cannot (Fig. 1).

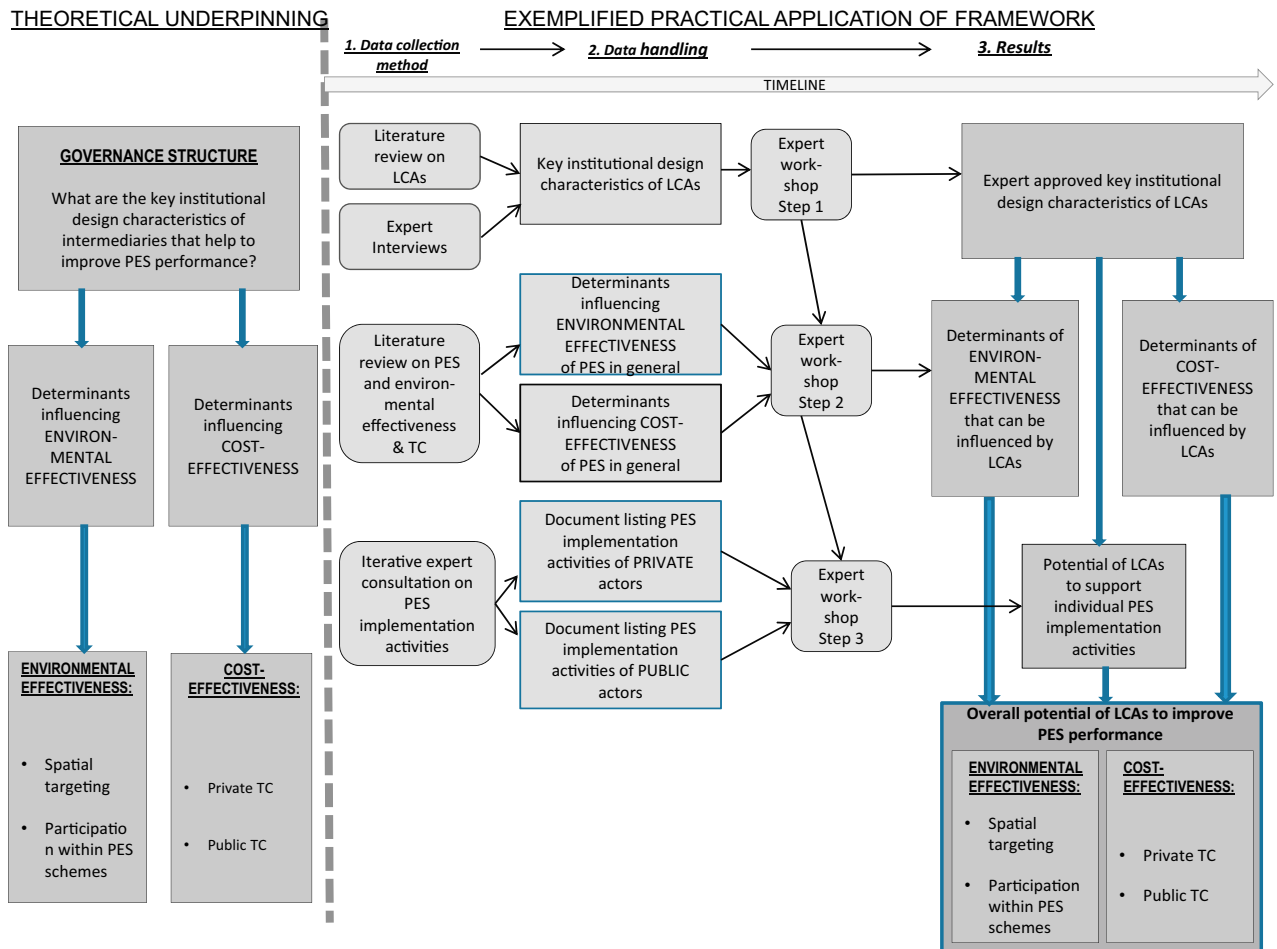


Fig. 1. Theory-based development and application of framework.

Source: Own illustration.

The first column in Fig. 1 depicts the theoretical underpinnings of the framework as just described; the remaining columns depict a roadmap of how the framework can be applied practically. To demonstrate the procedural method and capability of the framework, the framework was applied to the context of German LCAs.

Practical application of framework

The practical application of the framework involves different (partly chronological, partly iterative) steps for both data collection and data processing (Fig. 1).

First, we conducted an extensive literature review to identify the determinants that influence environmental effectiveness and cost-effectiveness of PES implementation (Fig. 2). In the case of cost-effectiveness, the overall level of public and private TC is influenced by (1) the nature and behavior of the involved actors, (2) the attributes of the transaction and (3) the institutional environment (Williamson, 1985, 2005, 2003). Multiple relevant determinants belonging to these three categories are discussed in the context of PES implementation and are summarized in Fig. 2. Furthermore, determinants influencing the overall level of environmental effectiveness (participation within and the ecological accuracy of PES schemes) were identified (Fig. 2). In particular, willingness to participate is influenced by (1) the nature and behavior of actors, (2) the attributes of the transaction and (3) certain market characteristics.

In the literature, several of the determinants that influence environmental effectiveness also influence cost-effectiveness and vice versa. For instance, both environmental effectiveness and cost-effectiveness are influenced by the attitudes of farmers or by their overall education level (Defrancesco et al., 2008; Ducos and Dupraz, 2006; Mettepenningen et al., 2011). Furthermore, private TC influence participation negatively (Falconer, 2000), whereas the precision and targeting of schemes clearly affects TC (Vatn, 2002). This finding implies that neither the determinants influencing environmental effectiveness and cost-effectiveness nor the two concepts of environmental effectiveness and cost-effectiveness are mutually exclusive and independent from each other. Rather, many of the determinants identified in the literature review affect both environmental effectiveness and cost-effectiveness, as indicated by the arrows between the two categories in Fig. 2. However, to overcome the difficulty of double counting and overestimating the potential of intermediaries, we assigned each determinant exclusively to either of the two categories. Determinants influencing mainly the perceptions and attitudes and thus the decision-making process of stakeholders predominantly affect environmental effectiveness. Determinants influencing mainly the amount of working hours spent to implement PES schemes predominantly affect cost-effectiveness.

The determinants summarized in Fig. 2 are likely to interact differently across different intermediaries. Some of the reviewed determinants can be altered either positively or negatively to

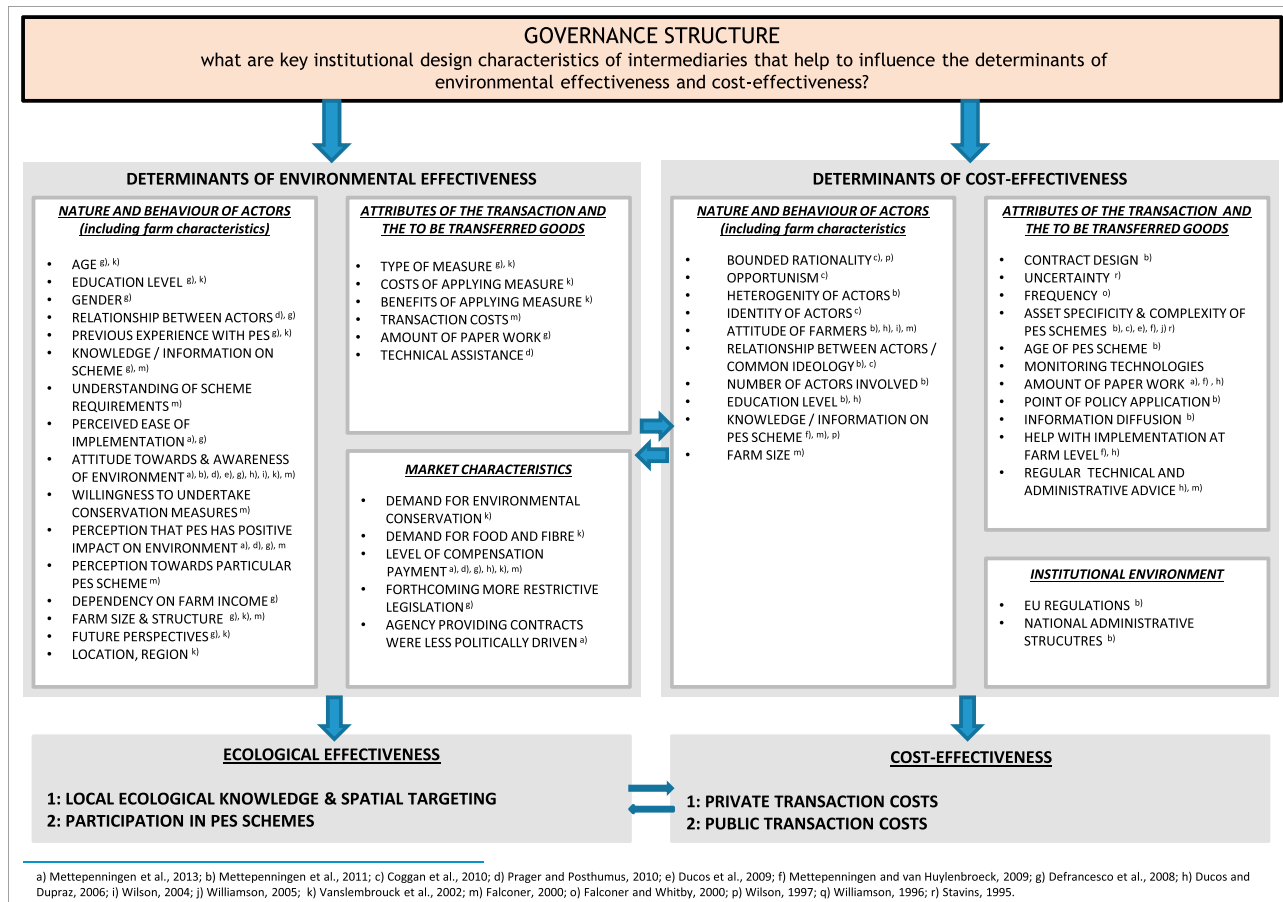


Fig. 2. Overall analytical framework to assess the potential of intermediaries to improve PES implementation.

Source: Own elaboration.

various degrees by different intermediaries (such as e.g., 'relationship between actors', 'understanding of scheme', or 'attitude of farmers'). Some determinants are likely to rather remain constant and cannot be altered or influenced directly by different intermediaries (such as e.g., 'age', 'gender', and overall 'level of education'). We do not consider those determinants that cannot be influenced directly by an intermediary in this paper. However, if it appears that some of those factors are highly relevant to successful PES implementation, one should consider how these determinants can be influenced indirectly by certain intermediaries (e.g., an intermediary directly addressing a certain age group or female farmers, if age or gender appears to be a relevant factor).

Second, the key institutional design characteristics of the respective intermediary, in this case the German LCAs, need to be elaborated. The key institutional design characteristics are those characteristics and qualities of the intermediary that enable him or her to influence certain determinants identified in the first step. What enables an intermediary to facilitate a well-functioning transfer of resources and hence allow for an improvement in overall PES performance?

The elaboration of key institutional design characteristics for LCAs was based mainly on three different but complementing sources. First, a comprehensive literature review and screening of available literature on German LCAs and comparable organizations at an international level was conducted. As a limiting factor, we found that only few independent and peer-reviewed studies on German LCAs exist. Furthermore, much of the existing gray literature on German LCAs is published by representatives of the

LCAs and their umbrella organization the German Association for Landcare (DVL – Deutscher Verband für Landschaftspflege). We found more literature with respect to comparable organizations elsewhere – such as e.g., Landcare in Australia, which had been used for the discussion of this paper. We followed the cited literature and read the literature clarifying the applied concepts. Second, we conducted expert interviews with the director of the DVL and subsequent explorative expert interviews with all twelve German LCA coordination office managers at the Länder level throughout the summer of 2011. Based on these sources, we prepared a preliminary elaboration of key institutional design characteristics of LCAs.

Third, to assess for which (trans-)actions of PES implementation the regarded intermediary can actually provide support and improve performance, a document listing the required implementation actions was prepared. The document differentiated between those actions accruing benefits on behalf of private farmers and those accruing benefits on behalf of the public administration. The document was sent iteratively to various experts by email, with an invitation to verify and complete the listed actions. Relevant actions were sorted chronologically and in accordance with Dahlman's functional taxonomy of transaction cost categories¹ (Dahlman, 1979), differentiating for (1) search and information

¹ Prager et al. (2012) emphasize that collaborative PES design and implementation activities do not follow clear-cut steps that can be classified into either category but rather involve overlapping phases.

gathering activities, (2) bargaining and decision-taking activities and (3) policing and enforcement activities.

Fourth, an expert workshop was held in Berlin, Germany, in October 2012, with seven participating experts. The aim of the workshop was (1) to discuss, revise and complement the identified institutional design characteristics of the examined intermediary (here LCA); (2) to discuss which of the reviewed determinants can potentially be influenced by the intermediary; and (3) to assess which activities of PES implementation can practically be supported by the intermediary and how these relate to environmental effectiveness and cost-effectiveness. Participating experts were affiliated with an LCA coordination office, the umbrella organization DVL, a private agricultural advice service center, a charitable foundation focusing on nature conservation, and a research institute. We started the workshop by discussing, revising and clarifying the key institutional design characteristics of the LCAs and relating them to the determinants influencing environmental effectiveness and cost-effectiveness. Those determinants that could potentially be influenced by local LCAs were identified. This was followed by reviewing which of the various PES implementation activities could be performed well by LCAs, which activities could be performed only poorly and which actions could not be performed at all.

In the following section we briefly highlight the main results of the exemplified practical application of the framework. We will discuss the main results of the four emphasized steps by presenting (1) the elaborated key institutional design characteristics of the examined intermediary – German LCAs – and (2) by assessing its potential impact on environmental effectiveness and cost-effectiveness. To disclose the source of the presented results, we denoted statements asserted during the expert interviews with the abbreviation EI and statements and outcomes from the expert

workshop with the abbreviation EW. Findings from the literature are indicated by citing the respective references.

Exemplified application of framework

Elaboration of key institutional design characteristics

LCAs in Germany are institutional arrangements of community-based natural resource management and exhibit a unique institutional set-up not replicated at an international level (EI; Prager and Vanclay, 2010). Approximately 155 local and regional LCA groups exist currently in Germany (EI; Metzner, 2013). The first German LCAs were established in 1985/86 through the initiative of individual local actors in Bavaria (Metzner, 2013; Güthler and Tschunko, 1999, Prager, 2009). The following reflect the key institutional design characteristics of LCAs and their umbrella organization DVL as depicted in Fig. 3. The highlighted characteristics represent the lowest common denominator across local groups.

Institutional integration of three societal actors

LCAs are collaboratives combining local stakeholders from the three societal actors groups (market, government, and civil society) with conflicting interests: They integrate (1) agricultural stakeholders (farmers, shepherds, land managers, land owners, etc.) that derive income from their business operations and are influenced or constrained by market forces, including positive or negative economic incentives; (2) municipal stakeholders (mayor, local administration); and (3) conservation stakeholders (nature conservation groups, environmental organizations, individuals with a conservation interest, such as bird watching). For all local LCAs that are formally integrated in the umbrella organization DVL, it

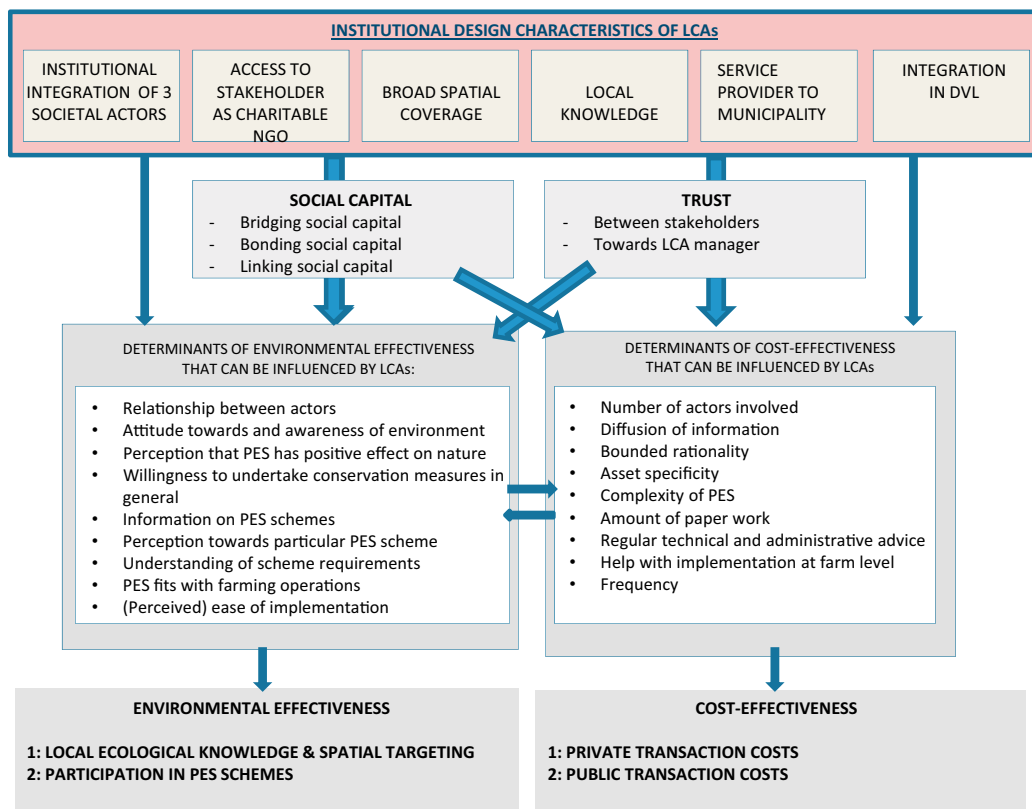


Fig. 3. Institutional design characteristics of LCAs and their potential to improve environmental effectiveness and cost-effectiveness.

is required that these three actor groups be represented by equal shares in the group's committee. A few LCAs additionally integrate tourism and/or the forestry sector (EI, Metzner, 2013; Prager and Vanclay, 2010). The integration of those three groups into one organization is a unique feature of German LCAs and is not replicated at an international level. In particular, the active involvement of nature conservationists is not met elsewhere (Prager, 2009, Prager and Vanclay, 2010). Currently, approximately 2000 municipalities, 10,000 farmers (approximately 500 of whom are shepherds) and 1200 conservation groups are members of one of the 155 local LCA groups (Metzner, 2013), with an increasing tendency for founding new LCAs (EI). Membership is voluntary (EI).

Farmers and nature conservationists but also farmers and public authorities have a long tradition of conflict and mistrust and did not communicate well historically. LCAs provide for round tables and facilitate communication and problem solving between the respective interest groups. Harmonization of conflicting interests between stakeholders is considered a key task of LCAs (EI). LCAs broker the diverse interest to put nature and landscape conservation activities into practice (EI, Metzner et al., 2013).

Historically, groups were established as bottom-up approaches, starting initiatives originated commonly from local people. Governmental agencies or ministries were often not involved in founding or setting up local groups. Frequently, it took many years to establish a group because conflicts and opposing interests needed to be solved first. It has been emphasized that these long formation processes create trust and understanding between the actor groups (EI, EW).

Access to stakeholders as charitable NGO

Local LCAs operate as NGOs and are registered as charitable non-profit-organizations. LCAs operate independently; they do not have any sovereign powers and are not committed to any political party or ideology but are only bound to protect and maintain the environment (as defined in their articles of association) (EI, EW). Various interviewees stated that the institutional set-up of a charitable NGO without sovereign powers is one of the primary advantages of LCAs. It enables LCA managers to have more flexible way to approach stakeholders, as opposed to public agents who are often constrained by bureaucratic processes and regulatory requirements (EI). In particular, access to land stewards is enhanced because farmers do not need to fear any legal obligations or regulatory interventions by LCAs, as opposed to governmental agents (EI). LCAs work with farmers on a voluntary basis, mainly within the programs of the second pillar of the CAP. Because they do not have any sovereign powers, they can only try to convince the respective stakeholder (farmers) by highlighting (economic) benefits of participation. Without payments, LCAs will not be able to convince farmers to provide ES: *"We will not be able to convince our clients if we cannot offer any (economic) benefits in terms of payment schemes. We will not be able to convince the local farmer or the mayor if we emphasize that the world is in a poor state. Rather the mayor calculates the benefits of participation and so does the farmer. We attempt to get the most out for all stakeholders"* (EI, trans. S. Schomers).

Furthermore, it has been emphasized that LCA managers operate on more flexible working hours and days than public employees (e.g., LCA managers can easily make a field visit on Saturdays or in the evenings on private farms). As a result, a more private and trustworthy relationship between LCA managers and farmers often emerges (EI).

Broad spatial coverage

Local LCA groups exist in all federal states of Germany (except for the city states). In Bavaria, they reach an almost comprehensive spatial coverage at the Länder level, with lesser coverage in other Länder (Metzner, 2013). Most local groups operate at the

administrative district level and reach at least a spatial coverage of the county. At this spatial level, they have a permanent representative, the local LCA manager. At the Länder level, a coordination manager connects the individual groups to exchange information, experiences, ideas, best practices and lessons learned between groups (EI, EW). In Germany, the Länder level is important for public PES implementation activities because environmental protection and nature conservation instruments differ between Länder.

Local knowledge

It has been emphasized that LCAs embrace profound knowledge and understanding of local ecological and social circumstances, mainly because of their institutional integration of the three conflicting interest groups. Farmers commonly provide their agricultural know-how and machinery as well as relevant plots and fields. Nature conservationists provide knowledge on ecosystem functions and their deficiencies in a region, i.e., the ecological problems that need to be tackled. Public authorities provide financial funds and political support. The LCA manager provides technical expertise and embodies a moderator or broker between the conflicting interest groups (EI, EW).

Conservationists can communicate via LCAs to government and farmers on where and which measures are most needed in a region and who can best implement such measures. Municipalities can communicate about the availability of PES schemes, level of remuneration and the importance of the ecological goal (EW).

Service provider to municipality

LCAs generally rely on public funds to perform nature conservation and landscape maintenance activities (EI). The German Federal Nature Conservation Act, §3, designates LCA groups as one preferred institutional organization to be commissioned with the active implementation of nature and landscape protection. The act emphasizes the institutional integration of municipalities, land stewards and nature conservationists in one group. Not surprisingly, both the interviewees and the literature accentuate the notion that the self-conception of LCA managers is frequently reflected as one of being a service provider and partner to government (EI). They adopt the role of an intermediary between the three stakeholder groups (Prager, 2009), mostly as their institutional set-up enables them to operate with few conflicts but a high level of goodwill: *"LCAs try to operate on the basis of consensus. We are the moderator, however with the clear aim of nature and landscape conservation as defined in the articles of association. . . . Many mayors are fed up with nature conservationists, as nature conservationists have the reputation to oppose most actions. LCAs are the practitioners in between them. We are the trouble-shooters, trying to find solutions"* (EI, trans. S. Schomers).

Many LCA coordination managers emphasized that they often perform tasks that should be provided for by the state. Municipalities are often overburdened and outsource many practical nature conservation activities to LCAs. Therefore, the formation of LCAs is frequently pushed by agents of the local nature conservation authority (EI).

Integration in DVL

Almost all local LCA groups are integrated in the umbrella organization DVL on a voluntary basis (EI; Metzner, 2013). Local LCA groups are legally independent from the DVL, i.e., the DVL cannot impose any mandatory requirements (EI). Local groups benefit from membership at various levels: First, the DVL establishes a functioning network between separate local groups. Information exchange, transfer of best practices, and lessons learned is a key activity. Provision of advisory services on the institutional design and structure of groups, particularly during early group formation processes, helps to avoid pitfalls. Specifically, the exchange of information at

the Länder level is supported because nature conservation and the respective public PES programs are tailored to the needs of the separate Länder (EI). Second, the DVL retrieves information from the local groups on experiences, lessons learned, needs, etc., from the various groups, and analyzes these to derive conclusions on what needs to be done and changed to improve the situation of LCAs and that of nature and landscape conservation (EI, EW). As a lobby group for LCAs, the DVL forwards the demands and needs of local LCAs to the relevant political levels (both at the national level of Germany and supranational level of EU). For the CAP reforms, the DVL, for example, forwards best practice examples on PES schemes of the individual Länder to improve program planning for Germany (EI, EW).

In addition, the DVL is linked to a network of partnering organizations in Europe (for instance, the “Veelzijdig Boerenland” in the Netherlands, the “Farming and Wildlife Advisory Groups” in the UK and “Sicona” in Luxembourg) and also globally to Landcare International (Metzner, 2013).

The DVL helps to gather the interests of individual groups, enabling local stakeholders to obtain lobbying powers that cannot be met by private individuals. The DVL lobbies in the interest of nature and landscape conservation (EW).

Social capital and trust

Local LCAs and the DVL create social capital and, at least to a certain extent, trust between involved stakeholders in rural communities. In this context, social capital represents an intangible asset and reflects an external but structure-inherent institutional design characteristic of LCAs, as depicted in Fig. 3.

The term social capital is multifaceted, and diverse characterizations of social capital coexist (Adler and Kwon, 2000). Bridging social capital considers the benefits individuals derive from participation in social networks. Social networks and groups facilitate direct and indirect links to others (Adler and Kwon, 2000) that can be used and leveraged to achieve ends of one's own interest (Baker, 1990; Coleman, 1990). Bonding social capital adopts a collective perspective and focuses on the internal linkages of and between collective actors and groups that foster cohesiveness and benefits such as trust or diffusion of information (Adler and Kwon, 2000; Fukuyama, 1995; Woolcock, 1998; Portes and Sensenbrenner, 1993). Putnam defines social capital as “those features of social organizations, such as networks, norms, and trust that facilitate coordination and cooperation of mutual benefit” (Putnam, 1993: 35–36). He defines social capital in terms of economic efficiency, enabling “participants to act together more effectively to pursue shared objectives” (Sobels et al., 2001 citing Putnam, 1993, 1995).

Linking social capital refers to the “norms of respect and networks of trusting relationships between people who are interacting across explicit, formal or institutionalized power or authority gradients in society” (Szreter and Woolcock, 2004: 655). It refers to connections with people in powerful positions, such as e.g., political or financial institutions (Woolcock and Sweetser, 2002). The DVL at the national level can be understood as one institutionalized form of linking social capital, connecting local LCA groups voluntarily and representing their interests and needs at the political level (national level of Germany and supranational level of European Union).

Building social capital is costly because considerable ‘start-up’ costs for establishing and maintaining relationships accrue. Social capital is created through repeated interactions by individuals spending time and energy working together to achieve certain aims (Compton and Beeton, 2012; Coleman, 1990). Adler and Kwon (2000: 106) note that “social capital investment may not be cost-efficient in certain situations”. However, in areas where local LCA groups have already been established, social networks between stakeholders already exist, i.e., the social capital ‘start-up’

investment has been made and is a sunk cost. However, neither social capital nor trust is static; both can dwindle away easily if people move away or if misunderstandings or management mistakes occur.

Local LCA groups connect diverse and commonly opposing interest groups. Through iterative and continuous exchange between those groups, it is likely that LCAs do not only connect those groups but also, over the long run, unite those conflicting interest groups to work together toward a common goal (EI) (bonding social capital). Nahapiet and Goshal (1998) argue that social capital will not arise among people who do not understand each other because otherwise people would not cooperate. Cooperation with and involvement in LCAs is voluntary on behalf of all stakeholders. We therefore argue that a certain level of social capital is a prerequisite for LCAs to exist because otherwise stakeholders would not participate. Interviewees stated that the exchange between stakeholders produced acceptance and trust between them, in particular where disputes had been successfully settled (EI). In areas with heavily conflicting interests, for instance, in Natura2000 areas, some LCAs provide round tables for conflict resolution and information exchange between stakeholders (EI).

