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Biodiversity offsets as market-based instruments for ecosystem services? From discourses to practices

Renaud Lapeyre [a,*], Géraldine Froger [b], Marie Hrabanski [c]

[a] Institute for Sustainable Development and International Relations (IDDRI), 41 rue du Four, 75006 Paris, France
[b] Cemotev, Université de Versailles Saint Quentin-en-Yvelines, BâtimentVauban, 47 bd Vauban, 78047 Guyancourt Cedex, France
[c] Artdev, cirad, 73 rue Jean-François Breton, 34398 Montpellier, France

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ABSTRACT

Building on the analytical frameworks of policy arrangements and new institutional economics, this article introduces the special issue on biodiversity offsets as market-based instruments (MBIs) for ecosystem services, deconstructing discourses and exploring practices on the ground. The idea of compensating environmental damages from development emerged in the 1970s in the USA and Europe. From the beginning of the century, as the international community became increasingly interested in MBIs as allegedly efficient mechanisms for environmental management, MBIs have rapidly gained traction within the biodiversity compensation policy arena. Terms of compensatory mitigation, biodiversity offsets, mitigation banking, habitat banking, species banking, wetlands mitigation, etc., have therefore widely spread as policy tools around the globe. In this context, academics, practitioners and decision-makers have most often characterized those schemes theoretically as an MBI and frequently grouped them all under the umbrella term of 'biodiversity offsets'. Building on contributions from the special issue, this article contends that biodiversity offset programs are on the contrary mainly characterized as a variety of different heterogeneous policy and institutional arrangements with limited features of market governance. Furthermore, hybrid structures, through long-term bilateral agreements with specific assets and between parties whose identity is crucial, are the rule rather than the exception.

1. Introduction

1.1. Context

The idea of compensation for environmental damages was part of a number of different measures that emerged in the 1970s both nationally, in the USA and Europe, and more globally within the framework of the Ramsar Convention (1972). But as instruments for environmental management, these primarily legal measures found little acceptance and were rarely applied. Moving forward to the 1990s the international environmental community became increasingly interested in market-based instruments (MBIs) as mechanisms for environmental progress. For their proponents indeed, direct regulation through the market, or some form of management relying on market mechanisms, is commonly put forward as the most effective way to conserve nature (Daily, 1997; Heal, 2000; Pagiola et al., 2002; Landell-Mills and Porras, 2002; Nicholls, 2004). While some authors contest this, fearing a trend towards the commodification of nature which they critique (Robertson, 2004; Kosoy and Corbera, 2010; McAfee, 1999, 2012; Gómez-Baggethun et al., 2010; Norgaard, 2010; Peluso, 2012), since the Kyoto negotiations (1997) MBIs have established themselves as preferred environmental policy tools in order to tackle issues surrounding energy, transportation, water, and climate.

By contrast, the development of MBIs in the biodiversity sector didn't gain real traction until the 2005 Millennium Ecosystem Assessment (MA) advanced the concept of ecosystem services (ES), which placed a spotlight on the economic value of biodiversity. In turn this helped legitimize the MBI model within the biodiversity and ecosystem services[1] policy arena (Farley and Costanza, 2010; Gómez-Baggethun et al., 2010; Boisvert et al., 2013); this was illustrated in various publications from the Economics of Ecosystems and

[1] Biodiversity is the variability among living organisms within a given ecosystem. It can include not only living organisms and their complex interactions, but also interactions with the non-living aspects of their environment. Biodiversity is at the basis of the integrity and the effective working of ecosystems and the services they provide, and therefore can be used as a measure of their status and health.

* Corresponding author.
E-mail addresses: renaud.lapeyre@iddri.org (R. Lapeyre), geraldine.froger@uvsq.fr (G. Froger), marie.hrabanski@cirad.fr (M. Hrabanski).

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Biodiversity (TEEB (The Economics of Ecosystems and Biodiversity), 2008, 2010), the OECD (Organisation for Economic Cooperation and Development) (2003, 2004, 2010), the Conference of Parties (COP) to the Convention of Biological Diversity (CBD), as well as in discourses about the Green Economy as unfolded in the run-up to the Rio+20 UN Conference on Sustainable Development (UNCSD (United Nations Conference on Sustainable Development), 2012). This is the context, largely economic in nature, in which the dialogue and perspective on compensation has evolved at the international and national scales, as well as the related mechanisms or institutional arrangements.