Trust is closely related to social capital. Ambiguity exists regarding whether trust equals social capital, trust is a precondition for social capital, or trust is a product of social capital. In this study, trust is conceptually distinguished from social capital as it reflects “a psychological state of individuals, whereas social capital is feature of social structure” (Adler and Kwon, 2000: 101). Social capital and trust are mutually reinforcing (Adler and Kwon, 2000), particularly for engagement in civic and political organizations (Brehm and Rahn, 1997). In the context of LCAs, there are two distinct types that are potentially present: First, personal or relational trust (Sutherland et al., 2013) between the stakeholders from the conflicting interest groups. It is not quite clear how to produce trust intentionally within heterogeneous communities.

Second, there is institutional trust, i.e., trust placed by individuals in the local LCA manager. All experts emphasized that LCA managers need to be accepted in a region and need to have a good reputation to achieve certain ends (EI). Experts stated that trust placed in the local LCA manager is a product of his or her work (EI). Furthermore, trust toward the local manager is reinforced due to his or her status as manager of a charitable non-governmental organization (see access to stakeholder). This finding is important because it clearly differentiates a governance structure incorporating LCAs from pure public-private governance structures.

The benefits of social capital and trust are diverse and generally influence outcomes of natural resource management positively (Compton and Beeton, 2012). The primary advantage of social capital is access to broader sources of information and better diffusion of information at lower costs (Adler and Kwon, 2010: 2013).

Assessing the potential to improve environmental effectiveness

Spatial targeting

In general, spatial targeting is considered to improve PES performance (Uthes and Matzdorf, 2013) and can be conducted at two levels: First, spatial targeting directs PES schemes to areas where they are most needed, e.g., to most suitable or vulnerable land parcels (Uthes et al., 2010). It provides environmental effects at lower costs than elsewhere (Uthes and Matzdorf, 2013). Second, targeted schemes, i.e., PES schemes that directly target site-specific environmental issues, and those schemes that impose more substantial management prescriptions on farmers, are considered to further enhance ecological effectiveness because total ES provision is augmented (Matzdorf et al., 2008).

The institutional integration of regional public stakeholders, nature conservation stakeholders and agricultural stakeholders

Table 1
PES implementation activities and potential LCA involvement.

	LCA's can help
Private search and information gathering	
Actions on behalf of the land steward	
Diffusion of information about existence of PES scheme, including availability of funds (focus on targeted schemes)	Well
Provision of information on content of PES scheme, including suitability of PES scheme to fit on own farm	Well
Provision of information on how to implement PES scheme (including estimation of needed working effort)	Well
Identification of most suitable plots/fields for PES (spatial targeting)	Well
Providing information on the pursued ecological goal (why PES scheme is important)	Well
Comparing different schemes/different alternatives	Not good
Estimating all costs that arise with implementing the PES scheme (including opportunity costs)	Not good
Private bargaining and decision taking	
Actions on behalf of the land steward	
Assistance in completing/filling out application forms	Well
Assistance with needed documentation of PES schemes	Well
If needed, providing/obtaining additional information during the application process	Well
Private policing & enforcement	
Actions on behalf of the land steward	
Ex-ante monitoring of contract compliance	Well
Public search and information gathering & spreading	
Actions on behalf of the public administration	
Identification of the most relevant ecological deficiencies – at local level –	Well
Identification of most relevant land stewards and land owner – at local level –	Well
Identification of most relevant plots and fields – at farm level –	Well
Diffusion of information about existence of PES schemes and availability of funds	Well
Public bargaining and decision taking	
Actions on behalf of the public authority	
Handling and editing of PES applications	Not at all
Approval/rejection of PES applications	Not at all
Diffusion of any additional information during the whole process	Well
Public policing and enforcement	
Actions on behalf of the public authority	
Monitoring of farmer's compliance with PES contract	Not at all
Preparation of inspection at farm level	Well
Evaluation of PES program or scheme at farm level	Well
Evaluation of PES program at the program level	Not at all

Source: Own elaboration.

and their embodied local social and ecological knowledge enables LCAs to improve spatial targeting by first detecting the most relevant farmers in a region and second by directing schemes to the most suitable or vulnerable plots in the respective farms (Table 1) (EW). Furthermore, institutional integration enables LCAs to redirect the targeted schemes to the most suitable or vulnerable land parcels at the farm level (EW). Practically, LCAs can help identify the most relevant actors at the local (regional) level and help identify the most relevant parcels at the farm level (Table 1) (EW). This sort of LCA involvement might be beneficial for targeted and horizontal PES schemes but also for the identification of Ecological Focus Areas² (EFAs). During the workshop, an expert emphasized that “LCAs are well-equipped to identify EFAs and their respective ecological potential for individual farms. Furthermore they can help to

register these areas within official field maps. LCAs pool ecological and nature conservational know-how, and have a better understanding of nature protection than for instance private consultants. This knowledge, combined with LCAs' connection to municipalities qualifies them in particular for any nature protection advisory services” (trans. S. Schomers).

Furthermore, LCAs can help to improve the problem of fragmented land ownership and implement spatial targeting at the landscape level (EW; Metzner et al., 2013). Currently, existing governmental PES schemes in Europe discourage landscape-level coordination and adopt a single-farm-level approach promoting individual and disconnected ecosystem management actions (Prager et al., 2012).

Participation

Acceptance of and participation in PES schemes is mainly influenced by the financial incentive (Mettepenningen et al., 2013; Ducos and Dupraz, 2006; Prager and Posthumus, 2010; Falconer, 2000). Also LCAs depend on payments to convince farmers to adopt conservation measures (EI, Metzner et al., 2013). Beyond the payment, however, LCAs could improve the decision-making process underlying the choice of participation (Fig. 3). LCAs hold the potential to improve farmers' participation in PES schemes by influencing their cognitive attitudes toward and perceptions of environmental concerns and improving farmers' know-how and skills by, e.g., providing technical assistance (TA) and environmental extension services. The provision of TA and enhancing farmers' awareness through extension officers has been an important driver for the adoption of conservation measures (Prager and Posthumus, 2010).

The institutional integration of the three stakeholder groups, their access as a charitable NGO without any sovereign power, and the inclusion of local ecological and social knowledge qualifies LCAs for the provision of TA and environmental extension services. Furthermore, these institutional design characteristics, including social capital and trust, hold the potential to positively influence the motivational structure underlying the decision-making process to participation. Social capital and trust can affect the adoption of best management practices positively, in particular as farmers are not atomized and utilitarian individuals behaving in a social vacuum (Harsanyi, 1968; Ishihara and Pascual, 2009). Rather, social networks influence decision making and any “attempts at purposive action are embedded [...] in concrete, ongoing systems of social relations” (Granovetter, 1985: 458). Social capital helps to diffuse information on PES instruments and can thus already affect the decision-making process of farmers (without TA and provision of extension services). Social capital can lead to a peer-group effect, either positively or negatively affecting the decision to adopt PES schemes (Munasib and Jordan, 2005), and improves social cohesion (Curtis and Lockwood, 2000). Social capital can help to diffuse valuable information among the network, solidarity, and produces “Strong social norms and beliefs, associated with a high degree of closure of the social network, encourage compliance with local rules and customs, and reduces the need for formal controls” (Adler and Kwon, 2000: 105). Prager (2002) emphasizes the importance of personal and social contacts as a factor determining participation and identifies several factors enhancing the acceptance of payment schemes at the level of actors: competency (or the assumption of competency), credibility and reliability of institutions, as well as attitudes between the various stakeholders involved. Well-functioning LCAs hold the potential to influence those factors.

During the workshop, it was emphasized that LCAs are well suited to provide and distribute information on the overall objective and pursued goals of the PES scheme (i.e., why PES scheme is important) (EW). Furthermore, it was stressed that LCAs are well

² Within the new EAFRD regulation, farmers need to allocate at least 5% of their agricultural area as Ecological Focus Areas (EFAs) in addition to any cross-compliance requirements.

suitable to advise farmers on which PES schemes are well suited for their farms, which management practices need to be changed and how and which of their plots will most likely result in the highest ecological impact (EW). This type of information holds the potential to influence attitudes toward and awareness of the environment, the willingness to undertake conservation measures in general, the perceived positive impact of PES on nature, the perception toward a given PES scheme and the perceived ease of implementation, the understanding of the scheme requirements and the perceived suitability of the PES to fit one's own farm (EW) (Fig. 3).

Assessing the potential to improve cost-effectiveness

Private transaction costs

Private TC adversely affect the private profit function of scheme participation and are key to participation in schemes (Fig. 3) (Mettepenningen et al., 2013; Falconer, 2000). TC need to be remunerated for because "measures are only attractive when they offer more than the compensation of the costs" (Mettepenningen et al., 2009: 656), i.e., scheme payments need to cover opportunity costs plus TC (Falconer, 2000; Mettepenningen et al., 2009). Given fixed public budgets for PES, reducing private TC allows for the maximization of total ES conserved and hence to improve economic efficiency.

Private search and information gathering processes. A major obstacle to participation is a lack of information on PES schemes (Wilson, 1997; Mettepenningen et al., 2013). Being locally enrooted, LCAs can diffuse and broker information on ecological deficiencies in a region including availability and funding of relevant PES schemes targeting these deficiencies (Fig. 3 and Table 1) (EW). Private TC can be reduced because farmers do not need to search on their own for relevant PES schemes. For example, LCAs can help to reduce asymmetrically distributed information on available PES schemes between principal (public administration) and agent (farmer). In particular, the existing social networks (social capital and trust) could facilitate the diffusion of information at relatively lower costs, at least to those farmers participating in local LCAs anyway (EW).

Furthermore, farmers need to determine which programs and schemes fit their farms relatively well. To achieve any ecological impact, it is relevant to know about the deficiencies in a region and to know which plots are most relevant to overcome this deficiency (see section "Spatial targeting"). LCAs can help to identify relevant areas and plots that are likely to yield the highest ecological impact (Table 1).

During the expert workshop, it was emphasized that LCAs are well suited to provide a farm assessment to farmers; they can clarify any doubts concerning how measures need to be implemented and can provide TA, which is of particular importance in the context of PES schemes (Fig. 3) (EW). Furthermore, asset specificity (Fig. 3) refers to specific agronomic knowledge needed to implement PES schemes (Fig. 3), which can be provided by LCAs.

Although LCAs are well suited to estimate the effort required to implement PES schemes, it was emphasized that LCAs are not well suited to compare different land use management alternatives and their respective economic income effects, such as comparing the private economic income derived from land use practices with and without PES schemes (Table 1) (EW). For such economic income calculations and to compare income alternatives from land use practices, private extension officers or farmers themselves are likely to have more competencies, specifically because a fine-tuned and professional business consultation (including a detailed analysis of the separate farm branches) is needed. Private farm advisors commonly have insights into economic returns on business operations, whereas LCAs would need to familiarize themselves with the diverse economic calculations already performed by the private

business consultant (EW). This is likely to increase TC, especially as the total number of actors is increased.

Private bargaining and decision taking processes. Many farmers perceive PES application procedures as too bureaucratic, not easily understandable and having high TC; in addition, technical eligibilities (assessment of farm diagnostic, presenting field maps, etc.) add considerably to private TC (Falconer, 2000; Ducos and Dupraz, 2006; Mettepenningen et al., 2009). Reduction in paperwork and savings in application procedures were identified as key drivers influencing participation as private TC are reduced (Mettepenningen et al., 2013; Falconer, 2000). Ducos and Dupraz (2006: 15) emphasize that "farmers have an aversion to time passed on administrative works" because this increases their costs of PES participation.

Currently, only few LCAs provide assistance within application procedures. However, this task could be easily performed by LCAs (EI, EW). "We do advise landowners and propose to perform certain land use practices on their plots. If farmers agree we help to prepare the contract documents. Contracts are signed, however, with the local government" (EI, trans. S. Schomers).

If LCAs help to complete PES application forms, to prepare field maps, etc., private TC can be reduced as certain activities are turned over to LCAs (Fig. 3). However, most likely, total TC will be reduced as well because LCAs currently hold relevant expertise and have the potential to develop additional expertise with respect to the application procedure. A learning effect accumulating with frequency will decrease TC for individual transactions if these are repeated over time (Mettepenningen and Van Huylenbroeck, 2009; Rorstad et al., 2007; Falconer and Whitby, 1999), especially for similar transactions (Coggan et al., 2013a,b). This learning effect can be expected for LCAs performing the same or comparable paper work for different private individuals (Fig. 3). LCAs thus hold the potential to decrease overall marginal TC. Furthermore, public TC will be decreased if applications are filled in correctly (Falconer, 2000).

Private policing and enforcement processes. Experts participating in the workshop discussed that LCAs are well suited to assist farmers in preparing for the official monitoring conducted by public authorities (Table 1). An ex-ante monitoring of contract compliance includes a verification of whether relevant documentation is in place, whether habitats have been managed according to the conservation objective and whether all details of the contract have been sufficiently implemented. This ensures that farmers will not encounter major difficulties during the official monitoring. Several LCAs already provide such services to their clients, especially to those clients who frequently encounter problems (EW).

Preparing farmers for the final monitoring conducted by public agents is likely to increase private TC in the first place because the total number of inspection visits is increased. However, during the final inspection visit by public agents, both public and private TC are most likely lower because farmers commonly encounter fewer difficulties (including risk reduction of sanctions and/or revisits). Whether ex-ante inspection assistance by LCAs will increase or decrease overall private TC (including risk reduction) is difficult to predict and depends on the individual farmer (Table 1). However, farmers considering such a pre-check as rather unbeneficial and costly will not enroll for such a service provision (EW).

Public transaction costs

Regarding the practical implementation of existing PES schemes, many actions can be (and already are) outsourced from public administration to LCAs. Cost-effectiveness can be improved, if LCAs perform these activities at relatively lower (transaction) costs.

Public search and information gathering processes. Public administrators can harness existing social structures to provide information on PES schemes, including availability of funding for the respective schemes. For example, LCAs that have successfully established a functional social network between actors with relatively high levels of trust can exploit the structure to diffuse information at relatively lower costs by providing information on PES in combination with their existing services. During the expert workshop it was emphasized that local LCA groups are well equipped to disseminate information and to clarify doubts with respect to actions needed to fulfill contracts. The integration of municipalities, nature conservationists and farmers enables LCAs to disseminate information on targeted schemes to the most relevant stakeholders (see section “Spatial targeting”) at relatively lower costs (Fig. 3 and Table 1), if these relevant land stewards are either (active) members of the LCA or consider the LCAs to be reliable brokers (EW).

Public bargaining and decision-taking processes. LCAs cannot support public authorities in handling and editing PES applications. Furthermore, LCAs can neither approve nor reject submitted PES applications. However, LCAs can communicate any additional information required throughout the entire PES implementation process (EW).

Public policing and enforcement processes. Monitoring of PES. In Germany, farmers’ compliance with governmental PES schemes is monitored exclusively by public authorities. There is no legal framework enabling LCAs to perform monitoring activities. During the workshop, it was emphasized that LCAs are rather well suited to perform advisory services. Commonly, advisory functions and control functions should not be performed by the same person or institution, as there is likely to be a conflict of interest. Providing advisory functions and assisting private farmers to prepare for the mandatory PES compliance inspection (see section “Private transaction costs”) is likely to ultimately decrease public TC in terms of time savings, non-compliance detection due to missing or faulty documentation and less need for follow-up inspections (Table 1) (EW).

Evaluation of PES. At the program level, LCAs cannot evaluate PES performance (Table 1). LCAs have neither access to any statistical databases revealing overall PES adoption rates nor expertise in running such statistical analyses (EW).

At the farm level, LCAs can evaluate the satisfaction of private farmers with schemes and assess which measures were implemented smoothly and what difficulties were encountered (EW). LCAs can communicate practical experience and expert knowledge on PES implementation to the public authority and make recommendations on program or scheme modifications to progressively adapt it better to local circumstances (EW). LCAs and the DVL frequently evaluate PES programs at the farm level (EW) and forward the information to the relevant political levels as a lobby group to promote the interests of the local LCAs (EW). The more stakeholders are involved to discuss necessary changes to existing PES programs and the more heterogeneous the interest groups are, the higher the overall TC becomes (Mettepenningen et al., 2011). However, adapting PES to better fit to local needs and deficiencies is likely to increase the environmental effectiveness of schemes over the long run.

Bounded rationality

The concept of bounded rationality assumes that individuals intend to behave economically rationally; however, their capacity to actually do so is limited by their cognitive ability and the finite amount of time available to gather and process information (Simon, 1978). The concept focuses “on institutions that can help humans to better handle the fact that they are not all knowing” (Vatn, 2005:

94). Given positive transaction costs, stakeholders lack the time and resources to find an optimal solution ex ante contract signing (Vatn, 2005), leading to the problem of unavoidably incomplete contracts (Williamson, 1996). TC is thus affected “as transactors collect and analyze information before, during and after transaction decisions are made” (Coggan et al., 2010: 1781). Extensive information sourcing specifically increases private TC up to uneconomic thresholds (Simon, 1978), which holds true in the case of PES (Mettepenningen et al., 2011; Mettepenningen and Van Huylenbroeck, 2009) and can thus impede PES adoption (Mettepenningen et al., 2013). The impact of bounded rationality on TC becomes an issue if risk is involved and asset specificity and high levels of uncertainty prevail, as well if there is a need to prevent opportunism (Williamson, 1975). An overview of definitions and sources of asset specificity is provided by Coggan et al. (2013a). In the context of PES, asset specificity may arise if measures need to be implemented on certain sites to, for instance, overcome habitat fragmentation (site specificity) or if certain agronomic knowledge is needed (knowledge specificity). In addition, different types of uncertainty exist. First, uncertainty regarding the future levels of agricultural commodity prices and hence of opportunity costs regarding alternative land use practices (producing agricultural commodities vs. producing ecosystem services) may exist. Second, uncertainty regarding what one needs to do to implement the contracted PES schemes may exist. Third, uncertainty may exist with respect to the behavior of the contracting parties and determining how to meet their obligations, which primarily affects the TC of monitoring and enforcement (Coggan et al., 2013a). The first uncertainty affects, for example, the forgone income of farmers and reflects the risk of losing money if payments of signed PES contracts do not match the increasing agricultural commodity prices. This uncertainty is of distinct importance if asset specificity or long-term contracts are involved. There is hardly any scope for LCAs to overcome this risk: “The land market in Schleswig Holstein is locked due to the increasing price tendency for agricultural commodities and the boom in biogas. On those areas no contractual conservation management agreements are signed anymore. Some arable farms can maybe implement some buffer strips, but apart from that there is not much we can do. PES schemes cannot compete with the current intensive field use” (EI, trans. Schomers). The second uncertainty, i.e., not knowing what one needs to do to comply with the contract and the associated risk of not receiving the payment or being fined if contracts are not fulfilled, can be reduced by LCAs through the provision of extension services. The third uncertainty is particularly relevant if opportunism prevails and contracting parties can provide false or incomplete information to obtain better profits (Coggan et al., 2013a), which primarily affects TC through increased monitoring and enforcement. However, Ducos and Dupraz (2006), Ducos et al. (2009), Falconer and Whitby (1999) and Mettepenningen et al. (2011) emphasize that trust between contracting parties can reduce TC related to opportunism. Furthermore, farmers’ attitudes and understanding of schemes affect compliance and reduce public TC associated with monitoring and control (Falconer and Whitby, 1999). Hence, establishing a well-functioning social network with trusting relationships between stakeholders and providing extension services might decrease public TC associated with monitoring and control.

Discussion and conclusion

Framework and transferability

Large governmental PES programs, such as agri-environmental programs in Europe, are commonly implemented by complex governance structures, involving different actor groups with varying roles for NGOs, public and private advisory organization or

governmental and semi-governmental entities (Sutherland et al., 2013). The need to assess the relative excellence and fit of diverse intermediary institutions will gain in importance with the further mainstreaming of the ES concept and increased PES implementation activities. Intermediaries assisting in PES implementation will be of particular importance in large PES programs, such as in the context of global ES and international payments for ecosystem services (IPES) schemes (Farley et al., 2010). Generally, the larger the spatial scale of PES programs, the greater the need for local and regional institutions and intermediaries ensuring the flow and transfer of resources between stakeholders (Farley and Costanza, 2010).

The framework presented in this paper can be adapted and transferred to assess the potential fit of diverse intermediaries for different PES programs and schemes as well as in different institutional settings (developing countries vs. industrialized countries; private “Coasean” PES schemes vs. public “Pigouvian” PES programs or those going beyond this dichotomous PES classification) (Schoomers and Matzdorf, 2013). The economic mechanism underlying large governmental PES schemes as well as most PES implementation difficulties encountered are very similar across countries and continents; similar PES programs across countries and continents differ mostly with respect to the surrounding institutional environment (Schoomers and Matzdorf, 2013). The framework presented is based mainly on Williamson’s ‘discriminating alignment’ application (1985), which does not consider the institutional environment (such as enforceability of law, distribution of property rights). Thus, the framework can be transferred to different PES cases in which mostly participation, ecological accuracy (spatial targeting) and/or TC are the main barriers affecting PES performance. To transfer the framework to different PES programs and institutional settings, the separate steps of the application (Fig. 1) need to be reviewed and reconsidered carefully. The theory-based framework needs to be adapted to the respective local conditions and problems: (1) Which factors influence PES performance (Spatial targeting? Participation? Transaction costs? Or something else?)? Whereas spatial targeting commonly appears to be a problem in larger PES programs, it might not be an issue in a smaller PES case that is implemented only very locally in a certain region. In a different setting, a major obstacle to ecological accuracy of PES might be for instance leakage (Wunder, 2008). (2) Which determinants affect PES performance in the considered case? Are those determinants summarized in Fig. 2 relevant? Are there different, perhaps complementary, determinants that need to be considered? For example, in a different setting, participation, ecological accuracy or TC might be strongly influenced by other determinants not listed in Fig. 2. If new factors (such as e.g., leakage) are considered, the new determinants need to be reviewed carefully. (3) How could these determinants be influenced by an intermediary, i.e., what are the institutional design characteristics of the respective intermediary that can help to ensure a better transfer of resources between the contracting parties? (4) All necessary actions to ensure PES implementation need to be compiled to discuss which of those actions are affected by the intermediaries’ potential and which are not.

Landcare associations

The primary aim of this paper is to emphasize the proposed framework as a tool to assess the potential of intermediaries to improve PES performance. The results on LCAs are considered secondarily and need to be interpreted with some caution: First, the presented results considerably reflect the viewpoint of LCAs and DVL. Viewpoints and experiences from experts independent of LCAs were mainly expressed during the workshop. Second, the

workshop was rather small ($n=7$), limiting the robustness and significance of the derived findings.

The presented results regarding the potential of LCAs are generalizations of the overall potential of LCAs. There is no such thing as one LCA. No inferences can be made regarding the degree to which LCAs actually do exploit this potential either at the aggregated national or disaggregated local level. No inferences can be made regarding whether individual LCAs currently have the capacity or will to perform those intermediary functions in addition to their regular business operations. No conclusions can be drawn regarding whether certain individual LCAs are especially successful in harnessing their potential whereas others are not. Currently, most LCAs do not provide PES extension services on a regular basis, commonly because there is a lack of remuneration for such activities. Some LCAs, however, do provide such activities, mostly on a sporadic scale and only within their usual business operations (EI). The difference across diverse LCAs in Germany is at least partially caused by a heterogeneous institutional environment. The institutional environment in which PES are implemented differs between the Länder with respect to (1) the availability and range of public PES measures offered and (2) the institutional and particularly financial support provided to LCAs (EI). The institutional environment, however, clearly affects the fit of governance structures and the level of TC (Coggan et al., 2013a) and the scope of active PES implementation support provided by the intermediary (Bosselmann and Lund, 2013).

However, the findings suggest that governance structures incorporating LCAs hold considerable potential to (1) influence the motivational structure underlying the decision-making process for PES adoption and (2) to improve PES performance by producing, accumulating and diffusing local knowledge. Local LCAs exhibit what Ostrom defines as local “time and place information” (1993: 50). This helps them to channel targeted PES schemes to the most vulnerable areas. The targeting of PES schemes increases the environmental effectiveness of PES because it helps to maximize ES provision given fixed budgets and voluntary requests for participation outweighing available funding (Wünscher et al., 2008). Simply increasing participation rates alone may lead to an inefficiently low supply of ES, if contracts are not targeted at landowners providing ES at the lowest cost and those lands that are most suitable to supply the contracted ES (Ferraro, 2008, Uthes et al., 2010).

Furthermore, LCAs can potentially decrease (3) private transaction costs. To a lesser extent, LCAs can (4) reduce public TC, especially if public authorities outsource those transactions to LCAs, which can be performed at relatively lower costs by the latter. Consequently, LCAs are very well suited to improve the PES performance of those schemes and measures that either rely considerably on local knowledge to improve spatial targeting or lack satisfactory adoption rates, especially if adoption is hindered either by the motivational structure underlying the decision-making process of farmers or if high private TC impede PES adoption (Fig. 3). However, PES targeting of local intermediaries is often determined by the values and interests of the separate organizations and the connected stakeholder group (Bosselmann and Lund, 2013), determining which local actor groups could be approached by local LCAs relatively easily. Still, the identified potential of LCAs to improve overall PES performance does not include the potential for misaligned incentives of individual field officers. Pham et al. (2010) raise concerns about the neutrality of intermediary organizations because they might be influenced by strong relationships or derived benefits from either group of stakeholders. This implies that incentives for local LCAs could exist to focus on maximization of funds for their farmers instead of truly focusing on environmental outcomes. In addition, individual LCA officers could undermine the PES priorities as defined by the PES funder to further their own interest. The presented results are

underpinned by related findings published in the literature. Overall, the provision of TA and enhancing farmers' awareness through extension officers has been an important driver for the adoption of conservation measures (Prager and Posthumus, 2010). Organizations comparable to LCAs, such as the Farming and Wildlife Advisory Group (FWAG) in the UK, have enhanced knowledge on best farming practices to overcome, e.g., soil erosion problems and improve soil management (Posthumus and Morris, 2010). FWAG has been credited with facilitating the promotion of governmental PES schemes so successfully that the Countryside Stewardship Scheme has been oversubscribed by participants (Falconer, 2000).

In Australia, Landcare participation has been credited with enhancing both awareness of environmental concerns and farmers' knowhow and skills. Consequently, Landcare "has contributed toward a change in farmers' attitudes" (Wilson, 2004: 476) and increased "the adoption of best management practices" (Curtis and Lockwood, 2000: 65 referring to Curtis and De Lacy, 1996a, 1996b). This contribution led to "an increase in the transparency of environmental degradation at the local level and a greater awareness, understanding and knowledge of land degradation issues and natural resource management by Landcare farmers" (Martin and Halpin, 1998: 455).

Furthermore, the Australian Landcare movement has been credited with creating social capital (Sobels et al., 2001; Compton and Beeton, 2012). As a social network, Landcare allows for the creation of vertical (i.e., formal) and horizontal (i.e., informal) communication and diffusion effects (Prager et al., 2012; Tamini, 2011). Within German LCAs, the former is created through the integration of LCAs in the DVL. However, the horizontal communication structure appears to be a key in determining whether Landcare can be considered a "positive phenomenon" (Compton and Beeton, 2012: 159) because it fosters adequate levels of bridging and linking social capital. A driver for the creation of bridging and linking social capital is the Landcare facilitator (Compton and Beeton, 2012). In line with this finding, experts emphasized that trust placed in the German LCA manager is crucial to operating successfully (see section "Elaboration of key institutional design characteristics"). Social capital helps to diffuse information at relatively lower costs, whereas trust ensures that the transmitted information is received and approved. Thus, social capital and trust help to improve cost-effectiveness (Mettepenningen et al., 2011; Morrison et al., 2008; Ducos and Dupraz, 2006; Mettepenningen and Van Huylenbroeck, 2009; Coggan et al., 2010) and environmental effectiveness (Mettepenningen et al., 2013; Prager and Posthumus, 2010). Intermediaries hold the potential to reduce TC if they provide information on PES in combination with their other and already existing services (Bosselmann and Lund, 2013).

Generally, ES provision in public payment programs can be greatly enhanced if feedback loops and two-way communication flows between relevant stakeholders are integrated in the governance structure, precisely because both social systems and ecosystems are complex, non-static systems subject to constant but also abrupt change (Prager et al., 2012; Folke, 2006). Based on the emphasized institutional design characteristics, LCAs could be one appropriate structure for fostering such feedback loops.

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Facilitating Governmental Payments for Ecosystem Services through Local Intermediaries: An Institutional Analysis in Germany

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Abstract:

Economic instruments for the management of natural resources and ecosystem services governance have gained in importance over the past few years. Payments for ecosystem services (PES) pay land users for the provision of ecosystem services or land use practices that are assumed to provide environmental benefits. The development and implementation of large-scale public PES programs, as agri-environmental measures (AEMs), depend on complex governance structures and involve diverse actors and stakeholder groups. However, research on intermediaries within PES implementation is still in its infancy. This paper aims to fill the gap by providing a case study analysis on the implications of a particular intermediary within a governmental PES governance structure. The unit of analysis are the German Landcare Associations (LCAs) which may intermediary support the facilitation of implementing AEMs in Germany. This analysis aimed at identifying the institutional challenges and constraints that hinder cost and environmental effective AEMs, at determining overall institutional framework conditions that need to be addressed to better enable LCAs for AEM facilitation, and at investigating the current and prospective future involvement of LCAs as an intermediary in the context of AEMs. The study is based on an online questionnaire including all German LCAs. The results of the study emphasize few, but severe challenging factors that adversely affect AEM implementation against the background of intermediary involvement.

Keywords:

Transaction costs, agri-environmental measures, landcare associations, cost-effectiveness, environmental effectiveness

1. Introduction

The consideration and use of economic instruments for the management of natural resources and ecosystem services governance has gained in importance over the past few years. The concept of payments for ecosystem services (PES) pays land users for the provision of ecosystem services or land use practices that are assumed to provide environmental benefits and thus works “by changing incentives rather than by making explicit rules

or directives” (Jack et al., 2008: 9466). At the international level, the majority of PES cases are developed, funded and implemented by governments; i.e. are public PES programs (Scomers and Matzdorf, 2013). Such governmental payment programs exist in many countries around the globe, e.g. agri-environmental measures (AEM) within the Common Agricultural Policy (CAP) of the European Union (EU), the Farm Bill in the United States (Meyer et al., 2015, Baylis et al., 2008; Scherr et al., 2007). Within the European agri-

cultural landscape, farmers have significant positive and negative impacts on the environment and governmental PES in the form of AEM have been of major importance for solving agri-environmental problems. Since their introduction, AEM have gained in importance in terms of budget allocations and land enrolment. In the EU they are now an obligatory instrument for all member states (Uthes and Matzdorf, 2013). However, AEM have frequently been criticized for low levels of effectiveness (Deumlich et al., 2011; Kleijn et al., 2004, Kleijn and Sutherland, 2003). Therefore, PES research often focuses on how the performance of these programs can be improved. For doing so, the analysis of PES' institutional structures (Vatn, 2015; Wunder et al., 2008) or PES' contract design characteristics is central (cf. Galler et al., 2015; Meyer et al., 2015; Rolfe and Windle, 2011; Uthes et al., 2010; Zabel and Roe, 2009; cf. also Schomers and Matzdorf, 2013 for a broader overview). More recently, actor-centred perspectives on PES performance have occurred – in particular for public PES programs. The development and implementation of these mostly large-scale public PES programs depends commonly on complex governance structures and involves diverse actors and stakeholder groups with varying roles and responsibilities for governmental and semi-governmental organizations, public and private advisory organizations, or non-governmental organizations (NGOs) (Matzdorf et al., 2014; Sattler et al., 2013; Bosselmann and Lund, 2013; Huber-Stearns et al., 2013, Sutherland et al., 2013). Recently, the importance of intermediaries as “actors who take on roles that connect and facilitate transactions between buyers and sellers” of PES (Huber-Stearns et al., 2013: 105) has increasingly been recognized, because intermediaries have been credited with the potential to improve the performance of PES implementation (Sattler et al., 2013; Ridier et al., 2011; Muradian et al., 2010; Ducos and Dupraz, 2006). It has been shown that governmental PES implementation crucially depends on local level knowledge on economic, social, and ecological circumstances which can be provided by an intermediary. Thereby, locally organized intermediaries can e.g. impact on the cost-effectiveness and environmental effectiveness of PES through local contacts and the provision of agri-environmental advice (Schomers et al., 2015a and 2015b). Such locally organised intermediaries hold the potential to influence the motivational structure underlying the decision-making process to PES participation or to deliberately target PES to the relevant areas and actors (Schomers et al., 2015b) or help to reduce

private and public transaction costs (TCs) in general (Schomers et al., 2015a). Typically, high levels of TCs often cause low levels of cost-effectiveness of PES (Vatn, 2010). However, research on intermediaries within PES implementation is still in its infancy. Only little research has been conducted on their roles, potentials or responsibilities and their influence on PES success so far (cf. Matzdorf et al., 2014). This paper aims to fill this gap by providing a case study analysis on a particular intermediary within a governmental PES governance structure. German Landcare Associations (LCAs) may support the facilitation of implementing AEM in Germany and have been considered as a suitable intermediary (cf. Schomers et al., 2015a and 2015b).

In this paper, we analyse how intermediaries can improve the problem of transacting AEM. This analysis has three aims:

- 1) identifying the institutional challenges and constraints that adversely affect AEM implementation as faced by an intermediary,
- 2) analysing the overall institutional framework conditions that need to be addressed to better enable the intermediary for the facilitation of AEM, and
- 3) investigating the current and prospective future involvement of LCAs as an intermediary in the context of AEM facilitation, i.e. analyse which transactions can be facilitated by an intermediary.

Based on the results of these three aims, we discuss the contribution of intermediaries to alleviate the identified adverse institutional framework conditions that challenge the AEM implementation.

Thereby, firstly, we frame the identified current and prospective future involvement of intermediaries to the identified institutional challenges and constraints that prevent a cost-effective AEM implementation against the backdrop of transaction costs analysis. This proceeding is based on an already existing analytical framework for assessing the potential of intermediaries to improve the performance of PES (Schomers et al., 2015a), which shows how intermediary involvement affects private and public TC. Secondly, we discuss how intermediaries can be enabled to become an important actor who improves the implementation of AEM. And finally, we put the findings of this paper into the broader perspective of international PES discourse. Thereby, we understand that due to the extensive experience with national governmental payment programs in the EU, the international PES discourse could profit from an exchange between AEM and PES research.

2. Method

In this section we first briefly describe our case study and then explain which methods were used for data collection and analysis.

2.1 Case study:

German Landcare Associations and AEM

Our unit of analysis are the German Landcare Associations (LCAs). LCAs are local groups that are organised as charitable non-profit and non-governmental organisations integrating municipal stakeholders, farmers, and nature conservationists on formal grounds (Schomers et al. 2015a, 2015b). LCAs operate at the district level and exist in all federal states of Germany. They are formally committed to preserve and maintain the environment and landscape. They are frequently involved in areas and activities that entail high conflict potentials, such as nature conservation activities in Natura 2000 areas or implementation of the Water Framework Directive (Metzner et al., 2013a and 2013b). LCAs therefore cooperate with farmers and public administrations on a voluntary basis. They often provide a collaborative approach towards the implementation of nature conservation activities (Prager, 2015a), and have therefore been designated in the German Federal Nature Conservation Act as one organization that should preferably be commissioned with the active implementation of nature conservation and landscape protection (Schomers et al., 2015a; Metzner, 2013b).

LCAs use diverse funds for their financing, including membership fees, private money from the Impact Mitigation Regulation, or public funds such as the ELER regulation for landscape management and nature conservation or AEM to perform landscape management and nature conservation activities (Prager 2015a; Metzner, 2013b). However, the diverse local LCA groups work to different degrees with AEM. Whereas some implement AEM themselves, others e.g. only provide information on AEM to farmers. Nevertheless, almost all LCAs hold a certain expertise on AEM and their respective institutional deficiencies and strengths. Consequently, LCAs are a suitable candidate for identifying relevant institutional challenges and constraints that hinder an effective and efficient AEM implementation. Furthermore, many LCAs already operate – again to varying degrees – as an intermediary in the context of AEM facilitation and are thus qualified to elaborate on the overall institutional framework conditions that need to be addressed to better enable intermediaries to facilitate AEM.

However, the availability and content of nature conservation measures – including AEM - differs highly across the federal states. There are also differences across federal states with respect to the monetary organizational support for local LCAs. Because of this differences, the questionnaire for this study (specified in section 2.2) had to be framed in a general manner to ensure that collected data were comparable across all LCAs in Germany. The data represent the expert knowledge of local LCA field managers, thus providing a good overview of LCAs actual and prospective future involvement in the context of AEM (Metzner, 2013b).

2.2 Data collection

We conducted an online questionnaire with QuestBack EFS Survey and invited all German LCAs to participate. We obtained the email contacts from the LCA umbrella organisation, being the German Association for Landcare (DVL – Deutscher Verband fuer Landschaftspflege, www.lpv.de) and from the regional coordination office in Baden Wuerttemberg¹. LCAs without valid email addresses were contacted by phone. We did not reach three local LCAs, neither by telephone nor email. Furthermore four LCAs declined to participate when being called by phone. In total, the invitation to participate in the online survey was sent to 152 LCAs. The invited participants needed to click on a programmed link in the email to open the online survey. In response, 87 LCAs clicked on the first page of the survey, 67 LCAs answered some questions but dropped out before finishing the questionnaire. Out of the 152 invitees, 55 fully completed questionnaires were returned. Only these are included in the result presentation and discussion. This reflects a response rate of 36.2%. As depicted in Table 1, the response rates across the federal states are comparable; only Saxony has a lower response rate than the other federal states. Bavaria and Baden-Wuerttemberg hold by far the largest number of local LCAs and exhibit representative response rates. The survey was online for 6 weeks (January – March 2014) and two reminders were sent out by email during this period.

¹ In Baden-Wuerttemberg, many new LCAs have been founded on political initiative over the past few years (cf. Metzner, 2013b). Not all of them were already listed with the DVL at the time of the survey.

Federal state	Existing LCAs	Invited LCAs	Participating LCAs	Participation rate per federal state
Bavaria	55	52	19	36,5%
Baden-Wuerttemberg	21 (25) ¹	25	10	40,0%
North Rhine-Westphalia	15	14	5	35,7%
Saxony	15	14	2	14,3%
Brandenburg	10	10	3	30,0%
Saxony-Anhalt	9	9	3	33,3%
Mecklenburg-Hither Pomerania	7	7	2	28,6%
Thuringia	7	7	4	57,1%
Hesse	6	5	2	40,0%
Schleswig-Holstein	5	4	2	50,0%
Lower Saxony	3	3	2	66,7%
Rhineland-Palatinate	2	2	1	50,0%
Total Germany	155 (159)	152	55	36,2%

¹ The higher number in brackets indicates that there are more local LCA groups in Baden Wuerttemberg than had been listed on the web page of the DVL at the day of survey mailing.

Table 1: LCAs in Germany and survey participation rates at the federal state level.

2.3 Questionnaire

The online questionnaire (see Annex 1) entailed open and closed questions. Open questions were used to assess the institutional challenges and general framework conditions that hinder an effective AEM implementation. Closed questions were used regarding LCAs overall involvement in the context of AEM implementation as well as their specific facilitation of AEM (including AEM development):

Research objective 1 (RQ1):

- “What do you consider as being the largest challenges and constraints that hinder an effective AEM implementation strategy?”

Research objective 2 (RQ2):

- “Which overall framework conditions need to be addressed to better enable you as an intermediary for the facilitation of AEM?”

To address RQ1 and RQ2, the answers to the open questions were grouped according to the identified institutional challenges and general framework conditions by the first author as presented in the result

section. To also obtain a reference in view of their current and future involvement we defined a third research question, which was sub-divided into two parts.

Research objective 3 (RQ3):

Firstly, we asked about LCAs' current involvement in the context of AEM implementation:

“How are you currently involved in the context of AEM?” with the closed answer categories “not at all”, “operatively, with own AEM application”, “operatively, with own Landschaftspflegehof”, “provision of information and assistance, to all farmers in our region”, “provision of information and assistance, only to farmers being member”, “provision of information and assistance – only to particular group of farmers”, “provision of information and assistance – only to farmers in a particular region”.

- 2 A Landschaftspflegehof practically supports environmentally sound management practices within agricultural lands. It thereby e.g. helps to preserve culturally formed landscapes through grazing and the like.

The last two answer categories entailed a box to specify what kind of farmers and areas.

Secondly, we asked:

- *“Would you like to facilitate the implementation of AEM in the future?” with the predetermined answer categories “yes” or “no”.*

We assessed LCAs’ specific current and prospective future involvement in the context of AEM facilitation. Therefore, we prepared a document listing all required AEM implementation transactions ex-ante survey development (see also Schomers et al., 2015a, 2015b). The document was sent iteratively to experts in the field of AEM implementation by email, with an invitation to verify, revise and complete the listed transactions. Subsequently, additional experts were invited to a workshop to revise and complement the listed transactions, but in particular to discuss which of these transactions can be supported by a non-governmental intermediary (who misses sovereign powers).

The identified activities that can be facilitated by LCAs were subdivided in three basic categories:

- 1) The provision of agri-environmental information and assistance to farmers,
- 2) the brokering of AEM to support a spatial targeting approach, and
- 3) the programming and development of AEM.

LCAs’ involvement in AEM facilitation was then enquired by asking if they facilitate the listed activities (see Table 2, result section). LCAs could state their respective involvement by clicking the closed answer categories “yes”, “we could provide service in the future”, “no”, “not applicable/don’t know”. The very last transaction in Table 2 “we contribute our local knowledge to the programming and further development of AEM” did not entail the answer category “we could provide the service in the future”, but rather asked how LCAs currently contribute this knowledge with an open answer box.

Each survey page also provided a comment box so participants could leave additional information or express concerns when feeling insecure with the closed answer categories. Given comments are highlighted in the result section; citations are in italics and were translated to English by the first author.

3. Results

3.1 Institutional challenges hindering effective AEM facilitation (RQ1)

Local LCAs stated various institutional challenges that hinder an effective AEM implementation in Germany. On the one hand these challenges concern the institutional framework conditions of the respective AEM, being: (i) the overall payment level for nature conservation, (ii) the bureaucracy of public administrations, (iii) the complexity and inflexibility of AEM, and (iv) too little agri-environmental advice and assistance provision towards farmers.

Regarding payment level (i), LCA field managers particularly indicated that an effective AEM implementation is hindered by rising opportunity costs on behalf of farmers, which challenges extensive agricultural land use practices. Combined with too low AEM payment levels, measures appear to be unattractive on economic grounds. Payments miss to provide economic incentives as they are below farmers’ opportunity costs and do not consider private transaction costs (TC). “We miss a remuneration of farmers in accordance with their effort, including time investment.” (LCA Baden Wuerttemberg, comparable comments in Bavaria, North Rhine Westphalia, Baden Wuerttemberg). “The largest challenge we face is the tremendous land consumption, making it more and more difficult to motivate farmers to participate in AEM. Land leases are escalating, increasing prices for energy crops and wind energy planning almost impedes extensive agricultural practices.” (LCA North Rhine Westphalia; comparable comments in Baden Wuerttemberg and Bavaria). “We are constrained by AEM’ lack of planning security and their remuneration of forgone profits – AEM miss an incentive component” (LCA Bavaria; comparable comments in Thuringa and Mecklenburg-Hither Pomerania).

Regarding bureaucracy (ii), LCAs emphasize that an effective AEM implementation strategy is often challenged by high levels of public bureaucracy and missing cooperation between the diverse public administrations, leading to a lack of timely provided information and high TC. “The largest challenge is the cooperation and information exchange with the diverse actors involved in AEM implementation, in particular the coordination among the different public authorities” (LCA in Baden Wuerttemberg). On the one hand, this increases the technical complexity of implementation, as the “pub-

lic administrations currently use different GIS systems, which are not compatible with one another – implementation was easier if the different administration would use the same system” (LCA in Baden Wuerttemberg). On the other hand, public administration “frequently misses to provide detailed information on the respective AEM conditions in time“ (e.g. LCA in Bavaria). This hampers the intermediary in getting “prepared for the provision of information and assistance to farmers“ (LCA Thuringia).

Regarding the over-complexity and inflexibility of AEM (iii) (e.g. LCA Bavaria, Baden Wuerttemberg, North Rhine Westphalia) they emphasize that AEM implementation is challenged by “a lack of reliable and consistent guidelines and specifications” (LCA Baden Wuerttemberg), furthermore they consider that “the documentation and billing procedures are too complicated” (LCA Baden Wuerttemberg). “The bureaucratic burden needs to be reduced, in particular the liability risk for farmers” (LCA North Rhine Westphalia) next to the “problem of liability risk in case of deficient advisory services” (LCA Bavaria). One LCA also emphasized that farmers need a “long term guarantee for the financing of measures” (LCA Thuringia, comparable in Mecklenburg Pomerania).

Finally, many LCAs point out that they consider the provision of agri-environmental advice and assistance towards farmers as very important, as many farmers do not have sufficient information and knowledge on the measures (iv), or the goal of the measures. One LCA emphasized that the provision of information is relevant to “convince farmers that nature conservation is important and to win them for specific nature conservation measures.“ (LCA in Thuringia).

3.2 Framework conditions for effective AEM implementation (RQ2)

In principle, LCAs support the notion that intermediaries can enhance AEM implementation and help to overcome some of the mentioned institutional challenges. In particular the provision of agri-environmental advice and assistance could be offered by such an intermediary. Intermediaries providing advice to farmers would be particularly effective, if the whole-farm approach was more central: “We need to provide trainings to farmers on relevant agri-environmental issues – most farmers miss important knowledge and we need to close the gap“ (LCA Baden Wuerttemberg). “A more

holistic approach is needed; advice should adopt a whole farm approach and not focus on the implementation of single AEM” (LCA Baden Wuerttemberg, Bavaria).

However, LCAs consider and emphasize the institutional environment in which they work and which is predominantly affecting their working conditions as an intermediary as extendable and improvable. In particular, they emphasize to miss institutional support for their involvement; which includes political and financial support, but also training and coaching on AEM for their function as an intermediary:

LCAs postulate that they are in need of a stronger political empowerment for an effective AEM facilitation. This includes political support and cooperation from public authorities, including the official mandate to support the implementation of nature conservation measures, or to become more involved in the programming of and in the advice system for AEM. “The political level should consider us more as a partner. In our federal state more LCAs need to be established and the public administration should use the competency of LCAs to implement nature conservation measures” (LCA in Rhineland-Palatinate, comparable in Mecklenburg Pomerania). “We need a more explicit commissioning of LCAs as an intermediary between agriculture and nature conservation, in particular to foster higher levels of acceptance” (LCA in Bavaria). “We need more official LCA involvement from AEM beginning onwards – starting with the inclusion of LCAs in the political programming of AEM” (LCA Lower Saxony, comparable in Saxony-Anhalt and Mecklenburg Pomerania). “The directions of advice towards farmers across public administration, the various NGOs, and farmer association should be harmonized and made more consistent with each other. LCAs could adopt a coordinating and bundling function. However, this should go along with public institutional support, as otherwise LCAs cannot provide advisory services independent from the final monetary contract volume” (LCA in Bavaria). “We are in particular need for trainings for content of measures, relevant framework conditions and the most relevant concerns and facts for the official control“ (LCA in Bavaria, comparable citations in Baden Wuerttemberg).

Finally, LCAs also emphasize the need to receive a financial remuneration for their AEM facilitation activities; in particular if their involvement is supposed to be institutionalized beyond the consultation of individual farmers on a voluntary basis. In this regard, LCAs point

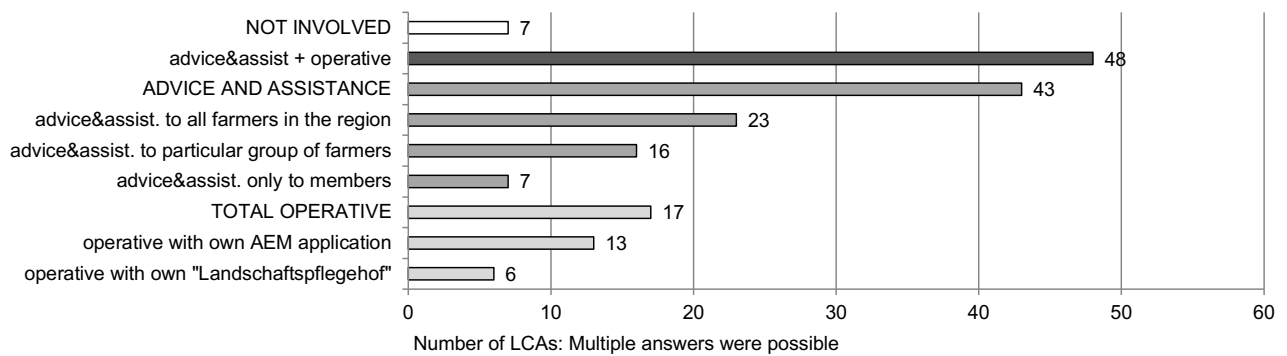


Figure 1: LCAs' involvement in the context of AEM.

towards the necessity of having sufficient personnel, in particular personnel trained for the facilitation of AEM: "We often have good ties and contacts to farmers in our region and can win some of them for AEM participation. The relationship between LCA and farmer is often less burdened than farmers' relationships with the public nature conservation administration – in particular since farmers frequently have objections against nature conservation. For a regular and more specialized AEM facilitation we miss personnel and time!" (LCA in Bavaria). "The biggest challenge is to make farmers' recall the LCAs as competent service provider in the context of AEM. However, this can only work out if we can employ professional staff! On honorary capacities like now we cannot succeed!" (LCAs in Thuringia, comparable citations in Bavaria, Brandenburg). "We need intensive and regular trainings and coaching for ourselves before advising and assisting farmers. However, the provision of advice and assistance as a service needs to be remunerated for" (LCA Thuringia, comparable citations in Brandenburg, Bavaria, Lower Saxony, Saxony, Saxony-Anhalt).

3.3 Current and future facilitation of agri-environmental measures (RQ3)

The majority (85.5%) of LCAs are currently involved in the implementation of AEM, as depicted in Figure 1. Most of them (78%) provide agri-environmental advice and assistance to farmers. Only 41.8% of LCAs provide agri-environmental advice and assistance to all farmers in the region, whereas 29.1% inform only a particular group of farmers, such as grassland farmers or farmers in a specific area (e.g. Natura 2000 areas). Furthermore, 31% of all LCAs are involved in an operative manner in the context of AEM which means that they apply for their own AEM contract: Hence, these LCAs are

not necessarily involved as an intermediary facilitating a smooth transacting between contracting parties. However, many LCAs that are involved operatively do also provide agri-environmental advice and assistance to others. Being asked if they would like to support AEM implementation activities in general in the future, only 78.2% of the survey participants affirmed their interest – which equals a lower share than are currently involved. Only 9.1% stated to have no interest, and 12.7% did not respond to the question.

The involvement of LCAs for the individual AEM facilitation transactions is displayed in Table 2. According to the interviewees' statements, all listed transactions could be facilitated by an intermediary such as LCAs. At least some of the LCAs currently already provide these services. However, the overall involvement of LCAs in the facilitation of AEM transactions could be increased in the future. For all listed transactions, some LCAs ticked the "we could provide service in the future" answer. The overall level of current and prospective future involvement varies considerably across the individual transactions, as depicted in Table 2.

3.3.1 Provision of agri-environmental advice and assistance

The transactions regarding the provision of agri-environmental advice and assistance (upper part of Table 2) are arranged in chronological order: Activities (1) to (6) occur ex-ante, transactions (7) to (9) accrue with and transactions (10) and (11) occur ex-post contract signing. The majority of LCAs are currently involved in activities occurring ex-ante contract signing. They often facilitate transactions that are based on information provision and dissemination of information on the existence and content of AEM, including how measures need to be implemented on the farm or information on

FACILITATION OF AEM IMPLEMENTATION TRANSACTIONS		YES	PROSPECTIVELY	NO	NOT APPLICABLE/ NO REPLY
Agri-environmental information & assistance	(1) We try to improve farmers' acceptance of AEM	61,8% (n=34)	20% (n=11)	5,5% (n=3)	12,7% (n=7)
	(2) We inform farmers on the existence of AEM including availability of funds	50,9% (n=28)	18,2% (n=10)	3,6% (n=2)	27,3% (n=15)
	(3) We inform farmers on the pursued ecological goal and explain why measure is important	69,1% (n=38)	16,4% (n=9)	1,8% (n=1)	12,7% (n=7)
	(4) We advise farmers on the content of the measures and explain how measures need to be implemented on own farm	56,5% (n=31)	23,6% (n=13)	3,6% (n=2)	16,4% (n=9)
	(5) We advise farmers on the expected effort and time needed to implement measures	58,2% (n=32)	16,4% (n=9)	9,1% (n=5)	16,4% (n=9)
	(6) We assist in identifying and selecting the most suitable plots and fields that shall be managed in accordance with AEMs on a single farm level	60,0% (n=33)	21,8% (n=12)	9,1% (n=5)	9,1% (n=5)
	(7) We assist in completing and filling-in the AEM application forms, in particular if these are long and complex	40,0% (n=22)	18,2% (n=10)	25,5% (n=14)	16,4% (n=9)
	(8) We prepare the application form as far as only the signature on behalf of the public authority is missing	32,7% (n=18)	16,4% (n=9)	32,7% (n=18)	18,2% (n=10)
	(9) We provide to and obtain for farmers additional and required information throughout the application and implementation process	52,7% (n=29)	12,7% (n=7)	18,2% (n=10)	16,4% (n=9)
	(10) We assist farmers with the required documentation and recording of AEM implementation activities	40,0% (n=22)	16,4% (n=9)	29,1% (n=16)	14,5% (n=8)
	(11) We help farmers to get prepared for the official control conducted by the public administration (e.g. we check if all documents are at hand, if all measures are implemented and documented decently, etc.)	14,5% (n=8)	18,2% (n=10)	50,9% (n=28)	16,4% (n=9)
Spatial targeting of AEM	(12) We broker AEMs in particular to very relevant areas	61,8% (n=34)	12,7% (n=7)	9,1% (n=5)	16,4% (n=9)
	(13) We broker AEMs in particular towards the most relevant actors	41,8% (n=23)	21,8% (n=12)	18,2% (n=10)	18,2% (n=10)
	(14) We broker AEMs in particular towards the most relevant actors to overcome a single-farm approach in order to e.g. alleviate habitat fragmentation or to ensure AEM implementation in a certain watershed etc.	40% (n=22)	25,5% (n=14)	12,7% (n=7)	21,8% (n=12)
	(15) We broker in particular the more complex and challenging AEMs	38,2% (n=21)	14,5% (n=8)	27,3% (n=15)	18,2% (n=10)
	(16) We broker in particular those AEMs that do approach the largest ecological problem in our region	30,9% (n=17)	16,4% (n=9)	23,6% (n=13)	29,1% (n=16)
Program-ming	(17) We discuss with the public administration which measures had been adopted and implemented smoothly and which difficulties were encountered by farmers	43,6% (n=24)	23,6% (n=13)	12,7% (n=7)	20% (n=11)
	(18) We contribute our local knowledge to the programming and further development of AEMs. If so, how?	50,9% (n=28)	-	27,3% (n=15)	21,8% (n=12)

Table 2: Facilitation of AEM implementation action.

the importance of the ecological goals pursued with the measures. Furthermore, they frequently involve specific local and ecological knowledge, for example helping to identify the most relevant farm plots, or advising on the effort and time needed to implement measure there. Combined with those LCAs indicating to be able to support these activities in the future, the surveyed LCAs consider their expertise to be particularly convenient for these activities.