Initially, the aspect of compensation was only considered as the final step in a process to manage environmental damage. The first steps were to prevent the damage or, when unavoidable, limit the damage from the impact of human intervention, such as avoiding or limiting the impact of infrastructure on sensitive ecosystems. Compensation as a final step was generally integrated into regulations requiring permits for development that impacted the environment. However, these regulatory devices were non-binding and seldom applied. The view of compensation has nevertheless evolved since the turn of the century, and programs of voluntary action for biodiversity compensation have developed through a mechanism called 'biodiversity offsets'. As a result, the Business and Biodiversity Offsets Programme (BBOP)[2] now defines biodiversity offsets as "measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken" (BBOP (Business and Biodiversity Offsets Programme), 2009). In this sense, biodiversity offsets are intended to be carried out during the final step of the environmental impact mitigation hierarchy—avoid, minimize, and mitigate (restore and offset); but on the ground, discussions are mainly focused on the last step 'compensate'. International organizations and conventions, think tanks, non-governmental organizations (NGO), and even private enterprises have incorporated the concept and promoted offset based instruments on a supranational scale. In national territories (particularly but not exclusively in the countries of the OECD) governments have also readily increased their focus on initiatives favouring compensation.

As a result, compensation programmes, whatever the way they are implemented and instruments used, are increasingly put in place around the globe. From Conservation (Species) Banking and Wetland and Stream mitigation in the United States, Fish Habitat ('HADD')[3] Compensation in Canada, the Forest Code Offsets or Developer Offsets in Brazil, the national biodiversity offsets Policy in South Africa or BBOP projects in Madagascar, through Impact Mitigation Regulations (Eingriffsregelung) in Germany and the CDC biodiversity bank in France in Europe, the Saipan's Upland Mitigation Bank or the Voluntary Malua BioBank (Malaysia) in Asia, to The New South Wales BioBanking state program or the Queensland's Koala Offsets program in Australia, among others, regulatory and voluntary compensation projects include the existence in 23 countries (plus at the EU and south east Asian level) of 39 existing programs around the world, and another 25 in various stages of development or investigation (Madsen et al., 2010, 2011). This enthusiasm has further been accompanied by a similar increase in scientific publications and grey literature on the theme of biodiversity offsets.

1.2. Biodiversity offsets in discourses: A unified category of MBI

In this context of rapid development, the abundant literature on compensation has most often characterized these various schemes above theoretically as an MBI and frequently grouped them under the umbrella term of 'biodiversity offsets'. We analyse both these discourses below.

First, the recent literature largely asserts that compensation operates through market-based instruments (Boisvert et al., 2013). Though there are no agreed definitions of these instruments and no established list of their constituent elements, proponents of MBIs assume that environmental problems are best conceptualized as externalities. Natural resources and ecosystem services, they believe, are indeed poorly managed because they are external to the market; thus their management could be improved by incorporating them into the market. At the opposite, other instruments, with no market link, e.g. regulations, monitoring and penalties, traditional tools and the command-and-control approach, are in effect classed as non market-based instruments. In this context, the UK Houses of Parliament considers for example that "biodiversity offsetting is a market-based conservation tool" (Houses of Parliament, 2011, p. 1). More broadly in the discourse, compensation mechanisms have been qualified and portrayed by a vocabulary infused with references to the market (credits, banks, markets, payments) without really questioning their relationship with market economics. Both the promoters of compensation through banks with their exchange of credits (Hartig and Drechsler, 2009; Jenkins et al., 2004; Whitten et al., 2003) or through other instruments as Payments for Environmental Services (Panayotou, 1994; Chomitz et al., 1998), and their detractors who see them as a commodification of nature (Maris et al., 2010; Robertson and Hayden, 2008; Robertson and Mikota, 2007; Robertson, 2004; Walker et al., 2009) consider them to fall under the term of market instruments.

Second, biodiversity compensation has often been defined as a unified umbrella category of market-based instrument under which different mechanisms variously named by scholars, decision-makers and practitioners, e.g. compensatory mitigation, biodiversity offsets, mitigation banking, habitat banking, species banking, wetlands mitigation, etc., would fall.