Approximately one third of survey participating LCAs indicated that they currently prepare the application forms to the point that only the signature of the public authority is missing (Table 2, transaction 8). One third of them work operatively, i.e. they apply for AEM themselves and do not prepare the applications as a service for farmers. Half of the LCAs preparing the application forms (n=9) are located in Baden-Wuerttemberg. This also implies that 90% of all respondents from Baden-Wuerttemberg prepare the documents for their farmers. LCAs hardly assist farmers in getting prepared for the official control conducted by public authorities (Table 2, transaction 11). Most LCAs do not consider this a service they could well provide in the future, as emphasized in their comments: "Control is not our responsibility. Surely, we can drop a hint if more effort is

needed to pass it. But actually we are not obliged to do so" (LCA in Baden-Wuerttemberg). "We hint farmers towards all known hazards and traps, which can occur during the control. Farmers sign the contracts and are therefore responsible for implementing the measures properly" (LCAs in Saxony). A local LCA group in Bavaria emphasized that they consider their operational involvement in AEM as a prime advantage for the provision of agri-environmental advice and assistance. "Since we are enrolled in AEM with our areas ourselves, our advice is perceived as being authentic. Those groups that miss own experience with AEM involvement should become trained on the issue before starting with the provision of information and assistance!" (LCA in Bavaria).³

3 The survey did neither assess the quality nor frequency of service provision. Many LCAs left a comment to indicate that they provide services only on a sporadic scale and rather upon individual demand and contacting on behalf of private farmers: "We provide advisory services only sporadically and in line with our ordinary business operations" (LCA in Bavaria). "We provide advice only if we are approached by individual farmers" (LCAs in Bavaria, Baden Wuerttemberg, Lower Saxony, Thuringia).

3.3.2 Targeting of measures and AEM programming

With respect to spatial targeting of measures, the majority of LCAs stated to currently broker AEM to most relevant areas (Table 2). To a lesser degree, LCAs currently broker AEM to most relevant actors and to actors to overcome the single-farm⁴ approach of AEM or to ensure implementation of AEM in e.g. a specific watershed. In particular for these two brokering activities, many LCAs indicate that they are currently not facilitating this approach, but that they could possibly do so in the future. Still to a lesser degree, LCAs broker the more complex and challenging AEM or those AEM that approach the largest environmental problem in their region. Also these activities could be further increased in the future. However, approximately one fourth of all LCAs indicate to not be able to perform these latter two activities in the future.

The results on LCAs involvement in the programming of AEM are mixed (lower part of Table 2). Almost 44% of all local LCA groups currently discuss with the public administration which measures were adopted and implemented smoothly and which difficulties were encountered by farmers. However, LCAs could increase their involvement in this regard substantially in the future – as stated in the “we could provide service in the future” column in Table 2. However, whereas half of all LCAs currently contribute their local knowledge to the programming and further development of AEM, 27.3% indicate that they do not. Current contributions involve a provision of LCAs local expert knowledge and practical experience towards the relevant authorities and administrations at the local and federal state level (LCAs in Baden-Wuerttemberg, Bavaria, Brandenburg, Lower Saxony), and a preparation of reports and participation in relevant expert meetings (LCA in Lower Saxony). However, some LCAs also criticize that “there is almost no chance for us to participate already during programming processes. LCAs hardly get invited to the relevant meetings. Invitations are rather send to farmer associations as well as nature conservation associations” (LCA in Mecklenburg Pommerania).

It appears that involvement of LCAs in programming activities is neither related to public funding of LCAs in some states (as e.g. in Baden-Wuerttemberg) nor to the state in which they operate. Only single LCAs in Baden-Wuerttemberg, Brandenburg, Bavaria, Hessen, Mecklenburg Western-Pomerania and Thuringia stated that they are involved in programming.

4. Discussion

The results on the overall challenges and adverse framework conditions show that an effective and efficient AEM implementation strategy (including further AEM programming) depends on a set of diverse factors. Although the survey entailed open answer categories for the questions on the challenges and adverse framework conditions, there is considerable overlap in the factors that were stated in the survey. It is noteworthy that LCAs across Germany exhibit vast consensus in this regard, and that there are few but serious challenges hindering an effective AEM implementation strategy.

Some of the stated challenges can be influenced directly by intermediaries (such as e.g. provision of agri-environmental advice), others can be influenced indirectly (such as e.g. the overall payment level or the complexity of AEM), whereas some cannot really be influenced by the intermediary at all (bureaucracy of administration).

In the following we will discuss (i) how intermediaries can alleviate the identified adverse institutional framework conditions that hinder an effective AEM implementation and (ii) how and why intermediaries should be empowered to improve the implementation of AEM. The discussion on how intermediaries can influence the adverse institutional framework conditions is based heavily on transaction cost theory, as it is obvious that intermediaries can largely influence the respective challenges by taking over and or reducing private and public TC.

4.1 Intermediaries' influence on adverse institutional framework conditions

4.1.1 Intermediaries' influence on private transaction costs

The emphasized challenge of missing agri-environmental advice and assistance, including trainings and whole-farm assessments, can be absorbed by an adequate intermediary who can provide such services. On the one hand, the commissioning of an intermediary to provide such services alleviates the emphasized challenge of missing AEM assistance directly; on the other hand

4 AEM have traditionally been directed to the individual farmers (Prager, 2015b). Thus, AEM miss to encourage the concerted action of farmers through cooperation for the preservation of ecosystems at the landscape level. Instead they only foster individual and disconnected actions of individual farmers (Prager et al., 2012).

it could mitigate the negative effects of the insufficient AEM payment levels and the complexity of measures. This also implies that the identified challenges are – at least partially – interlinked.

LCAs emphasize that AEM implementation is challenged by insufficient payment levels that miss to remunerate farmers in accordance with their effort, including their time investment – making up a substantial part of farmers' private TC. Although intermediaries cannot directly affect the overall monetary payment level, because those are specified by the overall design of public AEM programs and constrained by public budgets, they can very well affect the payment level indirectly, if they manage to reduce the private TC to participation. The recognition and remuneration of private TC are important, as these affect adversely the private profit function of AEM participants and thus the adoption of measures (Mettepenningen et al., 2013; Falconer, 2000). TC should be reduced whenever possible, and payments should consider and cover opportunity costs plus private TC (Mettepenningen et al., 2009; Falconer, 2000). Intermediaries can reduce private TC if they provide information or assist with certain AEM implementation activities (Schomers et al., 2015a).

The analysed LCAs stated to already provide agri-environmental advice and assistance to farmers. However, LCAs' current intensity of involvement differs substantially between the diverse AEM facilitation activities. LCAs stated their suitability to support in particular those transactions occurring ex-ante contract signing. The facilitation of these activities is important, as it helps to reduce private TC which in turn impacts on the adoption of AEM by farmers (Allan et al., 2013; Mettepenningen et al., 2013; Mettepenningen et al., 2009; Ducos and Dupraz, 2006; Falconer, 2000; Wilson, 1997). A main proportion of private TC results from information search ex-ante contract signing (Mettepenningen et al., 2009). A lack of information on AEM has been identified as a major obstacle to participation within schemes (Mettepenningen et al., 2013; Wilson, 1997). Falconer (2000) found that most farmers learn from professional advisors about the existence of AEM. AEM adoption generally requires that farmers know that AEM exist (Ridier et al., 2011; Falconer, 2000; Wilson, 1997), are aware of the environmental problem being addressed and how current land use practices influence the environmental problem (Allan et al., 2013; Mettepenningen et al., 2013; Smallshire et al., 2004), understand the management requirements prescribed by the scheme and how to apply them on

their farm (Ducos and Dupraz, 2006), and consider the management requirements as being appropriate and compatible with their overall land use practices and farm objectives (Mettepenningen et al., 2013; Siebert et al., 2006).

LCAs stated to also be involved in activities occurring with or ex-post contract signing (transactions 7–11), however to a lesser current and also prospective future degree than those transactions occurring ex-ante contract signing. However, it is particular these activities that provoke the largest private TC (Mettepenningen et al., 2009) – being also reflected in the finding that LCAs consider the complexity of the respective measures and their contracts with the complex AEM billing and documentation procedures as a major challenge to an effective implementation. This, in addition to the mentioned high-levels of bureaucracy of the public administration, hinder adoption of AEM as they increase private TC substantially (Mettepenningen et al., 2013; Mettepenningen et al., 2011). But these challenges can be indirectly alleviated by an intermediary through e.g. the provision of agri-environmental advice and assistance to farmers. In the case of too complicated application, billing, and documentation procedures, intermediaries can alleviate the consequences of high bureaucracy by facilitating or even taking-over certain activities and thereby unburdening the farmer.

These findings are in line with the literature, highlighting that farmers perceive application procedures often as too bureaucratic, incomprehensible, and too demanding with respect to the eligibility criteria (assessment of farm diagnostic, presenting field maps etc.) – adding considerably to private TC (Mettepenningen et al., 2009; Ducos and Dupraz, 2006; Falconer, 2000). Reductions in paper work and savings in application procedures have been identified as positively influencing participation in AEM through the reduction in private TC (Mettepenningen et al., 2009; Ducos and Dupraz, 2006; Falconer, 2000).

Intermediaries providing agri-environmental advice and assistance to farmers can thus help to reduce private TC, if farmers' information, application, or implementation and documentation costs are reduced (Ridier et al., 2011). The provision of agri-environmental advice and assistance is specifically recommended to encourage the uptake of dark-green and commonly more cost-intensive measures (Vickery et al., 2004). Smallshire et al. (2004: 254) emphasize, that "farmers need good information on the most appropriate solution". More complex and demanding AEM frequently

involve asset specificity, as specific agronomic knowledge needs to be acquired in order to implement the measure, further increasing private TC (Coggan et al., 2013). Furthermore, locally operating intermediaries with good knowledge on local social and ecological circumstances can adopt a spatial targeting approach of AEM implementation, if they provide agri-environmental advice and assistance deliberately to most relevant actors and areas (Schomers et al., 2015a, 2015b). Targeting of measures is important as it helps to increase the level of environmental benefits provided and thus the environmental effectiveness of measures, resulting in a higher efficiency of measures (Uthes et al., 2010). Targeting however, increases both, public and private TC (Falconer et al., 2000), which in turn can affect detrimentally the cost-effectiveness of the measures. A spatial targeting approach of AEM facilitation can be provided by the analysed intermediary (cf. transactions 12–16 in Table 2). The relevance of advice for targeting of AEM has also been emphasized by Meyer et al. (2015) and Schomers et al. (2015b).

The agri-environmentally centred advice and agricultural production centred advice could be combined and applied together at the whole farm level. Commonly, these two distinct types of advice are rather conflicting (Ingram, 2008). It is not straightforward to introduce a uniform national approach of advice, where the farming clientele is heterogeneous, with different farming systems and socio-economic groups co-existing (Feder et al., 2011). Instead, Feder et al. (2011) consider that different advice delivery systems, with varying roles for private and NGO providers, government, and semi-government entities, may need to operate simultaneously. Intermediaries with a clear environmental mandate commonly have a better understanding of nature conservation issues than for instance private agricultural advisors, whereas private advisors frequently have better insights into farmers' economic business operations including financial calculations (Schomers et al., 2015a).

4.1.2 Intermediaries' influence on public transaction costs

A deliberate usage of intermediaries can also help to reduce public TC – and might help to reduce the inflexibility and complexity of AEM over the long run. In this regard, intermediaries can provide feedback on practical implementation difficulties – including problems with the complexity of AEM - in AEM programming rounds to decision-makers at policy levels. Intermediaries can

bundle the experience and interests of farmers and forward these to the relevant levels. In the case of LCAs, this is currently done by some groups (see transactions (17) and (18) in Table 2). It is important to continuously monitor the results of measures and to evaluate the success of the schemes (Kleijn and Sutherland, 2003). In particular any adverse effects of schemes and measures need to be detected as early as possible, both at the individual farm and at the program level. LCAs' involvement in these activities could be increased further in the future. Intermediary involvement can increase available information from the local ground, helping to simplify AEM design and thus helping ultimately to improve the acceptance of AEM on behalf to farmers when it comes to implementation of measures.

Intermediary involvement in programming rounds affects public TC. Benefits in terms of lower public TC accrue if consultation with LCAs provides valuable information on local experience with existing AEM to public administrations at relatively lower costs or in better quality. Consultation with relevant local organisations helps to decrease costs of public information gathering and reduces public TC of AEM design processes (Mettepenningen et al., 2011) and implementation activities (Cruse et al., 2013). Mettepenningen et al. (2011) found a significant effect on time savings during AEM design for public authorities being in exchange with farmer associations. However, intermediary involvement can also affect public TC adversely. Since LCAs and specifically their umbrella organization DVL lobby for the interest of their farmers on political levels, this can increase public TC of environmental policies (McCann, 2005), in particular during stages of policy formulation and decision making, but also during policy implementation activities (Krutilla and Krause, 2010).

The impact of LCAs and DVL providing local information to relevant political levels and contributing to the programming of AEM on public TC is thus not straightforward. Furthermore, the benefits of LCA and DVL consultation are undermined if there is scope for the provision of misinformation, focusing predominantly on LCAs' own interests (or interests of cooperating farmers) not being in line with the overall aim of the policy design. This might occur if environmental concerns in AEM design are traded-off for farmers' conventional agricultural objectives during programming rounds. Nevertheless, this would help to improve acceptance and thus adoption on behalf of farmers. Farmers are generally more likely to adopt

practices that are economically viable and that also fit within their farm management (Posthumus et al., 2011, Hodge and Reader, 2010). Farmers often see a lack of alignment of AEM contract terms with the situation and business objectives of farmers (Van Huylenbroeck et al., 2005). If these are considered in policy design – at the expense of environmental effectiveness – acceptance of AEM is likely to increase, which in turn facilitates both, farmer's adoption of measures and farmer's collaboration with LCAs. Lobbying in the interest of farmers rather than in the interest of environmental effectiveness induces the traditional 'principal agent problem' (Sutherland et al., 2013), giving rise to poorer policy design and ultimately decreasing environmental effectiveness (Cruse et al., 2013).

Finally, LCAs emphasized that the challenge of insufficient AEM payment level is further exacerbated through the institutional environment in which measures are implemented. At the policy level, cross-sectorial interplay influences directly the competitiveness and effectiveness of AEM. The politically intended rising prices for energy crops lead to an intensification of agricultural land use practices on the one hand and accelerates opportunities costs of AEM participation on the other hand (cf. section 3.1). In this regard, locally operating intermediaries could support policy implementation by adopting a "watch-dog" function, and communicate on misfits between cross-sectorial policies and their adverse effects on the fields to relevant policy levels. In the case of the analysed implementation challenges of AEM in Germany, intermediaries could inform the public administration early on about the adverse impact of politically intended high prices for energy crops on nature conservation measures within agricultural fields. This could help to ensure a better coordination of intended and unintended effects of the diverse policy instruments at hand, which often are in conflict or even can cancel each other out.

4.2 How to qualify and empower intermediaries

The results on the intermediary's willingness to facilitate AEM in the future are mixed. Being asked directly, LCAs rather show a diminishing willingness to support AEM implementation activities in the future. However for the single activities as listed in Table 2, LCAs stated that they could increase their involvement in the future. Increases in involvement can arise through (1) encouraging those LCAs that are not yet involved at all and (2) increasing the frequency and quality of those who already are. Consequentially, the adverse framework

conditions that hinder the involvement of intermediaries need to be considered carefully, in particular if a stronger prospective involvement of intermediaries in the context of AEM facilitation is wanted (or even in the broader PES context).

Although many LCAs are currently involved in the facilitation of AEM – often however on a rather sporadic scale – the majority of them miss an institutional support for their involvement. Institutional support refers to the explicit and official political indorsement to facilitate AEM, but also include a financial remuneration for service provision. The results show that many LCAs in Baden Wuerttemberg – who are remunerated for their work - are engaged more profoundly than most other LCAs in the facilitation of AEM. In particular, they provide assistance in time and knowledge intensive AEM application procedures to their farmers. However, one could also argue that then LCAs might lose part of their independence and their standing with the farmers when they become official contractors of public authorities. Differences across LCAs in the intensity (frequency and quality) of their involvement can most likely be explained by the intermediary's own TC accruing with their involvement and differences in the remuneration of these TC. However, the remuneration of an intermediary's TC can be justified on efficiency grounds, if the intermediary's involvement leads to higher levels of environmental effectiveness.

Organisational funding of intermediaries is needed to ensure their ongoing and long term commitment. Prager (2011) emphasizes that an continuous organisational support including funding for groups that fosters conservation and landscape management is preferable and in general even more efficient than any ad hoc or project funding, in particular to make groups being resilient to external shocks and thus to ensure their long-term commitment for nature conservation. Sutherland et al. (2013) emphasize that longevity and expertise in agri-environmental advice is more important than the charitable status of a specific advisor for spurring trust towards farmers. Also, Smallshire et al. (2004: 254) consider ongoing information and support as a precondition to assist farmers to "deliver more complex management, rather than just one-off advice". LCAs consider the organisational support as relevant to ensure a continuous facilitation beyond their sporadic involvement. It is also vital to ensure that their advice is independent from the final contract volumes.

As emphasized above, the deliberate involvement of intermediaries can help to reduce private and public TC. However, for many of the listed activities the intermediary simply takes over the activity and hence covers the time needed or the TC associated with these activities. Thus, TC are transferred from one actor to another actor. Provided the fact that the intermediary can perform the respective activity at lower TC than the farmer or government, then the overall cost-effectiveness of AEM facilitation is improved. Intermediaries can also professionalize over time and accumulate a learning effect for similar transactions, which decreases TC for individual transactions, such as paper work, etc. (Schomers et al., 2015a; Mettepenningen and Van Huylbroeck, 2009; Rorstad et al., 2007). Nevertheless, even if TC are lower for the intermediary, the cost of transacting still arise, but now on behalf of the intermediary. This finding provides further support for the claim that intermediaries should be remunerated for their services, making the overall AEM implementation costs (TC) explicit and visible. The finding that some TC are worth to be borne in order to reduce other TC is not new (Pannell et al., 2013; McCann et al., 2005), in particular if they involve higher quality information and increase environmental effectiveness (Mettepenningen et al., 2011). Increases in TC are justified as long as marginal TC do not exceed marginal environmental benefits (Vatn, 2001). Therefore, the remuneration of an intermediary's incurred own TC for the facilitation of AEM can be reasonable, if the involvement improves environmental effectiveness of measures. Secondly, the remuneration of the intermediary's own TC is justified if they decrease other private and public TC. On economic grounds, the payment can be justified up to the point where the remuneration level equals the sum of the changes in private TC, public TC, and environmental benefits⁵.

Given that there is scope to decrease private and public TC, and to increase environmental benefits, the active and politically intended commissioning of intermediaries could increase the economic efficiency of public funds. Commissioning intermediaries with the facilitation of AEM should then, however, consider the urged need for training the intermediaries and also entail that

responsibilities and duties to be performed by the intermediary are precisely defined. A focus on the facilitation of transactions that provoke the largest private and public TC (in terms of time and knowledge needs) could be considered. It is in particular these activities that provide the largest potential for reductions in public and private TC as well as for improvements in environmental effectiveness (Schomers et al., 2015b).

Within the EU, advice services to farmers are mostly provided on a private and commercial basis, i.e. advisers charge farmers a fee for service provision (Prager et al., 2016). As a consequence, advice predominantly focuses on increasing overall agricultural production that can be marketed. This in turn affects the implementation of AEM often negatively (Sutherland et al., 2013; Ingram, 2008; Polman et al., 2008), as the farmers' opportunity costs are increased (Russi et al., 2016). However, since AEM are meant to spur the provision of public goods in terms of ecosystem services and biodiversity, public investments in advice systems that foster and safeguard the provision of these public goods can be justified, i.e. financing intermediaries from public funds seems justified and should be discussed. A commissioning could also consider the utilization of intermediaries and their local and practice based expert knowledge for furthering AEM design. The results indicate that currently there are large differences across LCAs when it comes to their current involvement in programming. The differences are not related to the single federal states and appear to be often provoked on behalf of public administrations that miss to invite LCAs to these rounds (cf. section 3.2). We urge that further research should be conducted on the reasons for not inviting these groups.

5. Summary and Conclusion

Public PES programs – such as AEM – have been implemented over the past decades to ensure the provision of agri-environmental benefits and landscape management of the country side. Diverse critiques on effectiveness and efficiency implications on these commonly large-scale programs have been raised and discussed ever since. More recently, the use of intermediary organizations to improve the performance of such programs has caught the interest of policy makers and scientists. Based on a case study analysis of LCAs and AEM in Germany this paper adds to filling the research gap on how exactly intermediaries can contribute to mastering different challenges associated to AEM implementation.

5 However, this theoretical calculation is based on the assumption that farmers are remunerated for private TC – which in fact is often not the case. Changes in private transaction costs would then make (public) funds being available for the remuneration of intermediaries.

Results of the study emphasize few, but severe challenging factors that adversely affect an effective AEM implementation. Most of the highlighted challenges can and often do appear within other public PES programs, too. As discussed, intermediaries can affect some of these challenges directly, as in the case of missing agri-environmental information and trainings, but also indirectly, as in the case of measures' complexity including their application contracts or low payment levels. Both, the direct and indirect effects intermediaries can provide can be assessed with transaction costs economics – as demonstrated in the discussion section of this paper. Governments should consider the use of local intermediaries if these can reduce the costs of coordination. Intermediaries can influence private and public TC accruing with PES program design development and measure implementation. Intermediaries that provide for information distribution and feedback loops in both directions, i.e. from the public authority towards the farmer and vice versa, can be particularly helpful to reduce private and public TC simultaneously. This includes the distribution of information and assistance with PES implementation towards farmers: However, it also includes the transmission of bundled local on the ground experience with measure implementation back towards public administration and their respective PES programming rounds to better adapt measures to local needs and requirements. An intermediary with expertise on nature conservation issues can further help to ensure that the specific aims of the measure are considered and approached accordingly. Changes in private but also public TC, but also changes in the environmental effectiveness (ecological benefits provided) of PES, can provide the rationale for the political and organisational support of intermediaries.

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Article

How Local Intermediaries Improve the Effectiveness of Public Payment for Ecosystem Services Programs: The Role of Networks and Agri-Environmental Assistance

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Abstract: Large governmental payments for ecosystem services programs (PES) have frequently been criticized for their limited environmental effectiveness. The use of local intermediaries has been considered as one possibility for improving the environmental effectiveness of such programs. German Landcare Associations (LCAs) have been identified as one intermediary that holds the potential to positively influence the implementation of agri-environmental measures (AEMs). This paper empirically assesses the involvement of LCAs in the context of AEM implementation in Germany. An online questionnaire was distributed to all LCAs in Germany. In a first step, we examine if LCAs (1) provide social networks between stakeholders and (2) provide agri-environmental information and assistance to farmers. In a second step, the LCAs assess (3) their perception of how strongly their work influences farmers' participation in PES schemes and (4) if they pursue the spatial targeting of AEMs. In a third step, we relate the relative level of social networks and the provision of agri-environmental information and assistance to their stated influence on farmers' participation in and spatial targeting of AEMs. Finally we derive overall conclusions on how intermediaries can enhance the effectiveness of PES programs in general.

Keywords: agri-environment measures; land use conflict and governance; social capital; local embeddedness; payments for environmental services

1. Introduction

Policy instruments that use economic incentives for the governance of ecosystem services and the management of land use conflicts, most common within agricultural landscapes, have gained in importance over the past years [1]. The number of publications referring to the concept of payments for ecosystem services (PES) has been increasing substantially over the past two decades at the international level [2]. The majority of PES cases refer to large governmental payment programs, such as the Farm Bill in the United States or agri-environmental measures (AEMs) in the European Union (EU) [3,4].

In Europe, most AEMs—defined as governmental PES—are part of the second pillar of the Common Agricultural Policy (CAP) of the European Union (EU) and are designed to encourage farmers to enhance environmental stewardship. The overall framework for AEMs is set by the European Union (EU), while the specific policy design of the individual measures is developed at the individual member state level. In Germany, the individual agri-environmental regulations and the design of individual measures are executed at the federal state level—the individual Länder [5,6]. AEMs require farmers to adopt predefined management practices that are considered to provide certain ecological benefits. Farmers receive governmental payments to compensate for their opportunity costs and for additional costs. The adoption of AEMs is voluntary on the part of farmers; contracts are commonly “take it or leave it contracts” [7]. However, the large governmental agri-environmental programs have frequently been criticized for their low levels of environmental effectiveness [8–11]. Major reasons for the low levels of environmental effectiveness of AEMs are (1) the low participation rates of individual farmers, in particular for those measures that impose more substantial management prescriptions and (2) insufficient spatial targeting of measures and schemes. Farmers’ participation in AEMs is a basic requirement to achieve any environmental effect at all [5]. Increasing participation rates will specifically provide higher levels of environmental benefits (environmental effectiveness) if AEMs are targeted [8,12–15]. Spatial targeting can be conducted at two levels. Firstly, spatial targeting deliberately directs AEMs to the most suitable or vulnerable areas or land parcels. Secondly, it specifically redirects those measures that directly target site-specific environmental concerns or that target a relevant habitat such as orchards or species rich grassland and that commonly impose more substantial management prescriptions [16].

The deliberate improvement of effectiveness with respect to these two criteria appears to be specifically challenging for large-scale public PES programs such as AEMs in the EU. Thus, questions on how to improve the implementation process have captured the interest of science, recently with a particular focus on one particular actor within the PES facilitating governance structure—the intermediary [17–22]. Intermediaries are defined as those “actors who take on roles that connect and facilitate transactions between buyers and sellers” [20], *i.e.*, players who mediate the exchange between ES beneficiaries or buyers and ES sellers [17,18]. Intermediaries can stem from civil society (being committed individuals or non-governmental organizations) or can be social entrepreneurs, organizations operating between policy and science, governmental entities, *etc.* [17,18]. The potential of intermediaries to improve PES implementation is largely affected by the intermediary’s motives, his or her capacities and competencies (Capacities and competencies refer to an intermediary’s core professional and social skills. An intermediary with skills in agricultural production knowledge can certainly adopt different roles than an intermediary with skills and knowledge in environmental and landscape management.), and his or her roles and responsibilities. Schomers *et al.* [23] consider social networks (social capital)

and trust to be favorable characteristics of intermediaries helping to improve both farmers' participation in and spatial targeting of PES. Social capital in general is created through repeated interactions by individuals spending time and energy working together to achieve certain aims [24,25]. In the context of practical PES implementation, the provision of bonding and bridging social capital is considered to be particularly favorable [23,24]. Bridging social capital predominantly includes the links between individual actors within a social network; bonding social capital focuses on linkages between collective actors and groups [26–29]. Trust is closely related to and often a product that is further reinforced through social capital [26,30]. Farmers do not act in a social vacuum [31,32] but rather react “in concrete ongoing systems of social relations” [33], and their decision-making process regarding PES participation can be influenced by e.g., social capital created in appropriate networks [34].