One of the first study to look at MBIs and offsets for the European Commission, Bräuer et al. (2006) for instance defined all 'compensation schemes' as the last of six market-based instruments. Similarly, in 2008, the International Union of Conservation of Nature (IUCN) classifies 'biodiversity offsets and mitigation and conservation banking' as one of the four market-based mechanisms, besides Markets for carbon sequestration, Markets for watershed services, and Markets for recreation, and besides five non market-based mechanism[4] (International Union of the Conservation of Nature (IUCN), 2008). More recently, the OECD (Organisation for Economic Cooperation and Development) (2013) proposed 'biodiversity offsets' as one of the six so-called 'innovative financial mechanisms', as classified by the Convention on Biological Diversity (CBD). Others are environmental fiscal reform; payments for ecosystem services; markets for green products; biodiversity in climate change funding; and biodiversity in international development finance.

In total, even though they have emerged from different contexts, been promoted by different actors, concern different subjects (biodiversity, species, habitat, wetland, fishes, etc.) and operate on different scales and with a variety of forms (regulatory, voluntary, etc.), in discourses all schemes related to biodiversity

[2] BBOP is an international NGO which collaborates with NGOs, companies, financial institutions, and government agencies to develop efforts in favor of biodiversity offsets. It represents the only biodiversity compensation international standards, as such a strong normative power.

[3] HADD stands for 'harmful alteration, disruption, or destruction'.

[4] These are: global environment facility; debt-for-nature swaps; conservation trust funds or environmental funds; Taxes; compensation to communities for opportunity cost and damages.

compensation are most often theoretically grouped into one homogeneous category of policy instruments called 'biodiversity offsets', and defined as a particular MBI.

1.3. Objective and methods of the special issue

Despite such discourses and rhetoric, we contend that reality on the ground tends on the contrary to show that variety in institutional arrangements for biodiversity offsets is actually the rule rather than the exception. The objective of this Special Issue is thus to deconstruct the concept of biodiversity offsetting and the institutional mechanisms attached to it. Articles aim to stimulate timely discussion and critical feedback and to influence ongoing debate on biodiversity offsets. By examining the alleged evidence of the link between biodiversity compensation and market instruments for ecosystems services, we further aim at highlighting the heterogeneity of biodiversity compensation mechanisms by their type of governance. To do so, in this introduction below we first present the complementary two-fold analytical framework that underlies following articles (political science and new institutional economics), before we discuss main elements uncovered in this special issue.

Articles in the following special issue present and analyse different schemes of biodiversity offsetting around the globe that stand at different stages of development. While schemes already existing for some time are studied in Froger et al. (2015) in the USA (wetland mitigation banking) and Australia (biobanking), initiatives currently emerging in other OECD countries are also analyzed in the cases of France and Germany (Froger et al., 2015), England (Sullivan and Hannis, 2015) and Canada (Hackett, 2015). The study of two programmes in Madagascar (Bidaud et al., 2015) will finally help better explore nascent biodiversity offset activities in the difficult context of developing countries.

Investigating both discourses as well as concrete governance structures on the ground, articles in this special issue use various, nonetheless complementary, methodological frameworks drawn from different disciplines: political economy (Hackett, 2015, in the case of Alberta, Bidaud et al. 2015, in Madagascar); institutional analysis and mapping (Froger et al., 2015 to map and compare several schemes); qualitative textual and discourse analysis through a software coding programme (Sullivan and Hannis, this issue in England); analytical stance on complex institutional arrangements and their performativity (Boisvert, this issue on biodiversity offset policies); and finally Foucaultian framework in order to explore links between knowledge and power, as well as policy transfer studies and bibliometric analysis using the Scopus search engine (Hrabanski on discourses in the general field of biodiversity offsetting). Eventually, we contend, such multidisciplinary approach will allow better deconstructing concepts, grasping the heterogeneity of offsetting activities presented, and finally disentangling their various aspects and specificities. This will also further allow for different, sometimes contradicting, sometimes complementing, scientific standpoints to be exposed and developed in this special issue.

2. Characterizing biodiversity offsets: Policy arrangements and governance structures

2.1. Biodiversity offsets programs in discourses as policy arrangements: Policy diffusion and values

The concept of 'policy arrangement' allows analysing the political modernization which refers to structural processes of changing interrelations between state, market and civil society, and to new conceptions and practices of governance (Arts et al., 2000, 2006; Van Tatenhove et al., 2000). According to Arts et al. (2006), policy arrangements refer to the substance and the organization of policy domains in terms of policy discourses, coalitions and actors, rules of the games and resources. These authors propose an analytical framework which could be applied to understand heterogeneity in biodiversity offsets arrangements.

The first item proposed by Arts et al. (2006) refers to policy discourses and considers that policy innovation can be brought about by the introduction of new policy concepts, new definitions of problems or the presentation of new approaches to solutions. Adopting such view, Boisvert (2015) proposes a critical appraisal of the notions of MBIs and markets as used in designing environmental policy instrumentation; she further discusses the economic status of the institutional arrangements into which ideal expectations of markets and ecological equivalence are materially scripted. In turn, Sullivan and Hannis (2015) analyse more precisely the discourse on biodiversity offsets in England and reveals strongly polarised views on market-based conservation technologies. Struggles over offsetting can thus be seen, at least in part, as irresolvable value struggles revolving around understandings of value commensurability, desirable human relationships with nonhuman nature, and associated normative conceptions of rationality. However this biodiversity offsets approach, Hrabanski (2015) argues, is very successful in global scientific and political arenas.

Such discursive innovations aim not only to present new perceptions, but also to bring about new coalitions and actors, which correspond to Arts et al. (2006)'s second item. As Hrabanski (2015) shows, the rapid rise in support for renovating compensation mechanisms is backed by actors interested in boosting the presence of MBIs. Since an instrument of public action can be viewed as an intervention method that gives preference to specific actors and private interests to the detriment of others, Hrabanski (2015) shows that it is useful to study actors who have promoted the renovation of compensation mechanisms and their dissemination. In other words, the biodiversity offsets' coalition has actually led to the emergence of new actors and policy entrepreneurs in order to diffuse this discourse, and to a change in the composition of environmental coalitions (BBOP, private sector, etc.). In the same way, Hackett (2015) illustrates that whether a significant portion of the critical literature has tended to focus heavily on a few elements of the ideal typologies said to adhere to neoliberal environmental governance and market mechanisms, the Alberta's case study challenges and complicates some of these narratives, and demonstrates that in some cases the state's embrace of market-based instruments may actually serve to extend and solidify existing state control.

Third, policy arrangements refer to rules of the games currently in operation, both in terms of actual rules for political and other forms of interaction, and in terms of formal procedures for pursuit of policy and decision-making. In this regard, Bidaud et al. (2015) analyse biodiversity offset strategies of two mining companies in a Madagascar. Biodiversity offsets are not mandatory for these mining companies but the rules of games have changed. Indeed the mining companies have publicly integrated biodiversity assessment into their respective investments and been involved in the policy to claim 'no net loss' or 'net positive impact' on biodiversity. Hence they supported this 'new' common goal, even if the strategies developed on the ground by these firms are only contextual, and diverse in terms of governance and development of scientific argumentation. In this way, the Malagasy's case illustrates a form of voluntary biodiversity offsets, which are presently modest in the world but are likely to become much more widely used as a part of standard business practices. Some observers, such as BBOP and the Ecosystem marketplace, hence believe these voluntary biodiversity offsets could serve as precursors to larger, broad-based biodiversity markets in the longer term. On the contrary, Hackett (2015) shows that in Alberta, though government support for the use of offsets has been

mentioned in a number of policy documents and in recent legislation, this support has remained largely discursive and no substantive government measures have yet taken place in order to initiate a system of markets in offsets linked to disturbance and land reclamation related to extractive industry.

Finally, the last point identified by Arts et al. (2006) deals with power relationships. This dimension can be the cause of dynamic change; for instance by adding or mobilising external or internal means of exercising power or resources (money, knowledge, skills), or by changing perceived power relationships as showed all the special issue's contributions.

To sum up, the introduction of biodiversity offsets approach can modify some policy arrangements and can be initiated from each of the four dimensions. It will then set of a chain reaction that affects the other dimensions in ways that need to be determined empirically, as analyzed in this issue.

This approach, based on the study of policy arrangements, should be viewed as a theoretical dynamic lens to analyse policy changes, including in biodiversity offsets, at a broader political level. It explains the evolution and rationale of policy arrangements which govern biodiversity offsets at the institutional environment level. However once such analysis has been undertaken, one needs as a necessary complement to analyse more precisely the "rules of games" (Arts et al., 2006) on the ground, e.g. the governance structures and associated modes of coordination of biodiversity offsets, with a focus on their economic organization (Williamson, 1991, 2000). Hence, looking through a more institutional and economic perspective, governance of relations between actors in biodiversity offset activities has to be looked at in depth. We present this below.