Correspondingly, intermediaries providing such networks and competencies are, firstly, likely to influence farmers' attitudes and perceptions towards nature conservation and PES as well as their willingness to participate in PES [23,35], which have been identified as important drivers influencing farmers' participation within PES schemes [36–41]. Secondly, intermediaries providing for well-functioning local networks commonly have access to broader sources of information and can better diffuse information at relatively low costs [26]. Intermediaries with functioning networks have therefore been assumed to exhibit the potential to further improve the environmental effectiveness of PES implementation by providing agri-environmental information and assistance to farmers [23]. The provision of these services before, during, and after PES application processes is generally found to influence farmers' participation positively, not least because it reduces private transaction costs and impacts farmers' attitudes towards PES and willingness to implement PES [36,38,39,42]. Furthermore, if intermediaries provide agri-environmental information and assistance deliberately, it helps to adopt a spatial targeting approach of PES.

The aim of this paper is to assess the importance of intermediaries that provide local social networks and agri-environmental information and assistance in improving the environmental effectiveness of public PES in terms of improved participation and spatial targeting. The paper is organized as follows. Section 2 describes our chosen case study, elaborates on the research questions posed within this paper, and describes the analytical framework used to answer the research questions and derives overall conclusions on the favorable PES involvement of intermediaries. The section also elaborates on how we collected and analyzed the empirical data. Section 3 presents the results of our case study, and Section 4 discusses the results of our case study. Finally, in Section 5, we add to the current PES literature as we derive overall conclusions on how intermediaries can enhance the effectiveness of large-scale governmental PES programs in general—focusing on the importance of social networks and the provision of agri-environmental information and assistance.

2. Method

2.1. Case Study Research

In this paper, we aim to contribute to a better understanding of the roles and involvement of intermediaries supporting the implementation of large-scale governmental PES programs. We adopt a

case study approach and take the German Landcare Associations (LCAs) and the implementation of AEMs in Germany as an example.

German LCAs have been identified as one intermediary with considerable potential for improving the environmental effectiveness of AEMs implementation [23]. LCAs are locally based groups led by professional field managers—they are paid for their ordinary business operations. Generally, LCAs focus on activities fostering species and habitat protection, assist in the conservation of agricultural lands and are often involved in areas of conflict, such as the implementation of the Water Framework Directive or the management of Natura 2000 areas [43]. In this context, they cooperate on a voluntary basis with farmers and public administrations. Daily business operations differ across local groups, with each group having its individual portfolio of activities [44]. LCAs commonly use diverse funds for their financing, including membership fees, public funds from the ELER regulation for landscape management and nature conservation projects, AEMs, private money from the German Impact Mitigation Regulation, *etc.* The latter funding source is, in particular, important for LCAs in Eastern Germany [45]. The provision of agri-environmental advice and assistance to farmers on AEMs in the form of advisory service is mostly not covered within their usual business operations [43,45]. LCAs are organized as charitable non-profit and non-governmental organizations that are committed to preserve and maintain the environment and landscape (as defined within their articles of associations). LCAs often provide a collaborative approach towards the implementation of nature conservation activities [44], and have therefore been designated in the German Federal Nature Conservation Act as a preferred organization to commission with the active implementation of nature conservation and landscape protection [23,45]. Most local LCAs exhibit a membership structure that is based on the obligatory and formal integration of local agricultural stakeholders (*i.e.*, farmers, shepherds, land managers, land owners *etc.*), local municipal stakeholders (mayor, local administration *etc.*) and local nature conservation stakeholders (*i.e.*, nature conservation groups, environmental organizations, individuals with a conservation interest *etc.*) in the group's committee. This threefold membership structure has been developed purposefully, as it promises to decrease conflict by resolving tensions and harmonizing contradictory interests between stakeholder groups. It is commonly considered to improve the acceptance of nature conservation [43,45,46], provide for social capital in terms of networks between stakeholder groups, and generate local knowledge on ecological and social circumstances [23].

We chose LCAs as our case study as these, first, are mostly committed actors at the local level. Their involvement in the context of species and habitat protection provides for certain practice-based exchange between the conflicting stakeholder groups. In this context, practice-based refers to the regular exchange between these different stakeholder groups on the ground. We consider that this exchange provides for bonding social capital in terms of a vibrant and practice-based local network between the diverse interest groups (going beyond obligatory and formal membership structures and annual committee meetings). In contrast to the obligatory membership structure, this network is, however, not necessarily provided for by all LCAs.

Second, we consider that bridging social capital is expressed in the frequency of farmers contacting local LCAs on their own initiative, in particular with concerns regarding nature conservation and AEMs, *i.e.*, the network between the intermediary and farmer. In addition, we consider that the LCAs' practical involvement combined with their clearly defined motive and mandate of preserving and maintaining the landscape and environment helps them to be known in the region and to be perceived as a competent

expert in the field of nature conservation and AEMs, both independently and compared to other actors. It is, in particular, an organization's perceived mandate that helps to create relational trust towards farmers [47]. We assume that local LCAs mostly know their region, including the most challenging ecological problems and deficiencies at the local scale, know most farmers, know about the farmers' constraints around AEMs participation and how to convince them to participate, *etc.* We therefore consider LCAs as not only able to provide agri-environmental information and assistance to farmers but also as able to use their local knowledge to broker AEMs to the most important areas and actors.

Within this paper, we focus on three main research questions:

- (Q1) Do local LCAs (a) provide for social networks (both between conflicting interest groups—*i.e.*, bonding social capital; and towards individual farmers—*i.e.*, bridging social capital) and (b) provide for agri-environmental information and assistance to farmers?
- (Q2) Do local LCAs assess their own work (a) as influencing farmers' participation rates in AEMs and (b) as improving the spatial targeting of measures?
- (Q3) Can LCAs' stated relative levels of social networks and their provision of agri-environmental information and assistance be related to their stated influence on farmers' participation in and the spatial targeting of AEMs? In other words, can we find a relationship between LCAs' stated involvement in the context of AEM implementation and their stated influence on the effectiveness of AEMs?

2.2. Analytical Framework

To derive overall conclusions on how intermediaries can enhance the environmental effectiveness of PES, we proceed as illustrated in Figure 1. Our assumptions on the determinants of environmental effectiveness (participation and spatial targeting) of PES are—as elaborated above—based on the literature. We consider that these two determinants can be improved through intermediary involvement, in particular, if the intermediary provides for local networks and agri-environmental information and assistance. Indications for such a relationship between intermediary involvement and effectiveness can also be found in the literature and is elaborated in detail in combination with the results of this paper in the discussion. Within our case study, we assess first and in accordance with Q1 how LCAs are currently involved in the context of AEMs implementation. We therefore asked LCAs to state their relative levels of bridging and bonding social networks and their provision of agri-environmental information and assistance. Both variables are operationalized by certain activities; the variables and their respective proxies are explained in detail in Section 2.4.2. Secondly, in accordance with Q2, we asked LCAs to self-evaluate the influence of their overall involvement on farmers' participation in AEMs and to state if they provide for a spatial targeting approach for AEMs. Third, in correspondence with Q3, we verify whether there is a correlation between LCAs' provision of social networks and as well as agri-environmental information and assistance and their stated respective influence on participation and targeting.

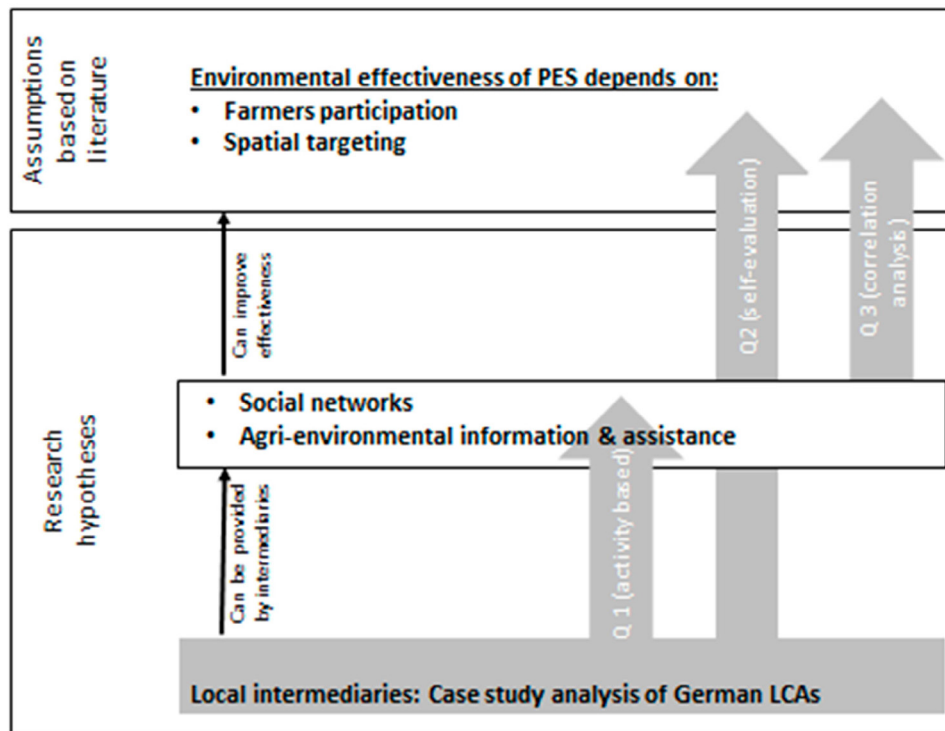


Figure 1. Analytical framework.

2.3. Data Collection

For the data collection, we programmed an online questionnaire and invited all local LCA groups in Germany to participate—thus being a full sample. Contact details for LCAs were obtained via the Landcare umbrella organization the German Association for Landcare (DVL—Deutscher Verband für Landschaftspflege) (www.lpv.de) and from the regional coordination office in the case of Baden Wuerttemberg (In the past few years, new LCAs have been founded in Baden-Wuerttemberg [cf. 40], and not all of them had registered yet with the DVL.). Those LCAs that did not have a valid email address were contacted by phone. We did not reach three local LCAs by either telephone or email, and four LCAs declined to participate when called by phone. Thus, from the total LCA population of $N = 159$ (cf. Table 1), we invited 152 LCAs to participate. Out of these, 87 LCAs clicked at least the very first page of the questionnaire, and 67 LCAs completed part of the survey. We ultimately received 55 fully completed questionnaires answered by local field managers—only those are included in the following presentation and discussion of the results ($n = 55$). The participation rate is 36.2%. As depicted in Table 1, the response rates across the federal states are comparable; only Saxony is not well represented in the sample. Bavaria and Baden Wuerttemberg hold by far the largest number of local LCAs and exhibit representative response rates.

Table 1. LCAs across Germany and survey participation rates.

Federal State	Existing LCAs	Invited LCAs	Participating LCAs	Participation Rate per Federal State
Bavaria	55	52	19	36.5%
Baden-Wuerttemberg	25	25	10	40.0%
North Rhine-Westphalia	15	14	5	35.7%
Saxony	15	14	2	14.3%
Brandenburg	10	10	3	30.0%
Saxony-Anhalt	9	9	3	33.3%
Mecklenburg-Hither Pomerania	7	7	2	28.6%
Thuringa	7	7	4	57.1%
Hesse	6	5	2	40.0%
Schleswig-Holstein	5	4	2	50.0%
Lower Saxony	3	3	2	66.7%
Rhineland-Palatinate	2	2	1	50.0%
Total Germany	159	152	55	36.2%

The survey was programmed using QuestBack EFS-Survey; participants were invited by email and needed to click on a programmed link that directly opened the online questionnaire. The questionnaire was online for six weeks (January 2014–March 2014), and during this period, two reminders were sent out by email.

2.4. Questionnaire

The questionnaire entailed questions regarding LCAs overall involvement in the context of nature conservation at the local scale, *i.e.*, their activities beyond their involvement in AEMs, and questions regarding their specific involvement in the context of AEMs exclusively.

The survey consisted of mostly closed questions with a limited list of predetermined response categories. Each page of the survey provided a comment box in which participants could leave additional information or express concerns if they felt insecure with the response categories. We consider the comments in the results sections of this paper; citations appear in italics and were translated into English by the first author.

2.4.1. Framing of Survey Questions and Limitations of the Data

With respect to nature conservation, there are differences across the individual federal states of Germany. The available nature conservation measures—including AEMs—differ across states. The survey was framed in a general manner to ensure that data are comparable across all LCAs in Germany. The questionnaire asked LCAs to self-assess and evaluate their involvement in the context of AEMs. The data represent the expert knowledge of local LCA field managers, thus providing a good overview of LCAs' actual involvement in the context of AEMs, on the one hand, and their self-estimation of their impact on the other hand. Thus, when considering the conclusions drawn from the results, it is important to bear in mind that only LCAs assessed the influence of their involvement, which could entail certain

bias due to strategic answers and an overrated influence on AEMs. As discussed in the introduction section, involvement in the deliberate provision of agri-environmental information and assistance services are currently not part of the usual business operations for most LCAs [43–45]. We believe that this reduces the risk of strategic answers, as their self-evaluation does not entail the need to perform particularly well in this regard. We consider that LCA field managers are the appropriate responder for the questionnaire and evaluation of the LCAs' work, mostly because the majority of questions cannot be ranked/assessed by others. We address the problem of bias for the relevant variables below and elaborate on the occurrence of strategic answers in combination with the stated results in the discussion section.

2.4.2. Indicators to Operationalize Our Research Questions

To operationalize our research aims, we developed indicators for the quantitative data collection and analysis. The majority of indicators are based on Schomers *et al.* [23]. Table A1 in the Appendix summarizes in detail the various indicators, the respective survey questions and the response categories as well as their transformation into quantitative variables for a statistical data assessment.

Q1(a) Provision of Social Networks

Bonding social capital is approximated by the provision of practice-based local networks, *i.e.*, the practical exchange between the diverse stakeholder groups on the ground. We asked, “*Do you provide a regular and practical local exchange on the ground and between the diverse stakeholder groups?*” Bridging social capital is assessed by the network between local LCAs and farmers in terms of the frequency with which farmers approach LCAs' with own concerns. We also consider the reason of farmers' approaching LCAs. We therefore asked, “*How often do farmers contact you on their own initiative—and why?*” as well as “*Who do farmers in your region commonly contact with concerns about nature conservation?*” and “*Who do farmers in your region commonly contact with concerns about AEMs?*”

Individual farmers could only state whom they contact individually, whereas LCAs have a broader overview on whom the majority of farmers contact at the aggregate regional level. The last two variables in addition require LCAs to assess whom farmers contact with concerns about AEMs and nature conservation—thus requiring LCAs to evaluate the choice of farmers. The variable thus entails the bias of making a (well-informed) guess about the actions of others.

Q1(b) Provision of Agri-Environmental Information and Assistance

To assess the various activities needed for AEMs implementation that can be supported by LCAs, we prepared a document listing all relevant activities. The document was sent iteratively to experts in the field of AEMs implementation by email, with an invitation to verify, revise and complete the listed transactions. Subsequently, an expert workshop was held in Berlin, Germany, in October 2012, with seven participating experts affiliated with an LCA coordination office, the umbrella organization DVL, a private agricultural advice center, a charitable foundation focusing on nature conservation and a research institute. Experts were invited to revise and complement the listed transactions and to identify and discuss which of these activities could be supported by LCAs (see Schomers *et al.* [23] for a more detailed list). Based on the identified activities, the questionnaire asked LCAs to indicate which of the

listed activities they currently support or provide. The single activities are listed in Table A1 in the Appendix. LCAs could indicate their involvement by clicking “yes”, “no”, “we could provide service in the future”, and “not applicable/don’t know” for every single activity. The questions assess LCAs’ current and potential prospective involvement in the facilitation of AEMs. The questions assess certain activities and do not entail normative aspects—we consider the potential for strategic answers to be relatively low for these variables.

Q2(a) Influence on Farmers’ Participation

We assess whether LCAs consider their work to influence farmers’ participation in AEMs via indirect and direct participation indicators. Indirect participation indicators assess LCAs’ stated impact on relative changes in farmers’ perceptions towards nature conservation, as this impacts farmers’ attitudes towards nature conservation measures, which in turn impact willingness to implement AEMs. We therefore asked LCAs to rate the following statements on a 5-point Likert scale (strongly disagree and strongly agree as the two endpoints): “*Farmers’ perceptions towards nature conservation commonly improve when cooperating with LCAs*”, “*Farmers’ attitudes towards nature conservation measures commonly improve when cooperating with LCAs*” and “*Farmers’ willingness to implement AEMs on their fields commonly improves when cooperating with LCAs*”. Direct participation indicators assess LCAs’ stated impact on the total number of AEMs contracted for both simple and more complex AEMs contracts. We therefore asked LCAs again to rate on a 5-point Likert scale the statements “*LCAs’ involvement have increased the number of complex, challenging, and cost-intensive AEMs contracts signed*” and “*LCAs’ involvement has increased the number of contracts signed for those AEMs that are relatively easy to monitor*”.

We consider the variables concerning participation to entail the largest risk of bias for two reasons. First, the indirect variables evaluate LCAs’ impact on changes in the cognition of farmers—which is somewhat difficult for LCAs to appreciate as it mainly concerns farmers. However, we feel that LCA field managers should have a sense of their clients, including the impact of their work on their clients.

Second, the variables entail the risk of strategic answers wherein LCAs (purposefully) overestimate their impact on both the indirect and the direct participation variables. We discuss the risk of bias in the discussion.

Q2(b) Involvement in Spatial Targeting

We assess LCAs’ involvement in spatial targeting in three directions: targeting schemes to the most relevant areas, targeting schemes to the most relevant actors, and targeting schemes to the most relevant actors to overcome a single-farm approach in order to e.g., alleviate habitat fragmentation or to ensure AEM implementation at the landscape scale (AEMs have traditionally been directed to the individual holdings through contracts with individual farmers [48]. The single-farm approach of AEMs does not encourage the preservation of ecosystems at the landscape level but fosters individual and disconnected actions by individual farmers [49]). We therefore asked LCAs to indicate their involvement by indicating “yes”, “no”, “we could provide service in the future”, or “not applicable/don’t know” for the following statements: “*We broker AEMs in particular to very relevant areas*”, “*We broker AEMs in particular towards the most relevant actors*”, “*We broker AEMs in particular towards the most relevant actors to*

overcome a single-farm approach in order to e.g., alleviate habitat fragmentation or to ensure AEM implementation". The variables assess the LCAs' current and potential prospective involvement in the targeting of AEMs.

2.5. Data Analysis

Data analysis was conducted using IBM SPSS 19. We used descriptive statistics to present the current involvement of LCAs as an intermediary for AEMs implementation in terms of their overall level of social networks, their provision of agri-environmental information and assistance as well as their overall impact on farmers' participation and the spatial targeting of measures.

In a second step, we test for the various correlations between social networks and the provision of agri-environmental information and assistance, participation, and spatial targeting. We run correlation analysis between most of the above-mentioned variables. Table A1 in the Appendix displays the values of the variables used for the correlation analysis to answer our research questions. The correlation coefficients presented in the results section of this paper are based on the Kendall Tau-B rank correlation coefficient, which is the most appropriate for smaller samples. We also run the correlations with the Spearman-Rho correlation coefficient. We obtained the same significant cases, however: correlations based on the Spearman-Rho correlation coefficient display slightly higher correlation coefficients than the Kendall Tau-B, which is why we chose to use the Kendall Tau-B. The total population size of our case study is limited ($n = 159$). Although the survey received a very satisfactory and representative response rate ($n = 55$), the total number of cases included in the correlation analysis is at the lower limit for running this type of analysis. The presentation of the correlation coefficient results should therefore be interpreted as tendencies suggesting the importance of social networks and of the provision of agri-environmental information and assistance to participation and spatial targeting.

We also run correlation coefficients between the social network variables and the various services included in the provision of agri-environmental information and assistance to check for potential influences between these variables. The correlation coefficients for these variables are displayed in Table A2 in the Appendix.

3. Results

3.1. Provision of Social Networks

3.1.1. Practice-based Networks between Stakeholder Groups

Although the formal integration of diverse stakeholder groups in local LCA committees is obligatory, it appears that this does not necessarily foster a regular practice-based exchange between these groups on the ground. A total of 67% of survey participants confirmed that they provided for a practice-based exchange and network between stakeholder groups. However, the frequency of exchange varies considerably across local groups and ranges from an almost daily basis to meetings occurring only once or twice a year.

3.1.2. Networks between LCAs and Farmers

The vast majority of LCAs (76%; $n = 42$) indicate that farmers do contact them either “always”, “very often”, or at least “sometimes”; 22% ($n = 12$) of LCAs stated that they were approached by farmers only “rarely” (Figure 2, left column).

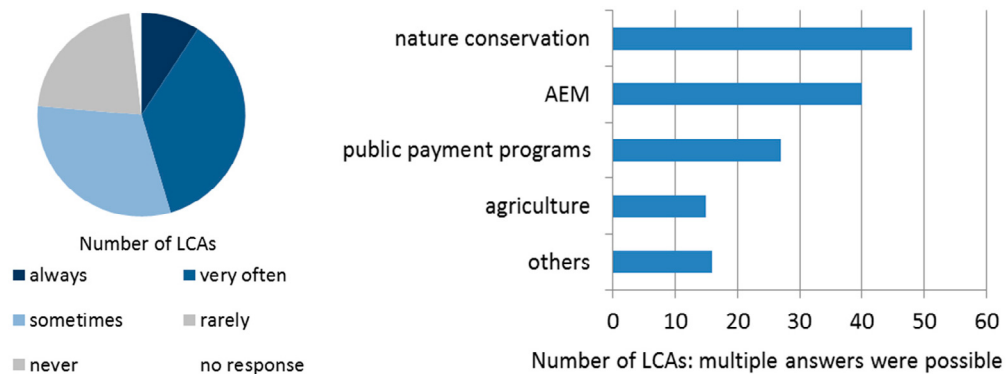


Figure 2. Frequency of (left) and reasons why (right) farmers contact local LCAs.

Farmers approach local LCAs for different reasons, but mostly with concerns on nature conservation (87%; $n = 48$) and AEMs (73%; $n = 40$). In addition, concerns about other funding for nature conservation aside from AEMs (51%; $n = 28$) is another relevant reason for contact. LCAs indicate that they are a less relevant contact for farmers with concerns on agricultural issues.

Furthermore, LCAs consider themselves to be important and among the organizations contacted by farmers with concerns about nature conservation and AEMs (Figure 3). The public administration is the most relevant contact for farmers in this area. However, in particular with respect to farmers’ overall concerns about nature conservation, there is only a minimal difference between the public administration and LCAs. Neither private agricultural consultants nor nature conservationists are considered to be relevant contacts for nature conservation and AEMs on behalf of farmers.

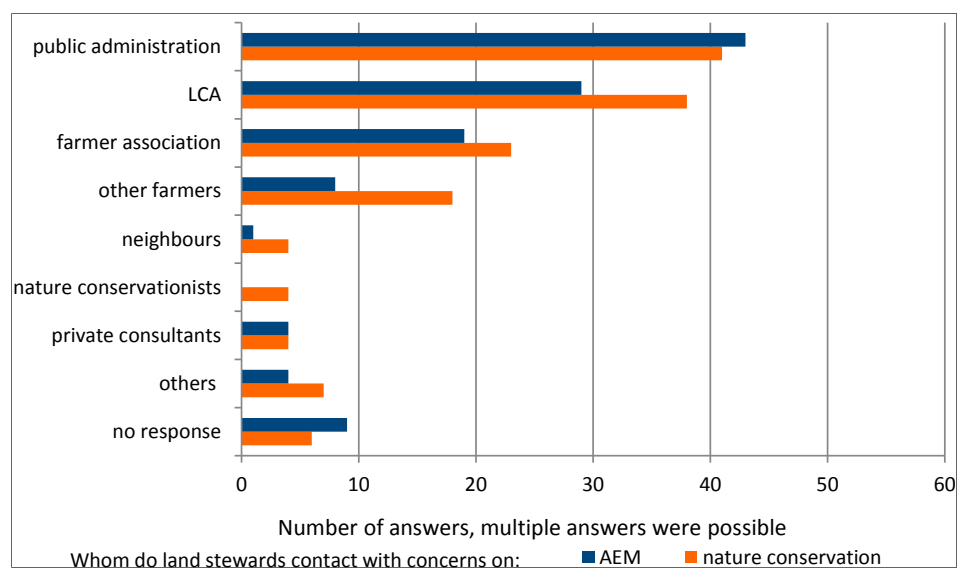


Figure 3. Whom farmers contact with concerns on nature conservation and AEMs.

3.2. Provision of Agri-Environmental Information and Assistance

Not all local LCAs are currently involved in the context of AEMs. However, 87% ($n = 48$) of survey participants indicated involvement in the context of AEMs implementation. Although the provision of agri-environmental information and assistance to farmers is not covered within the daily business operations of most LCAs, the majority of LCAs (78%; $n = 43$) stated that they provide advisory services (information and assistance), whereas 31% ($n = 17$) are involved in an operational manner (Figure 4). Operational LCAs either run their own “Landschaftspflegehof” or have applied for AEMs themselves (A Landschaftspflegehof practically supports environmentally sound management practices within agricultural lands and helps, e.g., to preserve existing culturally formed landscapes by grazing, *etc.*). Most operational LCAs also provide information and assistance on AEMs. However, the reach of advisory services is limited. Many LCAs offer services only to a particular group of farmers (cf. Figure 4—such as, e.g., only to grassland farmers, farmers operating in relevant areas such as Natura 2000 areas, or only members). Furthermore, the variables as displayed in Figure 4 only reveal how LCAs are involved in the context of AEMs. It does not show how often LCAs provide information and assistance services. It appears that many LCAs commented that they provided agri-environmental information and assistance only sporadically and frequently only at the request of individual land stewards – thus reflecting that these services are not within their ordinary activities: “*We provide advisory services only sporadically and in line with our ordinary business operations*”, “*we provide such services only upon demand to those farmers contacting us*” (trans. S. Schomers).

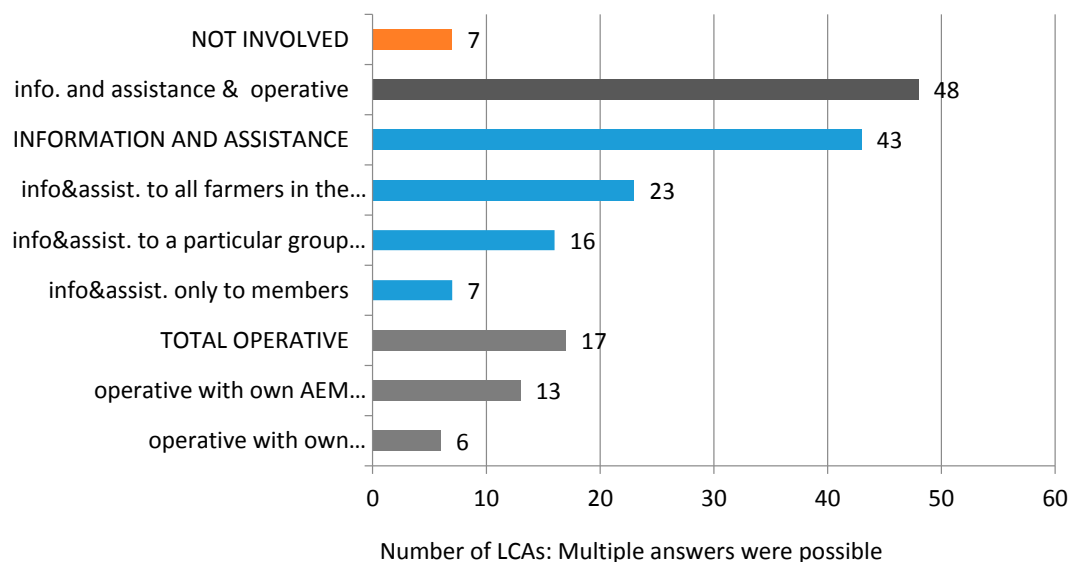


Figure 4. How LCAs are involved in the context of AEMs.

Table 2 provides a more detailed overview of the separate information and assistance services that LCAs do provide. The listed activities are arranged in chronological order, whereas the first six activities occur before contract signing, the last two activities accrue mostly after contract signing. A basic requirement for LCAs to operate with farmers in the context of AEMs is that farmers know about the existence of the various available measures and funds. However, only half of all LCAs provide such information. LCAs are particularly involved in those activities accruing before contract preparation and

signing (see Table 2). Furthermore, many LCAs state that they will be able to provide information and assistance in the future but do not do so now. Only a minority of LCAs indicate that they are unwilling to provide advisory services in the future—then however in particular for activities occurring with or after contract signing.

Table 2. Number of LCAs providing agri-environmental information and assistance.

Variable	Yes	We could Provide Services in the Future	No	Not Applicable/ Don't know	No Response	Total
Info&assistance AEMs	50.9% (n = 28)	18.2% (n = 10)	3.6% (n = 2)	7.3% (n = 4)	20% (n = 11)	55
Info&assistance eco	69.1% (n = 38)	16.4% (n = 9)	1.8% (n = 1)	5.4% (n = 3)	7.3% (n = 4)	55
Info&assistance content	56.5% (n = 31)	23.6% (n = 13)	3.6% (n = 2)	7.3% (n = 4)	7.3% (n = 5)	55
Info&assistance effort	58.2% (n = 32)	16.4% (n = 9)	9.1% (n = 5)	9.1% (n = 5)	7.3% (n = 4)	55
Info&assistance fields	60.0% (n = 33)	21.8% (n = 12)	9.1% (n = 5)	3.6% (n = 2)	5.5% (n = 3)	55
Info&assistance forms	40.0% (n = 22)	18.2% (n = 10)	25.5% (n = 14)	9.1% (n = 5)	7.3% (n = 4)	55
Info&assistance info	52.7% (n = 29)	12.7% (n = 7)	18.2% (n = 10)	7.4% (n = 4)	9.1% (n = 5)	55
Info&assistance docu	40.0% (n = 22)	16.4% (n = 9)	29.1% (n = 16)	7.2% (n = 4)	7.3% (n = 4)	55

3.3. Influence on Farmers' Participation

3.3.1. Indirect Factors

In general, LCAs perceive that their work positively influences farmers' motivation to participate in AEMs (Figure 5). They consider their work to particularly positively influence farmers' attitudes towards nature conservation and farmers' willingness to adopt AEMs. However, the 'perception towards nature conservation' as well as the 'attitudes towards nature conservation measures' variables do not exhibit a large variation in their values, *i.e.*, approx. 78% ($n = 43$) and 85% ($n = 47$) of LCAs mentioned having at least a slight positive impact.

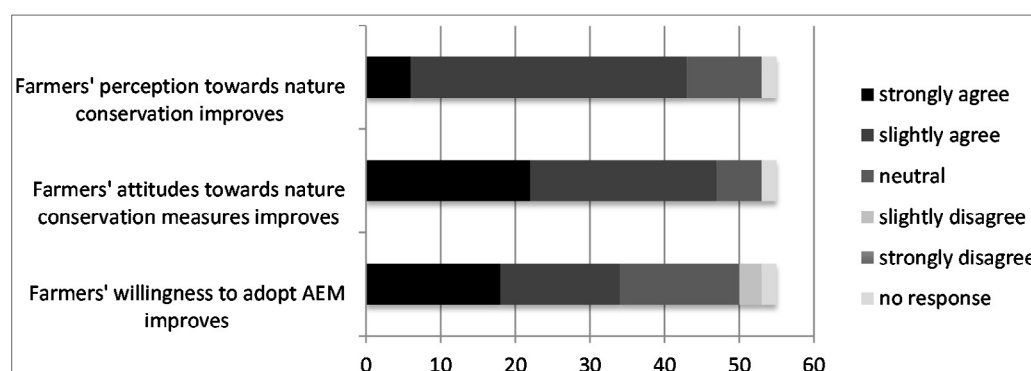


Figure 5. LCAs' stated influence on farmers' indirect participation drivers.

3.3.2. Direct Factors

A bit more than half of all LCAs also consider their current local involvement to be a positive influence on the total number of AEMs contracted for both complex (dark-green; 55%— $n = 30$) and the rather simple and less prescriptive (light-green; 53%— $n = 29$) measures (Figure 6). However, those LCAs indicating increases in complex AEMs contracts tend to indicate increases in the simple, less prescriptive AEMs contracts as well (the Kendall-Tau-b correlation coefficient between these two variables is 0.789, the Spearman-Rho correlation coefficient is 0.874; both are significant at a 0.01 level). Thus, most LCAs that stated that they positively influence participation rates do not focus on solely complex or simple measures. However, almost one third (29%; $n = 16$) of all LCAs indicate that they have no impact on the total number of LCAs contracted (Figure 6).

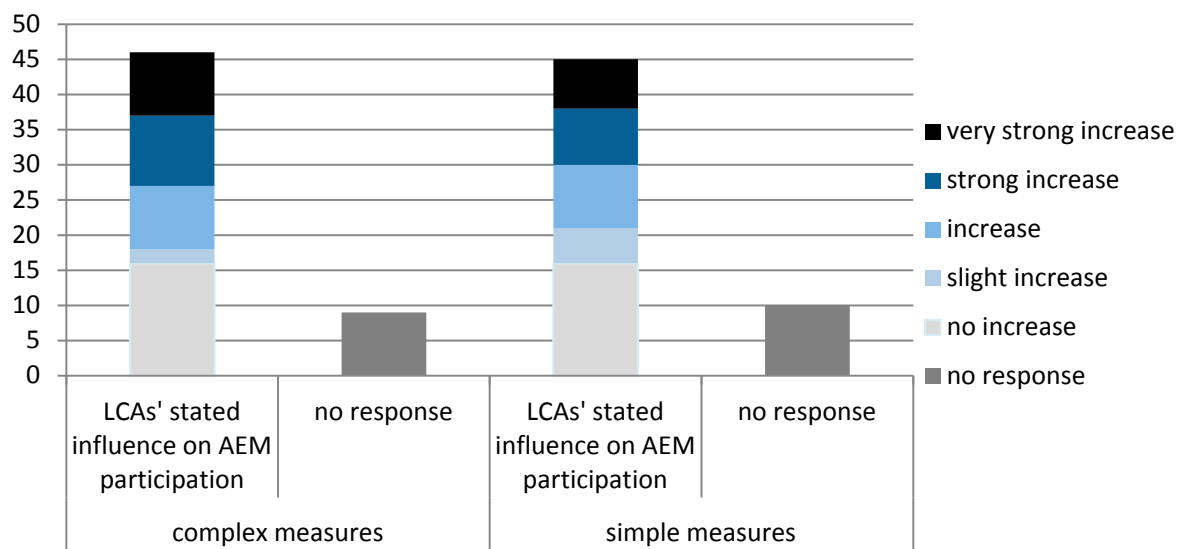


Figure 6. LCAs' stated influence on farmers' participation in complex and simple AEMs measures.

3.4. Involvement in Spatial Targeting

The majority of LCAs stated that they adopted a spatial targeting approach and brokered AEMs to most relevant areas (62%; $n = 34$). Only 9% of LCAs indicated that they neither do so currently nor anticipate doing so in the future. This finding is in line with the finding that some LCAs do provide advisory services to only a particular group of farmers (*cf.* Figure 4), such as grassland farmers or farmers in specific protected areas—which also indicates a spatial targeting approach.

Currently, 42% of LCAs stated that they brokered AEMs towards the most relevant actors, and 40% brokered AEMs to relevant farmers to overcome the single farm approach and to alleviate habitat fragmentation or to implement the water framework directive. The involvement of LCAs in all three types of spatial targeting of AEMs can be further increased in the future (Table 3).

Table 3. LCA involvement in spatial targeting.

Variable	Yes	We could Provide Services in the Future	No	Not Applicable/ Don't Know	No Response	Total
We broker AEMs to relevant areas	61.8% (n = 34)	12.7% (n = 7)	9.1% (n = 5)	1.8% (n = 1)	14.5% (n = 8)	55
We broker AEMs towards most relevant farmers	41.8% (n = 23)	21.8% (n = 12)	18.2% (n = 10)	3.6% (n = 2)	14.5% (n = 8)	55
We broker AEMs towards relevant farmers to overcome single farm approach	40.0% (n = 22)	25.4% (n = 14)	12.4% (n = 7)	9.1% (n = 5)	12.4% (n = 7)	55

3.5. The Relation between LCAs' Involvement and Environmental Effectiveness

The correlation analysis (Table 4) displays the relations between the various variables and helps when considering our research questions as stated in the introduction and method section.

3.5.1. The relations between Social Networks and Participation

The upper right edge of Table 4 displays the correlations between LCAs' local networks and the variables indirectly or directly impacting participation. Although the majority of LCAs indicate that they affect farmers' perceptions towards nature conservation and their attitudes towards nature conservation measures (Figure 5), we cannot find a correlation between the social networks and LCAs' stated influence on these two variables (farmers' perceptions and attitudes).

We cannot find a relation between LCAs' overall level of practice-based social networks between the stakeholder groups (bonding social capital) and any of the indirect or direct participation variables. However, the variables assessing the local networks between farmers and LCAs (bridging social capital) appear to be related to LCAs' stated influence on farmers' willingness to adopt AEMs and to the overall number of AEMs contracted. Furthermore, there is also a relation between the relative level of practice-based networks between stakeholders and the network between LCAs and farmers—*i.e.*, between the bonding and bridging social network variables (see Table A2 in the Appendix; Kendall-Tau-b correlation coefficient is 0.309 and sig. is 0.017).

3.5.2. The Relations between Agri-Environmental Information and Assistance and Participation

The lower right edge of Table 4 shows the correlations between the various agri-environmental information and assistance services that LCAs provide and the indirect and direct participation variables. We cannot find a relation between the provision of agri-environmental information and assistance and LCAs' stated influence on farmers' perception of nature conservation or farmers' attitudes towards nature conservation measures. However, the provision of agri-environmental information and assistance is related to the LCAs' stated influence on farmers' willingness to adopt AEMs. Except for the pure information on the existence of AEMs, it is specifically the provision of information and assistance *ex ante* to contract signing that is positively related to farmers' willingness.

Table 4. Correlation analysis; relation between networks & agri-environmental information and assistance and participation and targeting.

Variable	Participation (Indirect and Direct Influence Factors)						Targeting		
	Farmers' Perception Nature Conservation	Farmers' Attitudes Nature Conservation Measures	Farmers' willingness willingness AEMs	Complex AEMs Contracts	Simple AEMs Contracts	Targeting Areas	Targeting Actors	Targeting Fragmentation	
Networks between stakeholder	0.118 (n = 50)	-0.033 (n = 52)	0.025 (n = 52)	0.024 (n = 31)	0.192 (n = 32)	0.205 (n = 45)	-0.052 (n = 44)	0.000 (n = 42)	
Network LCA & farmer	0.150 (n = 52)	0.188 (n = 53)	0.428 *** (n = 53)	0.351 ** (n = 32)	0.487 *** (n = 33)	0.295 ** (n = 46)	0.195 (n = 45)	0.104 (n = 43)	
Network LCA & farmer for AEMs	0.133 (n = 53)	0.187 (n = 53)	0.458 *** (n = 53)	0.425 *** (n = 32)	0.456 *** (n = 33)	0.131 (n = 46)	0.012 (n = 45)	-0.097 (n = 43)	
Network LCA & farmer for concerns on nature conservation	0.212 (n = 53)	0.152 (n = 53)	0.477 *** (n = 53)	0.337 ** (n = 32)	0.343 ** (n = 33)	0.378 ** (n = 46)	0.154 (n = 45)	0.114 (n = 43)	
Info & assistance AEMs	0.011 (n = 39)	0.116 (n = 38)	0.038 (n = 38)	-0.025 (n = 23)	0.250 (n = 23)	-0.047 (n = 33)	0.086 (n = 33)	0.072 (n = 31)	
Info & assistance eco	-0.119 (n = 45)	0.298 * (n = 47)	0.294 ** (n = 47)	0.063 (n = 30)	0.066 (n = 31)	0.497 *** (n = 41)	0.228 (n = 41)	0.175 (n = 39)	
Info & assistance content	-0.088 (n = 45)	0.033 (n = 46)	0.268 * (n = 46)	0.206 (n = 29)	0.168 (n = 30)	0.345 ** (n = 41)	0.348 ** (n = 41)	0.198 (n = 39)	
Info & assistance effort	-0.092 (n = 45)	0.126 (n = 46)	0.371 *** (n = 46)	0.118 (n = 28)	0.161 (n = 29)	0.582 *** (n = 42)	0.378 ** (n = 42)	0.231 (n = 40)	
Info & assistance fields	0.004 (n = 49)	-0.037 (n = 50)	0.247 * (n = 50)	0.276 * (n = 30)	0.310 * (n = 31)	0.636 *** (n = 44)	0.554 *** (n = 43)	0.418 *** (n = 41)	
Info & assistance forms	-0.077 (n = 45)	0.074 (n = 46)	0.329 ** (n = 46)	0.121 (n = 30)	0.158 (n = 30)	0.422 *** (n = 42)	0.396 ** (n = 43)	0.250 (n = 40)	
Info & assistance info	0.083 (n = 45)	0.132 (n = 46)	0.173 (n = 46)	0.049 (n = 29)	0.082 (n = 30)	0.686 *** (n = 42)	0.437 *** (n = 41)	0.340 ** (n = 39)	
Info & assistance docu	-0.198 (n = 47)	-0.224 (n = 47)	0.059 (n = 47)	0.092 (n = 29)	0.067 (n = 30)	0.333 ** (n = 43)	0.402 *** (n = 43)	0.275 * (n = 41)	

Significance level = *** 0.01, ** 0.05 * 0.1; (n =) displays number of valid cases included in the correlation analysis.

We also find a weak relation between the provision of agri-environmental information and assistance and the network between LCA and farmers, in particular in terms of contacting for AEMs (ranging from 0.237 to 0.475; see Table A2 in the Appendix).

3.5.3. The relations between Social Networks and Spatial Targeting

We cannot find a clear and significant relation between LCAs' local networks or perceived competency in nature conservation and AEMs and their pursued spatial targeting activities (upper left edge of Table 4), except for the correlation between the targeting of AEMs to most important areas and two of the networks between farmers and LCA variables.

3.5.4. The Relations between Agri-Environmental Information and Assistance and Spatial Targeting

It appears that there is a relation between the stated provision of agri-environmental information and assistance and the spatial targeting variables, in particular, targeting to the most relevant areas. Except for simple information on the existence of AEMs, most correlation coefficients between these variables are statistically significant (lower left edge of Table 4).

4. Discussion

4.1. Provision of Social Networks and Agri-Environmental Assistance

The results show that the majority of LCAs consider themselves to be providing functioning local networks, in particular, networks between local farmers and the local LCA manager. Most LCAs stated that they were contacted by farmers at least every now and then, in particular with concerns on nature conservation and AEMs. According to the LCAs, only the public administration appears to be more important for farmers' with concerns about nature conservation and AEMs. We consider the stated answers as being realistic for different reasons. First, compared to the other literature, LCAs appear to underrate their importance compared to the public administration. Prager [44] mentions that "*conflicts between farming and public conservation interests were one reason for establishing [LCAs] initially*"—with high levels of mistrust between farmers and public agencies being common. LCAs helped to improve this situation. Comparable results have been published by Schomers *et al.* [23]. However, the legally binding AEMs contracts are signed between farmers and public administration—thus, the overall importance of the agency is not surprising.

Second, the distribution of responses regarding the frequency with which farmers contact LCAs exhibits sufficient heterogeneity—unless many LCAs indicate that they are contacted "always" or "very often". Still, 53% of LCAs stated that they were approached only "sometimes" or "rarely," thus stating rather low levels of social networks. In addition, the reasons that farmers approach LCAs appear to be in line with their business operations—focusing on nature conservation and not on overall agricultural concerns [23,43–45,50]. This indicates that LCAs are perceived and contacted in accordance with their official mandate – being a key driver for the creation of relational trust [47]. These findings could be interpreted as indicating that the majority of local LCAs consider themselves to be a known and mostly accepted intermediary in the context of nature conservation and AEMs, exhibiting relational trust towards their farmers and underlining LCAs' overall fit in the provision of agri-environmental

information and assistance. Their clear standing for nature conservation qualifies in particular for the provision of targeted advice with a clear focus on ecosystem functions and biodiversity. In this way, LCAs' stimulus can clearly be differentiated from e.g., private consultants, who were appraised as being rather unimportant for both farmers with concerns on nature conservation and AEMs. Private consultants often rather provide production centered agricultural advice. Agri-environmental advice can be differentiated from the provision of pure agricultural advice as the latter focuses mostly on improving overall commodity production practices and potentially adversely affects the environmental effectiveness of AEMs [47,51,52]. Therefore, agricultural advice should also cover agri-environmental concerns [47,53], not least because sustainable farming practices as prescribed by AEMs require skills and knowledge [54]. However, intermediaries with a clear environmental mandate and which are not perceived as neutral or even pro-agriculture are often at a disadvantage in creating relational trust, as opposed to e.g., private consultants [47]. However, clearly focused agri-environmental intermediaries need to understand the farmers' (economic) perspective and their constraints, in particular because the adoption of measures is voluntary and LCAs can mainly convince farmers by highlighting the (economic) benefits [23]. The emphasized disadvantage of generating relational trust towards farmers for actors with a clear mandate for nature conservation appears to be overcome at least partially by LCAs, as indicated by the frequency with which farmers contact them. This conclusion is also supported by research on comparable organizations at an international level, such as the Farming and Wildlife Advisory Group (FWAG) in the UK [47].

The findings on the frequency of and reasons for farmers contacting LCAs also indicate that there is a need for organizations to provide information services on AEMs and nature conservation, *i.e.*, that there is currently a deficiency in the provision of such services. Interestingly, the plain provision of information on the existence and availability of AEMs funds appears to be less important than assistance with most subsequent and more substantial AEMs implementation activities. This indicates that most likely, the majority of farmers know about AEMs and that intermediaries providing assistance should be involved in more time intensive and knowledge specific activities.

The reasons why LCAs are currently not providing these services have not been covered within this study. We consider that the limited provision of advice is at least partially provoked by LCAs' internal transaction costs. These transaction costs arise with the provision of advice and are not always adequately compensated. However, the provision of information and assistance reduces farmers' private transaction costs and thereby the total costs of participation [55,56] and is thus considered to trigger participation. Within the last CAP rounds, advice was considered to be an important component to tackle the increasing ecological challenges within the agrarian landscape (see, e.g., Regulation (EU) 1305/2015 [57]). Many urge for more advice and assistance services, which are however restricted due to limited financial resources.

Further, the high relevancy of the public administration for farmers' with concerns about nature conservation and AEMs might indicate that services such as agri-environmental information and assistance could also be provided by government agencies that operate at the local level, manage to provide sound networks including relational trust towards their farmers, and maintain sufficient local ecological and social knowledge. It is not the charitable status of an organization that produces trust, but rather the organizations' perceived mandate [47]. Thus, public agents may not necessarily be at a disadvantage in creating good relations with individual farmers.

4.2. The Influence on Participation and Targeting

The majority of LCAs consider that their work improves both the indirect and direct participation variables. LCAs particularly consider their work to be influencing farmers' perceptions and attitudes towards nature conservation and nature conservation measures; these are the variables with the highest level of affirmation. Farmers' perceptions and attitudes are important drivers in the decision-making process for whether to participate [36,39,41,58,59]. On the one hand, the results as stated by LCAs could indicate that the pure presence of LCAs and their local involvement in the region almost always impacts farmers' perceptions of nature conservation and their attitudes towards the respective measures. On the other hand, the low variation in the two variables' values (perception and attitudes) could also indicate that these entail a bias in the form of strategic answers—thus overrating LCAs' impact on these two very cognitive variables. The emphasized potential of highly strategic answers and thus biased data cannot be ruled out. However, we consider this set of data to be sufficiently realistic to show interesting tendencies and to derive overall conclusions on the importance of social networks and agri-environmental information and assistance for participation and targeting for three reasons. First, LCAs self-appraisal of the indirect and direct participation variables is supported by findings from others on comparable organizations. Prager [44] highlights LCAs' contribution to awareness-raising and changing mindsets, also for production-oriented farmers—a result that Prager also emphasizes for the Dutch counterpart of LCAs. Landcare in Australia has also been credited with improving farmers' attitudes and increasing adoption of conservation measures [60–62]. The same holds true for the FWAG in the UK [40]. Second, the variables “farmers' willingness to adopt AEMs improves” and the two direct participation variables (“complex AEMs contracts” and “simple AEMs contracts”) exhibit heterogeneity in the response distribution. A total of 35% of all respondents indicate neutrality or even disagree slightly with the statement that LCAs improve farmers' willingness to adopt AEMs; further, almost one third of all respondents also state that LCAs do not influence the overall level of AEMs contracted. Third, the correlation analysis exhibits significant relations only for the latter three variables (willingness to adopt AEMs and the two direct participation variables). Thus, we refrain from deriving conclusions on LCAs and their influence on these two indirect participation variables (perceptions and attitudes).

The majority of LCAs also indicate that they currently are or prospectively will be able to perform spatial targeting of AEMs. This indicates that most local groups have the relevant ecological and social knowhow regarding the local circumstances required for such activities. It also indicates that LCAs consider themselves as being able to communicate and convince farmers to adopt the relevant measures. Prager [49] notes that LCAs are well suited to foster a cooperative AEMs implementation approach. In practice, however, it appears that the majority of LCAs do not target AEMs to overcome a single-farm approach, which often requires less cooperation among farmers and less facilitation efforts on behalf of LCAs than a cooperative AEMs approach. Compared to the provision of information and assistance, considerable potential for improving the spatial targeting of measures is currently not used and could be levered in the future. Hence, there is scope for LCAs to further increase their involvement in the facilitation of AEMs in the future. More research is needed to understand how to help them increase their involvement in this regard.

4.3. The Importance of Providing Social Networks and Agri-Environmental Information and Assistance for Participation and Targeting

4.3.1. The Importance of Agri-Environmental Information and Assistance

Our results indicate that the deliberate provision of agri-environmental information and assistance impacts on farmers' willingness to adopt AEMs (the first two indirect participation variables). In particular, assistance with the more specific time- and knowledge-intensive activities occurring *ex ante* and with contract signing are correlated to farmers' willingness to adopt AEMs—whereas, the pure provision of information on AEMs is not related to the farmers' willingness to adopt variables. This finding is also in line with other literature. Information and assistance encourages farmers' willingness to adopt AEMs mainly because private transaction costs are reduced [36,40,55,63]. Private transaction costs arise, in particular, up until the point when the final signature is due, *i.e.*, for private information gathering and bargaining and decision-making processes [7]. However, although the provision of information and advice is positively correlated to farmers' willingness to adopt AEMs (indirect participation variable), we cannot find that such service provision can be related to the overall number of AEMs contracted (the direct participation variables). This is a striking result and against most other findings in the literature which cite that access to information and connection to agency or local networks are important drivers for the adoption of conservation measures [35,52,64]. Those LCAs indicating that they provide agri-environmental information and assistance did not reveal the intensity (frequency) of service provision. Many commented that they provide information very sporadically and upon demand from individual farmers—the current overall impact on participation might therefore be minimal in many cases. However, the missing relation between information and assistance and the direct participation variables could indicate something else. While information and assistance improves farmers' willingness to adopt AEMs, it does not necessarily result in more contracts signed. Although for some farmers, the adoption of conservation practices is based on altruistic motives or lifestyle goals [41], this is not the case for the all farmers [58]. A farmer's decision to participate in conservation measures is generally the outcome of “complex interactions of social and cultural as well as economic and policy influences” [59]. The improved willingness to participate could be undermined if relevant factors in the external environment oppose this willingness. Such factors could be too low payment levels, inadequate or inflexible contract terms, too much bureaucracy, high transaction costs, *etc.* [36,55,58,65], ultimately averting participation.

However, most of the agri-environmental information and assistance variables exhibit moderate to strong and significant correlations with all spatial targeting variables. This finding indicates that those LCAs that currently adopt a spatial targeting approach commonly also provide information and assistance—in particular towards farmers in most important areas. Again, the pure provision of information on the existence of AEMs is not related to any of these variables. We interpret these findings as indicating that is, in particular, the time- and knowledge-intensive AEMs implementation activities (such as providing information on the effort and time needed to implement measures or selecting the most suitable fields that will be managed in accordance with AEMs) that are currently supported by LCAs to manage a deliberate brokering of AEMs, *i.e.*, to achieve the spatial targeting of measures. The

importance of agri-environmental advice for successfully achieving the spatial targeting of AEMs is also found by Meyer *et al.* [66].

4.3.2. The Importance of Social Networks

Interestingly, and compared to the provision of agri-environmental information and advice, the variables that proxy LCAs' relative levels of social networks exhibit more and higher correlations with the participation variables (willingness to adopt AEMs as well as complex and simple AEMs contracts). This finding suggests that it is not only about the provision of agri-environmental information and assistance but also about who provides the services. Next to the provision of agri-environmental information and assistance, intermediaries should therefore also invest in the generation and maintenance of social networks and relational trust with their clients—this inference is also supported in the literature [26,47]. The correlations between the information and assistance variables and the (bridging) social network variables (*cf.* also Appendix) indicate that advice and networks might reinforce each other. On the one hand, the provision of advice clearly provides for contact with farmers—in particular, as farmers mostly approach LCAs with concerns on AEMs and nature conservation. On the other hand, the existence of social networks enables LCAs to provide information and assistance at relatively lower costs and can thus be a driver for the provision of advisory services [23,44,64].

However, the local and practice-based network between the diverse stakeholder groups (bonding social capital) does not appear to be relevant for improving farmers' participation in AEMs. This result is noticeable, as the formal membership structure was built purposefully as a lever to improve the acceptance of nature conservation in general [43,45,46]. Local LCA “groups provide a forum for negotiation and conflict resolution where stakeholders with diverse interests cooperate as equal partners”, leading to a “broader acceptance of environmental concerns and coordinated action to ensure outcomes” [46]. This conflict resolution potential is likely to improve acceptance of nature conservation measures in areas with high levels of conflict, such as in, e.g., Natura 2000 areas [43]. Furthermore, it is assumed that these groups produce knowledge related to local ecological and social circumstances [23]. However, the practice-based exchange between the diverse and often conflicting interest groups appears to be almost irrelevant to individual farmers in the context of AEM facilitation. This finding underlines the importance of the local individual field manager, his contacts with farmers and his soft skills - hence, the local embeddedness of the field manager in terms of relational trust and bridging social capital. In the literature, this type of local embeddedness has particularly been emphasized as being important in the context of AEMs and nature conservation measures in general [17,18,47]. Compton and Beeton [24] also found that in the case of the Australian Landcare, it is also the local field facilitator and his respective levels of bridging social capital that determines whether Landcare can be considered a “positive phenomenon”. In this context, a major advantage of LCAs is their broad spatial coverage [23] and their mostly long-term existence and involvement at the local scale [45]. According to Sutherland *et al.* [47], longevity in expertise in the provision of agri-environmental information and assistance is more important than the charitable status of an intermediary in engendering trust. However, to make local groups resilient against external shocks and to clearly ensure their commitment and involvement in nature conservation, continuous organizational support that includes funding for local groups should be considered [45,67]. According to Prager [67], the institutional funding of local groups to ensure local

landscape management and nature conservation involvement is preferable and more cost-effective than any ad-hoc funding or project funding.

There is a weak correlation between the bridging and bonding social capital variables (*cf.* Appendix). This could indicate that exchange between the diverse stakeholder groups helps LCAs to become visible and known in the region and creates personal networks between the field manager and farmers. It would therefore have a very indirect impact on farmers' participation. The membership structure is a unique feature of German LCAs, and in particular, the active involvement of nature conservationists is not met by any other group at an international level [45,46]. An indicated irrelevancy of this membership structure for AEMs facilitation may imply considerable opportunities for other intermediaries in addition to LCAs that do not exhibit the organizational membership structure of LCAs but that provide good levels of local social networks, in particular to farmers, and include the relevant local social and ecological expertise.

Except for two cases, the social networks variables are not related to spatial targeting as conducted by LCAs. Because most of the social network variables consider the direction of farmers contacting the local field manager, this finding could indicate that spatial targeting does not occur accidentally. In combination with the discussed findings on the provision of agri-environmental information and advice, this could indicate that a spatial targeting strategy for AEM needs, in particular, the deliberate provision of agri-environmental information and advice.

5. Conclusions

Based on the presented and discussed results, overall conclusions on how intermediaries can generally enhance the environmental effectiveness—in terms of overall participation and spatial targeting—of large-scale public PES programs are now derived.

Deficiencies in the current implementation of PES clearly offer the potential to improve the environmental effectiveness of governmental PES. The discussed results indicate that the provision of agri-environmental information and assistance is one building block to improve the effectiveness of AEMs—however, it is also important to consider who provides such services. Locally embedded intermediaries who provide both local social and trustworthy networks and agri-environmental information and assistance should be considered as an active component within PES-implementing governance structures, as they can actively help to improve overall participation rates and the spatial targeting of measures. Local embeddedness refers, on the one hand, to the importance of personal networks based on relational trust between the individual intermediary and the individual farmers. This also requires that the intermediary is recognized, known, and approachable by farmers, in particular with respect to his capacities and competencies in PES and nature conservation issues. The local social network between the intermediary and farmers (bridging social capital) is likely to help influence farmers' cognition and thus the decision-making process regarding participation (the willingness to adopt PES). On the other hand, local embeddedness refers to knowledge about local social and local ecological circumstances and deficiencies. This is, in particular, a prerequisite for the targeting of PES to most relevant areas or for overcoming the single farm approach entailed in many measures. The targeting of measures requires, in particular, the deliberate provision of agri-environmental information and assistance throughout the entire PES application and implementation process. There is

a need to support specifically the more time- and/or knowledge-intensive PES implementation activities—not least as these provoke high private transaction costs. Therefore, it is important that the intermediary has good knowledge of the respective PES measures, the respective ecological aims of the measures, how and where the measures need to be implemented, how to manage the bureaucracy and paperwork of the application, and so on. Our results indicate that—at least in our case study region—there are deficiencies in the provision of agri-environmental information and assistance; thus, there is ample room to improve the environmental effectiveness of such measures.

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Author Contributions

The authors jointly designed the manuscript, including the development of the questionnaire. The first author wrote the main part of the manuscript, however all authors contributed. All authors contributed to the content in various discussions.

Conflicts of Interest

The authors declare no conflict of interest.

Appendix

Table A1. Operationalization of research questions.

Indicator	Survey Questions	Response Categories	Value (Correlation Analysis)
	Social networks and perceived competency		
Practice-based networks between stakeholders	<p>“Do you provide a regular and practical local exchange on the ground and between the diverse stakeholder groups?”</p> <p>... and “if so, how often do you foster such an exchange annually?”</p>	yes, no open answer	0, 1
Network LCA & farmer	<p>“How often do farmers contact you on own initiative?”</p> <p>... and “why?”</p>	<p>always, very often, sometimes, rarely, never, not specified</p> <p>nature conservation, AEM, payment programs apart from AEM, others</p>	<p>Always = 4 Very often = 3 Sometimes = 2 Rarely = 1 Never = 0 Others not included in correlation analysis</p>
LCAs' perceived competency for nature conservation	“Whom do farmers in your region commonly contact with concerns on nature conservation?”	public administration, LCA, farmer association, other farmers, neighbours,	LCAs mentioned = 1 Otherwise = 0
LCAs' perceived competency for AEM	“Whom do farmers in your region commonly contact with concerns on AEM and why?”	public administration, LCA, farmer association, other farmers, neighbours,	LCAs mentioned = 1 Otherwise = 0
Components of agri-environmental information and assistance			
Info & assistance AEM	“We inform farmers on the existence of AEM including availability of funds”	yes, we could provide service in the future, no, not applicable/don't know	Yes = 1 In future or no = 0 Others not included in correlation analysis
Info & assistance eco	“We inform farmers on the pursued ecological goal and explain why measures are important”	yes, we could provide service in the future, no, not applicable/don't know	Yes = 1 In future or no = 0 Others not included in correlation analysis

Table A1. Cont.

Indicator	Survey Questions	Response Categories	Value (Correlation Analysis)
Info & assistance content	"We advise farmers on the content of the measures and explain how measures need to be implemented on own farm"	yes, we could provide service in the future, no, not applicable/don't know	Yes = 1 In future or no = 0 Others not included in correlation analysis
Info & assistance effort	"We advise farmers on the expected effort and time needed to implement measures"	yes, we could provide service in the future, no, not applicable/don't know	Yes = 1 In future or no = 0 Others not included in correlation analysis
Info & assistance fields	"We assist in identifying and selecting the most suitable plots and fields that shall be managed in accordance with AEMs on a single farm level"	yes, we could provide service in the future, no, not applicable/don't know	Yes = 1 In future or no = 0 Others not included in correlation analysis
Info & assistance forms	"We assist in completing and filling-in the AEM application forms, in particular if these are long and complex"	yes, we could provide service in the future, no, not applicable/don't know	Yes = 1 In future or no = 0 Others not included in correlation analysis
Info & assistance info	"We provide to and obtain for farmers additional and required information throughout the application and implementation process"	yes, we could provide service in the future, no, not applicable/don't know	Yes = 1 In future or no = 0 Others not included in correlation analysis
Info & assistance docu	"We assist farmers with the required documentation and recording of AEM implementation activities"	yes, we could provide service in the future, no, not applicable/don't know	Yes = 1 In future or no = 0 Others not included in correlation analysis
Participation			
Farmers' perception nature conservation	"Farmers' perception towards nature conservation commonly improves when cooperating with LCAs"	strongly agree, slightly agree, neutral, slightly disagree, strongly disagree	Strongly agree = 2 Slightly agree = 1 Neutral = 0 Slightly disagree = -1 Strongly disagree = -2

Table A1. Cont.

Indicator	Survey Questions	Response Categories	Value (Correlation Analysis)
Farmers' attitudes nature conservation measures	"Farmers' attitudes towards nature conservation measures commonly improve when cooperating with LCAs"	strongly agree, slightly agree, neutral, slightly disagree, strongly disagree	Strongly agree = 2 Slightly agree = 1 Neutral = 0 Slightly disagree = -1 Strongly disagree = -2
Farmers' willingness AEM	"Farmers' willingness to implement AEM on their fields commonly improves when cooperating with LCAs"	strongly agree, slightly agree, neutral, slightly disagree, strongly disagree	Strongly agree = 2 Slightly agree = 1 Neutral = 0 Slightly disagree = -1 Strongly disagree = -2
Complex AEM contracts	"LCAs' involvement has increased the number of complex, challenging, and cost-intensive AEM contracts signed"	strongly agree, slightly agree, neutral, slightly disagree, strongly disagree	Strongly agree = 2 Slightly agree = 1 Neutral = 0 Slightly disagree = -1 Strongly disagree = -2
Simple AEM contracts	"LCAs' involvement has increased the number contacts signed of those AEMs that are relatively easy to implement"	strongly agree, slightly agree, neutral, slightly disagree, strongly disagree	Strongly agree = 2 Slightly agree = 1 Neutral = 0 Slightly disagree = -1 Strongly disagree = -2
Spatial Targeting			
Targeting areas	"We broker AEMs in particular to very relevant areas"	yes, we could provide service in the future, no, not applicable/don't know	Yes = 1 In future or no = 0 Others not included in correlation analysis

Table A1. Cont.

Indicator	Survey Questions	Response Categories	Value (Correlation Analysis)
Targeting actors	"We broker AEMs in particular towards the most relevant actors"	yes, we could provide service in the future, no, not applicable/don't know	Yes = 1 In future or no = 0 Others not included in correlation analysis
	"We broker AEMs in particular towards the most relevant actors to overcome a single-farm approach in order to e.g. alleviate habitat fragmentation or to ensure AEM implementation"	yes, we could provide service in the future, no, not applicable/don't know	Yes = 1 In future or no = 0 Others not included in correlation analysis

Table A2. Correlations between other variables.

	Social Networks				Provision of Agri-environmental Information & Advice					
	Network between stakeholder	Network LCA & farmer	LCAs' nature conservation	LCAs' competen. AEM	Info & assis. AEM	Info & assis. eco content	Info & assis. effort	Info & assis. fields	Info & assis. forms	Info & assis. docu.
Network between stakeholder	0.309 ** (n = 52)	0.309 ** (n = 52)	0.250 * (n = 52)	0.507 *** (n = 54)	0.268 * (n = 46)	0.254 * (n = 47)	0.310 ** (n = 46)	0.475 *** (n = 46)	0.238 * (n = 46)	0.237 * (n = 47)
LCAs' competency nature conservation	0.250 * (n = 52)	0.510 *** (n = 54)	0.628 *** (n = 55)	0.628 *** (n = 55)	0.293 ** (n = 46)	0.324 ** (n = 47)	0.342 ** (n = 46)	0.401 *** (n = 46)	0.328 ** (n = 46)	0.354 ** (n = 50)
LCAs' competency AEM	0.507 *** (n = 54)	0.510 *** (n = 54)	0.628 *** (n = 55)	0.628 *** (n = 55)	0.293 ** (n = 46)	0.324 ** (n = 47)	0.342 ** (n = 46)	0.401 *** (n = 46)	0.328 ** (n = 46)	0.354 ** (n = 50)

Significance level = *** 0.01, ** 0.05 * 0.1.

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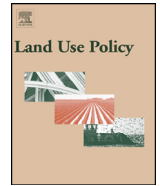
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Viewpoint

Civil society actors at the nexus of the ecosystem services concept and agri-environmental policies



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ABSTRACT

This viewpoint is based on the premise that it may be reasonable to further integrate the ecosystem services (ES) concept into agri-environmental policies, particularly into agri-environmental measures (AEMs). Building on this, we show that collaboration between the government and civil society actors (CSAs) may offer many opportunities to integrate the ES concept into AEMs. Furthermore, we demonstrate how collaboration with CSAs can be fostered and we provide some future research directions that should be considered.

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1. Introduction

The ecosystem services (ES) concept originated in socio-ecological research and has been adapted by economists over the past several years. Recently, it has been increasingly used in the environmental policy arena (e.g., MA, 2003; TEEB, 2010). Despite much criticism of its technical, social, and ethical aspects (Jax et al., 2013; Noorgard, 2010; Redford and Adams, 2009), the ES concept has been perceived as useful for policy conception and communication (Hauck et al., 2013; Ruhl, 2011). Meanwhile, the integration of the approach into various supranational and national environmental policies has taken place and has already been analyzed by policy researchers and extensively discussed in the realms of politics, policy-making, and administration (cf. Matzdorf and Meyer, 2014; Hauck et al., 2013; Ruhl, 2011). Specifically, EU and US agri-environmental policies have been acknowledged as particularly suited to the integration of the ES concept, in particular, because these policies already include a range of financial incentive instruments.

Agri-environmental measures (AEMs) represent the main financial incentive instrument of EU and US agri-environmental policies. Existing AEMs have been frequently criticized for lacking provisions of additional ES (Hodge and Reader, 2010). The majority of inter-

national governmental AEMs pay for the adoption of prescribed land management practices and make assumptions about resulting improvements in the agricultural environment (cf. Reed et al., 2014). Most AEMs are designed and implemented at the farm scale, whereas the appropriate scale for ES provisioning is ignored (Prager et al., 2012). The nexus of AEMs and the ES concept has recently been emphasized in different scientific publications, along with various strengths and weaknesses of this approach and possibilities for integration (Reed et al., 2014; Matzdorf and Meyer, 2014). Reed et al. (2014) and Matzdorf and Lorenz (2010) show that generally, spatially targeted and ES outcome-based AEMs may be more efficient than existing approaches but include certain challenges, such as ES valuation and commodification, as well as barriers to cross-boundary collaboration.

Integration of the ES concept should result in clearly communicated objectives and payments for specific services. Therefore, the quantification of ES goals is an outstanding requirement for integrating the ES concept with AEMs (cf. Matzdorf and Meyer, 2014) in order to visualize the services provided by nature and their values for humans. These visualized values can provide good arguments for effective environmental protection and may help broaden the social legitimization of payments through AEMs. ES implementation may prevent payments of hidden subsidies, can promote trust in the political process, and may validate farmer contributions to society. By raising social acceptance, the ES concept may help change the interpretation and appraisal of “additionality”. The integration of the concept may help to calculate and

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justify transaction costs and initiate new discussion about farmer surpluses (producer rents), especially if payments yield positive external effects (cf. Matzdorf et al., 2014).

Initial attempts to integrate the ES concept into agri-environmental policies may be observed in higher-level legal environmental frameworks, such as the new EU Common Agricultural Policy (CAP), or in new high-level administrative entities (Matzdorf and Meyer, 2014). Furthermore, it may be presumed that those who are in charge of devising and revising agri-environment schemes are familiar with the idea that society benefits from agricultural landscapes and are also progressively conversant with the ES and payments for ecosystem services concepts, depending on the respective national agri-environmental policies (cf. Potter and Wolf, 2014). For further ES concept integration and better implementation of the relevant ES strategies, governments must intensely foster the progress and enhancement of variable quantification, monitoring, and control methods. Therefore, the integration of different actors into method development, implementation and integration is necessary.

Suggestions for integration include the promotion of collaboration at catchment or wider spatial scales, the building of social capital, and the creation of partnerships to deliver ES. Consequently, “bridging organizations” have been emphasized as potentially immensely helpful to these endeavors (Prager et al., 2012). The participation of key stakeholders is needed for coordination, facilitation, and implementation (cf. Reed et al., 2014). Civil society actors (CSAs) could serve as such key bridging stakeholders, most importantly to cope with the challenges of ES integration into agri-environmental policies and agri-environmental measures (AEMs). We broadly think of the scope of CSAs as “... people [who] get involved outside of government or purely economic activities in order to (help) shape social processes”¹ (Matzdorf et al., 2014: p. 188). They can be individuals or be formally or informally organized, e.g., in NGOs, foundations, associations, social movements, or citizen action groups.

Within this viewpoint, we emphasize that collaboration with civil society offers many opportunities to achieve ES integration and better implementation of the relevant aspects of the ES concept (Section 2). Subsequently, we show how collaboration with civil society at the nexus of agri-environmental policies and ES can be fostered (Section 3). Finally, we provide directions for future research that should be conducted to take a step forward (Section 4). Most of the input for this viewpoint stems from individual and collective research that has been conducted by the research group CIVILand,² whose overall focus was on institutional diversity of PES in Germany, Great Britain, and the US, and the role of the different actors involved, with a strong focus on the actual and possible role of civil society and PES on agricultural lands.

2. CSAs for ES concept integration

As described above, successful ES-based AEMs require knowledge about economic, social, and ecological circumstances at the local scale. Right there, we see many CSAs that embrace on-the-ground experience with nature conservation measures and are embedded in relevant social structures (Schomers et al., 2015).

Thus, committed individual CSAs, possibly as parts of organizations (e.g., Landcare groups in Germany or Australia; Schomers et al., 2015; Prager and Vanclay, 2010), could be substantially important for supporting the integration of the ES concept into AEMs for multiple reasons. It could be especially important that different CSAs, pursuing different objectives, work together or that CSAs are integrated into a broad local network including different stakeholders groups. In the following we emphasize four areas where CSAs could make a huge contribution to the implementation of ES concept integration in AEMs. We underpinned every aspect with a successful case study example based on CSA involvement (in detail cf. Matzdorf et al., 2014). Generally, many of the arguments for CSA involvement that are emphasized in the following discussion mirror those from the general public participation and collaborative governance literature (e.g., Young et al., 2013; Newig and Fritsch, 2009; Reed, 2008; Stringer et al., 2006).

First, regional CSAs can provide a sound understanding of frequent problems encountered with ES concept integration because they are rooted on the spot. They have regional knowledge of ecological problems and economic situations and are often part of a broader stakeholder network. Thus, the integration of CSAs can help to foster the variable quantification of ES and to design more landscape-level targeted schemes, in terms of better project quality (cf. Reed, 2008). For example, this concept can be demonstrated with the case of the German Blühendes Steinburg project, where a nature conservation foundation, together with the local farmer's association, successfully implemented an output-based payment scheme for grassland areas combined with a tendering procedure. By introducing two underutilized payment approaches that are appropriate for a specific situation, they supported areas that lacked existing nature conservation requirements. The focus on indicator species and personal contact between commissioned biologists and farmers, who surveyed the relevant areas together, led to a better understanding of nature conservation (<http://www.sn-sh.de/index.php?id=1112> and Matzdorf et al., 2014). Furthermore, this case shows that by establishing common ground, participatory processes have the capacity to find new ways for participants to work together and for knowledge integration (Stringer et al., 2006).

Second, we found that many CSAs have regional knowledge, links to local networks, and direct contacts to farmers (depending on the individual CSA). Therefore, they can promote (state) programs and help with outreach, in terms of better acceptance (cf. Reed, 2008). As they often enjoy more trust than government actors and speak local farmers' languages, they can identify suitable areas, convince farmers of the value of testing new approaches, and offer them advice and guidance during their participation. This can, for example, be observed in the case of the Conservation Reserve Enhancement Program (CREP) in Vermont, which supports outreach and assistance by third parties. One of those third parties is Ducks Unlimited, a non-profit organization conducting wetland and forest conservation projects and connecting farmers and landowners to funding sources. They contribute to CREP by identifying appropriate sites and personally contacting landowners (US Department of Agriculture, Farm Service Agency, 2011; US Department of Agriculture, Farm Service Agency, 2005; and Matzdorf et al., 2014). As a further consequence, a higher acceptance of these programs could also lead to better compliance and swifter implementation (cf. Newig and Fritsch, 2009 on participation procedures).

Third, locally engaged CSAs can support and improve not only the quality and performance of ES targeting but also the monitoring of agri-environmental measure outcomes through direct monitoring or the mobilization of other regional players, sometimes even volunteers. This was the case in a German government-financed program for the protection of meadow birds, called *Gemeinschaftlicher Wiesenvogelschutz*. Here, voluntary site supervisors

¹ CSAs can be active at different levels, ranging from the grassroots level up to the international level. CSAs are typically characterized by voluntary engagement, independence, compassion, and creativity, which contribute to social cohesion and building public consensus within modern societies (cf. Matzdorf et al., 2014).

² CIVILand was a research group that had been engaged in Payments for Ecosystem Services (PES) in the context of civil society initiatives. It was based at the German Leibniz-Centre for Agricultural Landscape Research (ZALF) and conducted research in cooperation with various partners in Germany, the UK, and the US: <http://www.civiland-zalf.org/en/>.

played a pivotal role in identifying suitable sites, developing management restrictions and monitoring compliance, both in close cooperation with the participating farmers and with a coordinating local association, called Kuno e.V. It has been emphasized that through the commitment of the voluntary site supervisors and the personal and direct contact with potential participants, farmers have developed a connection to the project (Jeromin, 2009 and Matzdorf et al., 2014). This example especially accounts for the findings that face-to-face communication may positively influence the ecological standard of decisions, and the procedures for participation may increase the acceptance of certain public policy decisions (cf., Newig and Fritsch, 2009).

Fourth, CSAs are often significantly involved in the development of innovative, successful new ideas and conservation approaches that could be integrated within or converted to public conservation schemes. To test innovative ideas, CSAs often combine private and public funding. If possible, they even use their own land to test novel ideas, together with their tenants. There are some particularly successful governmental payments that started as pilot projects, initiated bottom-up by CSAs with private money. Among those are programs such as the already mentioned *Gemeinschaftlicher Wiesenvogelschutz* in Germany and the Northern Everglades Payment for Environmental Services Program (NE-PES) that was based on the ecological success of the Florida Ranchlands Environmental Services Project (FRESP). FRESP was launched by the World Wildlife Fund, Resources for the Future, and local ranchers and was financed by governmental and non-governmental financiers (Lynch and Shabman, 2007 and Matzdorf et al., 2014).

3. CSA involvement in agri-environmental policies

As we have shown, AEMs could benefit from CSAs, generally and especially in terms of ES concept implementation because CSAs are local. In turn, committed and highly motivated CSAs frequently use agricultural policy instruments, mainly AEMs, to achieve their own goals (cf. Matzdorf et al., 2014). In this manner, CSAs perform brokering activities, commonly without any official recognition or empowerment, to act as an intermediary (Schomers et al., 2015). However, due to the limitations of their funding resources and legal capacity, there have been numerous restrictions on CSAs supporting ES concept implementation (Matzdorf et al., 2014).

First, to progressively leverage and use the beneficial potential of civil society intermediaries at the nexus of ES and AEMs, we suggest that public authorities should increasingly recognize and appreciate their involvement and potential. It should involve, on the one hand, an evaluation of the role of civil society and its respective potential for ES-based AEM development, implementation, and monitoring. On the other hand, it would require a more explicit transfer of responsibilities for AEM facilitation toward locally embedded CSAs. This approach meets the general requirements for the success of the participatory processes—a sound institutionalization (cf. Reed, 2008). Such devolution of responsibilities from authorities to civil society could involve, for example, official commissioning of certain brokering services or improved institutionalized inclusion of CSAs in AEM design and programming. However, there could be fears about the limited budgets and capacity of many CSAs, the fractured and highly issue-focused nature of many CSAs compared to the Government's cross-sectoral role, and the level of conflict and distrust within the CSA community. Such concerns must be addressed in the design and institutionalization of the CSA involvement. The role of CSAs and the goals of involvement must be clearly determined (cf. Young et al., 2013), for example, by involving and remunerating certain CSAs for sector and issue specific tasks that they can fulfill due to their set-up and experience, as in the case of CREP.

Second, in terms of the frequent involvement of CSAs in the development of innovative new conservation approaches, integrating the ES concept into agri-environmental policy may help to evolve funding schemes for the development of innovative civil society and provider-based projects and AEMs, including initiatives from private landowners or collaborations between CSAs and private landowners. Funds should be provided for the bottom-up development, implementation, and testing of pilot projects that are expected to generate certain pre-defined goals. Such improvements, in terms of independent processes, are assumed to better integrate stakeholder values and lead to positive conservation outcomes (cf. Young et al., 2013). The focus on the final ES delivery of pilot projects can assure that the innovating actors are not merely following their own agendas. Such bottom-up initiatives may also increase public participation and contribute to public awareness and acceptance. Hence, it will be important to create and institutionalize opportunities to adopt successful measures into the governmental policy framework following their implementation.

Third, new approaches toward civil society participation should be taken into account. One salient idea is the combination and integration of ES quantification or monitoring with the innovative approach of citizen science (cf. Theobald et al., 2015; Couvet and Prevot, 2014). In particular, there may be concerns about situations where farmers rely on payments based on monitoring by members of the public on their land. Such conflict-causing constellations may, for instance, be avoided by integrating farmers into the monitoring process, as presented above in the *Blühendes Steinburg* project and the *Gemeinschaftlicher Wiesenvogelschutz* project. Here, the collaboration was also acknowledged to have furthered better understanding of conservation on the part of the farmers. This corresponds to Stringer et al.'s (2006) assumption about the capacity of the participatory processes to transform adversarial relationships if the participants learn to appreciate one another's viewpoints. Thus, if farmers are integrated, a citizen science system could work and additionally contribute to mutual understanding of different stakeholders, e.g., the farming sector and conservationists. Correspondingly, citizen science approaches could be further developed and extended to enable farmers to collect more data themselves, in parallel with public data collection for AEM monitoring.

Fourth, a major emphasis is placed on modeling (cf. Reed et al., 2014), including worldwide activities to develop and improve ecosystem service modeling approaches, such as the MIMES (Multi-scale Integrated Model of Ecosystem Services, e.g., Boumans et al., 2015), ARIES (Artificial Intelligence for Ecosystem Services, e.g., Bagstad et al., 2013) or InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs, e.g., Naidoo et al., 2008) modeling systems, among others. Many existing PES already use computer-based modeling approaches. Such is the case for pure governmental agri-environmental programs, such as one that was initiated to prevent nitrogen pollution in the Lagan catchment in Southern Sweden (cf. Collentine, 2012), but especially for many PES projects with explicit CSA involvement, such as the Florida Ranchlands Environmental Service Project (FRESP, see above), the Medford Water Quality Trading Program in Oregon (Oregon Department of Environmental Quality (ODEQ), 2007; www.deq.state.or.us/wq/trading/trading.htm), or the PEPA (Performance-based Environmental Policies for Agriculture) project (today: Pay-for-Performance Initiative, Winsten and Hunter, 2011; Winsten et al., no date, www.uvm.edu/~pepa). In particular, participatory (e.g., Mendoza and Prabhu, 2006; Cabrera et al., 2008) or mediated modeling (e.g., van den Belt, 2004) appear to be promising methods and may offer possibilities for bottom-up approaches that include the involvement of CSAs and their considerable local knowledge directly from the start of the scheme development. It further meets what Reed (2008) emphasizes as a growing demand for accurate environmental man-

agement, involving a combination of local and scientific knowledge. Although stakeholder participation is time consuming and thus more expensive on the front end, it usually makes the process more effective and is less expensive to implement (van den Belt, 2004), especially because of the high level of skepticism about scientific modeling (cf. Meyer and Thiel, 2012). Including stakeholders in the model-building process typically increases the shared level of understanding about the problem at hand and allows for joint learning for everyone involved, and it greatly improves the chances that a mutually acceptable solution can be found. To this end, it also promotes feelings of ownership toward the developed solution by participants. Application has so far included decision support for improved coastal zone management, facilitation of collaborative learning endeavors in watershed management, or future planning in designated areas (van den Belt, 2004).

4. Next steps

We acknowledge that there is ample need for further general investigation of the role CSAs may play in terms of (1) practical ES concept application on the ground and (2) leveraging the experience and potential of CSAs for furthering AEM design, communication, implementation, and monitoring. Therefore, further research is needed on how to enable CSAs to use, transfer, and translate the ES concept into practical conservation approaches on the ground, beyond any governmental agri-environmental programs. In particular, knowledge about how to use the concept as a capable communication tool at a practice-based level is necessary, i.e., ways to bring the concept down to earth (cf. Matzdorf and Meyer, 2014). Moreover, research is needed concerning whether and how the integration and amplification of the ES concept with agri-environmental policies can help both public actors and CSAs effectively and efficiently achieve their respective conservation aims. Research should also target how to leverage the expertise, (local) knowledge and innovation potential of CSAs to better integrate and use the ES concept within public agri-environmental programs. This includes research on designing appropriate measures and schemes (including the development of proxies and methodologies for ES-based payment schemes), implementation (including the provision of advice and assistance at the local scale, and brokering activities), and monitoring activities (including formalized monitoring through CSAs). Finally, research into participatory modeling tools and their integration into ES-based agri-environmental policies and the role CSAs can play therein is required. Such modeling tools are needed for ES quantification against a set baseline, where ES measures can serve as a direct assessment of the impact of the schemes (cf. Burton and Schwarz, 2013; Matzdorf and Lorenz, 2010; Zabel and Roe, 2009).

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5 Discussion: Intermediaries Influence on the Performance of PES

The dissertation has shown that governmental PES programs are the most common and prevalent PES cases at an international level (P1). Thus, governmental actors play a very central role in most PES programs and schemes. As a consequence, many PES are not as new as often mentioned in the literature (cf. Wunder 2005, Corbera et al., 2009). P1 clearly shows that within the international PES discourse, most publications focus on PES schemes in Latin America but miss to integrate research on AEMs in the EU or the Farm Bill in the United States. This is mostly the case as research on AEMs and the Farm Bill has been in place for much longer and uses a different terminology – unless many research foci appear to be quite comparable across the continents (cf. P1). Connecting and integrating these diverse research schools more strongly appears to be important, as this will potentially lead to research synergies.

Concerns on how to lever the cost-effectiveness and environmental effectiveness of PES have been identified as one research priority within the international PES discourse (P1). This is not surprising, given the large amounts of public funds that are being allocated to these programs (cf. also section 1.5 of framework text).

The dissertation analyses how intermediaries can improve the performance of PES – in terms of influencing the cost-effectiveness and environmental effectiveness. The extensive governmental responsibilities within these governance structures obviously shape the institutional framework conditions in which intermediaries can operate. Within the analysed case study of AEMs in Germany, the institutional framework conditions provide ample room for intermediary involvement. In the following I discuss how the analysed intermediary – being the German LCAs – can improve the cost-effectiveness and environmental effectiveness of public PES. Analysing these two aims simultaneously makes sense because these two concepts are somewhat interlinked: Cost-effectiveness is determined by public and private TCs, whereas environmental effectiveness is determined by overall participation levels and spatial targeting of measures. Private TCs influence to a certain extent the overall participation levels and thus environmental effectiveness; whereas spatial targeting influences heavily the TCs of scheme implementation (both, public and private TCs) and thus the cost-effective-

ness of PES. If intermediary involvement helps to improve both aspects simultaneously, intermediaries can ultimately improve the economic efficiency of governmental PES programs.

5.1 The Influence of Intermediaries on the Cost-effectiveness of PES

The influence of intermediaries within public PES programs on the cost-effectiveness of public PES programs has been analyzed mostly from a new institutional economic perspective, i.e. by assessing if, how, and for which activities intermediaries can influence private and public TCs of PES facilitation. In general, LCAs stated that a major institutional deficiency of public PES programs is a too low payment level, which is often not being competitive with other land use practices and their respective outcomes and thereby hindering participation on behalf of land users. This tendency is further being aggravated by increasing land leases combined with rising prices for energy crops (P3). This critique on too low payment level is certainly very general and does not differentiating for the broad set of PES measures existing within the CAP and the fact that some measures do entail deadweight losses⁴ (Reiter et al., 2016). Thus, the finding that a too low payment level hampers participation is mostly true for those PES measures that impose more substantial management prescriptions on farmers. Russi et al. (2016: 74) mentioned that public PES in Germany are often “too low to represent a sufficient extrinsic motivation, if intrinsic motivations are lacking”, as payments do not cover farmers’ opportunity costs. However, as stated by LCAs in publication P3, the problem of the too low PES payment levels is partially provoked through high TCs. PES payments “miss a remuneration of farmers in accordance with their effort, including time investment” (cf. P3), i.e. their private TCs. Also in literature, high levels of private TCs have been identified as influencing participation negatively (Prager and Posthumus, 2010; Collentine et al., 2004), mostly as it directly affects the profit function of farmers (Mettepenningen et al., 2013; Falconer, 2000). Intermediaries cannot directly influence the overall payment level (except for arguing for higher payment levels within PES programming rounds), however it appears that intermediaries can affect the private TCs. Reductions in private TCs are congruent with reductions in the private costs to participation. Private TCs arise because of information search before contract signing (Mettepenningen et al., 2009). In a first step, farmers need to know that PES schemes exist (Ridier et al., 2011). Falconer (2000) found that most farmers learn from professional advisors that certain PES exist. Then farmers need to understand the environmental problem and how different land use practices affect the problem (Mettepenningen et al., 2013; Smallshire et al., 2004). Furthermore they have to understand the prescribed management practices and how

⁴ The German concept of „Mitnahmeeffekte“ does not exist in the same way in the Anglo-Saxon language. The cited reference uses the term “Mitnahmeeffekt” to refer to incentive payments provided for land use practices that would have been applied also in the absence of the payment. I therefore translated the term “Mitnahmeeffekt” with the economic concept of deadweight loss.

to apply them on their own farm (Ducos and Dupraz, 2006). Assessing whether these prescriptions are appropriate and compatible with the overall farm objectives and respective land use practices is also time intensive and hence provokes considerable private TCs (Mettepenningen et al, 2013; Siebert et al., 2006). However, also activities occurring with or after contract signing involve heavy private TCs (Mettepenningen et al., 2009; 2013). Not surprisingly, a lack of information on PES is a major obstacle to participation within schemes (Mettepenningen et al., 2013, Wilson, 1997). The findings of P2, P3 and P4 indicate that the analysed intermediary can support all these activities by providing agri-environmental advice and assistance. P3 and P4 shows, that many local LCAs do inform and assist farmers with these relevant activities. However, for most LCAs the service is only provided on a sporadic scale. Many LCAs commented that they provide advice and assistance only upon demand of individual farmers – and in particular to farmers contacting the local LCA. Hence, the results of P3 and P4 clearly indicate, that there is a need and demand for an intermediary providing agri-environmental advice and assistance.

Furthermore, the results of P4 indicate, that the provision of these services do influence farmers willingness to adopt PES, in particular if the more time and/or knowledge intensive transactions are supported, i.e. those activities that involve relatively higher private TCs. However, based on the correlation analysis in P4, I could not find that it is the provision of advice and assistance that necessarily leads to more PES being contracted, i.e. I could not find a statistically significant correlation between the separate advice and assistance activities and the actual number of PES being contracted (P4: 13871). This result is very interesting as it is against most literature emphasizing the importance of reducing private TCs in order to impact on the adoption of PES (cf. Mettepenningen et al., 2013). However, Mills et al. (2016) also found that advice affects farmers` willingness to undertake environmental management activities. But this willingness is often not translated into behaviour, mostly because farmers` miss the ability to do so. Hence, “training was needed specifically to equip the farmer with the practical skills and confidence to enable him to undertake positive environmental behaviour” (Mills et al., 2016: 7). Furthermore, LCAs did not reveal the intensity (frequency) of agri-environmental service provision and rather stated that many of them provide services unregularly. Given that overall intensity is low and not necessarily aimed at increasing the overall number of contracts, the overall reduction in the relevant TCs is low. In addition, the questionnaire sent to LCAs did not assess why LCAs provide agri-environmental advice and assistance to farmers. As found in publication P4, the provision of agri-environmental services is positively correlated to the spatial targeting activities of LCAs. Hence, those LCAs providing agri-environmental advice and assistance might do so in order to boost environmental effectiveness of PES via deliberate spatial targeting of measures, rather than simply increasing the total number of contracts signed in general or reducing private TCs. However, such a spatial targeting approach of PES incurs high TCs (Vatn, 2001), in particular on behalf of public authorities because of greater administration efforts (Vergamini et al., 2013). Currently, relevant PES measures are mostly input based measures. Thus, in order to pursue a deliberate spatial targeting of these measures,

public agents have to identify the most urgent environmental problems and challenges, and have to approach the most important areas and actors. As discussed in P2, locally committed intermediaries that provoke cooperation among stakeholder groups help to identify the most urgent needs at local level, help to identify the relevant actors. Local intermediaries supporting public agencies in their spatial targeting approaches can help to reduce public TCs. Targeting of measures requires in particular a deliberate provision of agri-environmental advice and assistance throughout the entire PES application and implementation process. Locally committed intermediaries supporting such a spatial targeting approach do, however, not only affect public TCs of PES implementation and thus the cost-effectiveness of PES. Given that a spatial targeting of measures results in higher levels of environmental benefits provided, intermediaries also affect the efficiency of PES. As defined in chapter 1.3 of this framework text, efficiency does not take the overall level of environmental benefits provided as given, but rather relates the total level of environmental benefits provided to the costs of the PES. Hence, and based on the idea that intermediaries can influence cost-effectiveness and environmental effectiveness of PES implementation simultaneously, they can impact on the overall efficiency of PES. Although intermediaries appear to influence private and public TCs in certain regards positively, their effect on total overall cost-effectiveness is not straightforward. In fact, total TCs of PES implementation are not necessarily reduced. Most of the emphasized public and private TCs are reduced as the intermediary now absorbs the activity. This implies that the cost of transacting now arises on behalf of the intermediary. However, if the aim of the intermediary involvement within the governance structure is to increase the overall cost-effectiveness of PES facilitation, then overall TCs (including the TCs of the intermediary) have to be reduced. As discussed in P2 and P3, total TCs are reduced if the intermediary can perform the relevant activities at relatively lower costs than the public authority or the private farmer. P2 emphasizes that certain activities can – at least most likely – be pursued by the local intermediary at relatively lower cost. For some transactions there are economies of scale and or a certain learning effect occurs, e.g. information search costs, application costs of paper work etc. Furthermore, certain characteristics of the intermediary appear to be beneficial to support certain transactions at relatively low cost: A local embeddedness in terms of knowing the local social and ecological circumstances, holding functional ties to relevant actors and being known in the region as a credible and contacted intermediary in the context of nature conservation has been discussed as being helpful for spatial targeting at relatively low costs (P2 and P4).

However, even if the intermediary could perform certain transactions at lower costs and thus help to reduce overall private and/or public TCs, on behalf of the intermediary TCs for the facilitation of PES occur. Intermediaries with own practical PES experience benefit from their practical experience and know about the requirements and content of measures. In this regard, the analysed intermediary indicated to require trainings and coaching before advising and assisting the farmer (cf. P3), further increasing the overall TCs arising from intermediary involvement. Intermediaries require good levels of knowledge on the respective PES measures at the technical program level (applica-

tion procedures, content and aim of measure, etc.), as knowledge is a primary source for such service provision (Prager et al., 2016). Mills et al. (2016: 8) emphasize that providing advice to farmers “often requires specific scientific knowledge that farmers may lack.” However, the intermediaries need to acquire this knowledge themselves as well. In general, to improve the quality of agri-environmental advice and assistance, relevant training opportunities (including new study programs) should be developed (Oppermann et al., 2018). As found in P3, there is the need that the intermediary needs to be compensated (remunerated) for the service provision. This is particularly called for by the intermediary if the service provision was to be lifted to a more professional and qualified level (P3). Here arises the question on whether agri-environmental advice and assistance should become commercialised (i.e. intermediaries charge fees to their clients) or whether such services should be paid for by public money arises. Although farm advisory services are considered as a “key instrument of various agricultural and rural policies of the European Union (EU), aiming at integrating environmental and health issues into agriculture”, no public investments to provide such services have occurred so far (Prager et al., 2016: 329). As a consequence, at the moment the existing advice services are mostly provided for on a commercial basis (Prager et al., 2016). This clearly provokes equity concerns, as part-time farmers and smaller commercial farmers are hardly approached by commercial farmers – mostly because service providers focus on solvent clients to maximize own profits (Labarthe and Laurent 2013, Harter and Hass, 1992). Furthermore, commercial advice commonly focuses on agricultural production advice that aims to improve and increase overall commodity production. Such services often affect the implementation of public PES programs negatively (Sutherland et al., 2013., Ingram, 2008, Polman et al., 2008). Increased agricultural commodity production increases the opportunity costs to PES participation (Russi et al., 2016), not least as the payments for the provision of ES and other environmental benefits are currently not adequately paid for. Also experience with advice commercialization has shown that this often leads to insufficient investments in knowledge for farmers and advisors with respect to integrating environmental aspects in the production of agricultural output (Labarthe 2009, Laurent et al., 2006). It is unlikely that the provision of ES and other environmental benefits will be captured within this commercial advice, mostly because of their public goods character that – at least currently – does not provide private economic income. However, in my opinion, it is in particular this public good character of ES and biodiversity that provides good and ample argument for public investments in such services. If public authorities increasingly recognize and appreciate the active involvement of non-governmental intermediaries within the PES implementing governance structures, then this should also consider an active and more explicit commissioning of local intermediaries with the facilitation or brokering of measures at the local scale (P5).

Increases in TCs due to intermediary involvement can be justified on economic grounds, if these lead to an increased environmental effectiveness of measures (Vatn, 2001).

5.2 The Influence of Intermediaries on the Environmental Effectiveness of PES

The influence of intermediaries on environmental effectiveness has been analysed by (1) looking at their impact on farmers participation within PES and (2) elaborating on their ability to target measures to relevant actors and areas.

A farmer's decision to participate in conservation measures is commonly the outcome of "complex interactions of social and cultural as well as economic and policy influences" (Siebert et al., 2006: 328). From the perspective of the mostly CIE theory, I analysed if intermediaries can influence the behaviour of farmers through e.g. shaping their decision-making process to participation. The CIE theory emphasizes that the social environment within which people act is important as it can influence preferences, through e.g. cooperation and a better access to information (Vatn, 2005). This perspective on intermediaries stresses their effect on forming the individual farmer and his or her willingness to adopt PES. Higher level of participation improves environmental effectiveness, in particular if relevant actors are enrolling.

The results of the individual paper of this dissertation indicate that, according to the intermediary, he/she can influence the attitudes and preferences of farmers towards nature conservation and the implementation of PES positively.

Firstly, and discussed in the section on cost-effectiveness, farmers' willingness to adopt PES appears to be influenced through agri-environmental advice and assistance - thus coinciding with the NIE theory. Nevertheless, the provision of advice and assistance services has not been identified as a factor finally increasing overall participation levels (cf. P4 and discussion above in 5.1). However, the results of P4 indicate that contacts between farmers and a locally operating intermediary is an important determinant for shaping farmers' willingness to adopt measures as well for actually increasing the overall level of PES contracts signed. A statistically significant correlation had been found between the presence of locally embedded intermediaries that can be approached by farmers and farmers' willingness to adopt measures. More importantly, there is also a positive and significant correlation between the farmers contacting the intermediary and the total number of measures contracted. This result is noteworthy, as it clearly indicates that farmers' decision making process to participation is more complex than decreasing TCs in terms of agri-environmental advice and assistance. Local social networks and relational trust towards committed intermediaries with expertise on nature conservation and PES appear to be important factors that can support the adoption of PES. Hence, such an intermediary can help to influence the non-monetary preferences of farmers, i.e. the intrinsic motivation. Thus, the question on "who" provides agri-environmental advice and assistance is at least as important as the service provision itself. In accordance with the CIE this implies, that locally embedded and committed intermediaries can help to influence the (environmental/ecological relevant) perceptions and preferences of farmers. Commitment appears to be important, as the intermediary mentioned that they have to convince farmers that nature conservation is important.

Thus, next to the payments that can lead to motivational crowding-out (Pattanayak et al., 2010; Vatn, 2010) or crowding-in effects (Ezzine-de-Blas et al., 2015; Matzdorf et al., 2014), it is also the intermediary and his local involvement that can lead to crowding-in effects and thereby underline the effectiveness of the PES. The findings of this thesis are in line with other results on comparable intermediaries (Prager, 2015; Wilson, 2004; Curtis and Lockwood, 2000; Falconer, 2000; Martin and Halpin, 1998). In addition, other literature also emphasizes the importance of access to information and connection to local networks as drivers for the adoption of conservation measures (Baumgart-Getz et al., 2012; Tamini, 2011; Polman and Slangen, 2008). It is a very challenging task to change farmers' deeply-held values and beliefs – particularly through advice alone (Mills et al., 2016). However, long-term and extended periods of personal interaction with known advisor groups who managed to build up trust over time can make such a change in mindset to occur (Sutherland et al., 2013). Trust and social networks are the result of committed and continuous interactions between actors. Neither trust nor functioning networks are static; rather investment in interactive processes are needed (Sessin-Dilascio et al., 2014). Intermediaries involved within PES implementation should therefore invest in the generation and maintenance of long-term local social networks based on relational trust towards their clients. Whereas the intermediary analysed within this dissertation explicitly mentioned that the status of being a non-governmental (civil-society) is important, as it helps to approach farmers on a more flexible, less constrained and more trustworthy level (cf. P2), Sutherland et al. (2013) emphasize that longevity in expertise in the provision of agri-environmental advice and assistance is more important than the charitable status of the intermediary's organization. However, civil society actors appear to be relevant in the context of PES implementation. Sattler et al. (2013) found, that the majority of intermediaries involved within PES deals come from civil society. Next to trust, credibility is very important as higher levels of credibility (such as people from farming backgrounds or trusted networks) yield higher persuasion levels (Blackstock et al., 2010). Whereas P4 of this thesis shows that social networks are also reinforced through the provision of agri-environmental advice and assistance, Labarthe et al. (2013) found that the quality of advisory services provided to farmers increase if advisors manage to establish good relationships with their clients. Understanding farmers' willingness to adopt and their ability to adopt environmental management practices is important to help policy-makers to design appropriate advice and support programmes (Mills et al., 2016). Farmers' perceptions and attitudes are very important factors influencing their willingness to participate in PES (Greiner, 2015; Mettepenningen et al., 2013; Greiner and Gregg, 2011; Defrancesco et al., 2008; Siebert et al., 2006). The nexus between individual locally committed intermediaries and the success of PES schemes is also emphasized in other studies (Sattler et al., 2013). Matzdorf et al. (2014: 154) stress that "it is striking how often governmental (agri-environmental) programs are utilized by dedicated stakeholders at the local and regional levels. [...] it is not the specific governmental program (PES) that is successful, but a

regional or local project that utilizes that governmental program. The main initiative in these examples of governmental payments, then, comes not from government but from committed conservationists with roots in the region”.

The results of mostly P4 indicate that in order to support a spatial targeting of measures to most relevant actors and areas, a deliberative provision of agri-environmental advice and assistance is helpful. This concerns in particular the most knowledge and time intensive activities throughout the entire PES application and implementation process. The importance of agri-environmental advice and assistance for achieving successfully a targeting of measures is also found by Meyer et al. (2015). In order to provide agri-environmental advice and assistance deliberately, i.e. to the most relevant actors and areas, intermediaries require good knowledge on the local social and local ecological circumstances. Freese and Steinmann (2006: 120) emphasize that “it is neither easy nor sure to get appropriate areas under contract and this makes the measures expensive”, mostly as it increases TCs. This could also be the reason why we did not find a relation between the network in terms of farmers contacting LCAs and their targeting activities. I.e., in order to successfully enrol relevant farmers and areas in PES, a deliberate provision of assistance is needed.

However, to provide this deliberate assistance, intermediaries also require a good knowledge on the local social and local ecological circumstances. Functional local networks do not only entail the possibility to distribute relevant information at relatively low cost – functional local networks also entail the potential to generate local knowledge on the respective local social and local ecological circumstances. Intermediaries learn about who is doing what in the region, who is interested and open towards nature conservation, learn about the respective economic constraints of farmers and so on. In this regard, the importance of investing in the generation and maintenance of functional local social networks – in particular good local ties and relational trust towards the individual farmers, as well as the holding or even production of local knowledge on local social and ecological circumstances appears to be of importance.

I did not differentiate for the diverse farmer types. Farmers are very heterogeneous and exhibit different behavioural patterns with different predispositions towards nature conservation. Guillem et al. (2012) for instance cluster farmers into 4 different behavioural groups: (1) Profit-oriented farmers maximise profits and do not hold strong positive attitudes towards nature. (2) Multifunctional farmers are oriented more or less equally towards profit-maximization and environmental objectives. (3) Traditionalists are innovation-averse and reluctant to participate in PES. (4) Hobbyists do not farm for business; their main interest is the environment. I did not ask the intermediary with what kind of farmers they are cooperating. However, since these farmers differ in their initial predisposition towards nature conservation, it is very much likely that the intermediary’s influence on their cognition also differs (Sutherland et al., 2013). Mills et al. (2016) highlight the need that advisory approaches need to be sensitive to the many and very heterogeneous farmers and their different combinations of willingness and abilities to implement conservation measures. “To be able to develop this understanding and locate advice in its farm specific context requires some degree of personal

engagement” (Mills et al., 2016: 11), thus again highlighting the importance of personal contacts. Nevertheless, and with considerations on cost-effectiveness of PES, intermediaries could prefer cooperation with those farmers being less reluctant towards nature conservation. In this regard, Mills et al. (2016: 8) also emphasize that providing “advice to those farmers that are ‘willing’ and ‘able’ can ensure the highest quality environmental outcomes for the land” (Mills et al., 2016:8).

5.3 Beyond the Intermediary’s Influence on Cost-effectiveness and Environmental Effectiveness

All in all, local intermediaries are only one piece influencing the performance of PES. There are a variety of other factors influencing the effectiveness of PES. At least two of these should be discussed briefly in the following:

First, the analysed intermediary has indicated that, in general, the overall payment level of PES in Germany is too low to be competitive with other land use practices. In addition, the intermediary indicated that they often have to convince farmers that nature conservation is important. This finding is in line with other literature concluding that PES in Germany are often rather a reward for adopting conservation practices, as “the payment was too low to provide enough extrinsic motivation to influence the management strategies of all potentially interested farmers” (Russi et al., 2016: 76). Certainly, farmers with lower levels of intrinsic motivations for nature conservation and/or farmers with relatively higher levels of opportunity costs are more difficult to convince. Hence, the overall price level of public PES and in relation to farmers’ opportunity costs influences how good intermediaries can facilitate the measures towards the land users. Economic arguments are very important – and without payments, farmers will not provide any ES (cf. P2). Thus, although locally based and committed intermediaries can help to influence farmers’ preferences and perception and thus intrinsic motivations to adopt PES, it is very important to consider farmers extrinsic motivations. Farmers should be paid adequately for the maintenance and provision of public goods in terms of ES and biodiversity including landscape protection – and there is a need to reconsider the overall payment level of the public PES programs. The CAP of the EU has been criticized heavily for handing out “income support to already wealthy recipients” but missing to effectively address environmental issues (Zahrnt, 2009:2). The ES concept and the related economic arguments as put forward within e.g. the TEEB studies provide good arguments for paying farmers for the maintenance and provision of ES and biodiversity beyond any legal requirements (Albert et al., 2017). Matzdorf and Meyer (2014) consider that the ES concept will increasingly be used to explain and legitimize public payments towards farmers, however only for the actual provision of the respective ES. This idea is reflected in the call for reform of the CAP 2020 and the political postulation of ‘public money for public goods’. I.e., the ES concept helps to reconsider the two-pillar system of the CAP and to reconsider the intensive allocation of public funds towards direct farming payments of the first pillar (cf. e.g. Natural Capital Germany – TEEB.DE,

2016; Oppermann et al., 2016). “In order to improve the efficiency of remuneration, CAP payments currently attributed to direct payments (first pillar) should be channelled to the second pillar” (Albert et al., 2017: 75). Redesigning the CAP should also integrate the consideration and explicit commissioning of intermediaries at local scale, including funds for the provision of agri-environmental advice and assistance to further boost the environmental effectiveness and private and public TCs of PES.

However, Potter and Wolf (2014) point out that powerful coalitions will continuously hinder a decoupling of payments from farming.

Second, cross-sectoral policy interplay further impacts on the competitiveness of public PES, as e.g. public subsidies to produce energy crops for biogas increase land users’ opportunity costs to PES while at the same time leading to an intensification of agricultural land use practices (cf. P3 but also Russi et al., 2016). A further mainstreaming of the ES concept within policy can help to identify and manage sustainable land use practices across sectoral boundaries and the diverse administrative levels (Albert et al., 2017; Matzdorf and Meyer, 2014).

Finally, and as emphasized in P5 of this dissertation, the involvement of civil society actors in general can be more diverse and extensive than the just discussed facilitation of PES (cf. also Matzdorf et al., 2014). However, research on non-governmental intermediary involvement in PES in general and their ability to provide agri-environmental advice and assistance to support the facilitation of PES in particular has so far been very limited. More effort should be devoted to this topic in the future, notably since this appears to be a relevant criterion for success of PES.

6 Conclusion

Governmental PES programs are very relevant instruments to steer pressing environmental concerns in Germany, in the EU, and also at an international level. Improving the cost-effectiveness and environmental effectiveness of these programs is of societal interest. First, because large amounts of public money are allocated to these programs and efficient and effective spending should be guaranteed for. Second, as the maintenance and generation of ES and biodiversity within agricultural lands become more and more pressurized with increasing intensification of farming, it is of particular importance to increase the environmental effectiveness of PES.

The results of this thesis show, that intermediaries within governmental PES governance structures can play an important role for improving these programs. The thesis indicates that locally operating, committed intermediaries focusing on agri-environmental benefits and providing agri-environmental advice and assistance could and should be an important component of PES facilitating governance structures. The environmental effectiveness of PES facilitation increases with intermediary involvement.

However, although intermediary involvement helps to reduce public and private TCs of PES facilitation, the overall effect on total TCs and thus cost-effectiveness of PES facilitation is not straightforward.

Certain characteristics, such as being locally organised and providing good levels of social networks with farmers, are important factors determining the intermediary's ability to influence cost-effectiveness and environmental effectiveness. Higher levels of environmental effectiveness in turn also justify higher TCs of PES facilitation.

Public authorities should increasingly recognize and appreciate this potential and should consider a more explicit commissioning of intermediaries within PES governance structures. Both, their potential to increase the total number of PES being adopted, but in particular their potential to deliberately target the most relevant areas and actors should be recognized. As most ES and biodiversity entail the characteristics of public goods, a public funding for the provision of intermediary involvement and in particular for the provision of agri-environmental advice and assistance is justified.

However, since intermediaries are only one piece of the puzzle determining the overall performance of PES, it is important to also consider the other factors that foster or hinder a successful implementation strategy. These are, amongst others, the overall PES payment level or adverse effects of cross-sectoral policy interplay.

7 References

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Eidesstattliche Erklärung

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