2.2. *Biodiversity offsets on the ground as heterogeneous modes of governance: A proposed new institutional analysis*

As earlier discussed, most compensation schemes referred to in the literature actually address differing economic realities on the ground, being promoted by different actors, constraining different types of individuals, concerning different ecosystems, aspects of biodiversity, and operating at different scales. Ultimately, grouping all these heterogeneous schemes under an homogeneous umbrella category of instruments and broadly assuming it is an MBI, makes it hard to rigorously analyse these tools and improve policy formulation, implementation, monitoring and robust evaluation. Against this backdrop, we believe that one should rather precisely analyse each policy instrument or scheme on the ground, and disentangle its institutional and economic characteristics as well as its relations to market mechanisms and their main features.

To do this, we propose to analyse biodiversity offsets instruments, including those presented in this special issue, through the lens of new institutional economics. Vatn (2010) as well as Muradian and Rival (2012) have shed new light, through institutional analysis, on the governance characteristics of mechanisms for collective decision-making and collective action with respect to natural resources management. In both cases, looking at coordination mechanisms, authors opposed markets and hierarchies to govern ecosystem services, while in the latter case Muradian and Rival (2012) additionally envisioned the possibility of hybrid arrangements in payments for ecosystem services. Going further, Vatn et al. (2014) distinguish liability based markets for ecosystem services from non-liability based ones on the one side and direct markets from markets with intermediaries on the other. In the latter category, authors differentiate between complete and incomplete markets with intermediaries.

Taking stock and building on Williamson (1979, 1991, 2000) and Ménard (2005), we aim here at going forward and conducting a thorough new institutional analysis by investigating the specific role of transaction costs in the governance of biodiversity offsetting mechanisms.

More particularly, we contend that offsets should be analyzed through their economic unit of comparison: the transaction. Following Coase (1937), Oliver E. Williamson states that economic relations and exchanges between two or more actors are not coordinated at no cost through the "invisible hand" of the market price system; hence institutions matter (North, 1993, p. 2) and one needs to craft other forms of coordination of actions and relations, e.g. firms, where internal coordination is done through human hierarchies and cross-department transfers, rather than prices. In this context, choosing the most efficient way to organize business and economic relations, Commons (1932) contends, involves to precisely look at "the ultimate unit of activity […]: the transaction". Through this lens, a mode of governance, also called an institutional arrangement, is designed to "provide appropriate incentives to govern a relationship between two or more economic actors" (Allen, 2000, p. 900) in order to better organize transactions between agents.

To do so, Cheung (1998) defines transaction costs as "just about all the conceivable costs in society except those associated with the physical processes of production and transportation" (p. 515). According to this approach, transaction costs occur whenever there are two or more individuals in whatever relation with one another, whether within or outside the market mechanism. Ultimately so, actors seek to set a governance structure that maximizes economic gains net of all costs, namely both production as well as transaction costs (Lapeyre, 2011).

In order to economize on transaction costs and craft efficient modes of governance, one has to analyse behavioural hypotheses about actors undertaking such transactions[5], as well as the attributes of these transactions between actors. The attributes of the transaction that influence modes of governance to emerge include specificity, uncertainty and frequency.

First, investments and expenses are transaction-specific when actors cannot market or redeploy these through another transaction with another actor. In this case, the specific identity of the parties poses non-marketability problems as this has important cost-bearing consequences (Williamson, 1979, p. 240) and the actor is especially vulnerable to opportunistic behaviours. On the contrary expenses and investments incurred for a transaction that are unspecialized pose few hazards, since transacting individuals in these circumstances can easily turn respectively to alternative buyers or sellers. Specificity in the transaction can concern the physical asset invested in (asset specificity), the geographical site of investment (site specificity), and the human capital invested in (human specificity). In all cases, transactions where the specific identity of parties is crucial, leading to issues of uncertainty and opportunism, are said to be idiosyncratic. Second, uncertainty defines a situation where actors are unable to perfectly observe and monitor complex tasks involved by others within the transaction (Ghertman, 2003). Finally, the frequency of transactions can

[5] Simon (1985) states: "Nothing is more fundamental in setting our research agenda and informing our research methods than our view of the nature of the human beings whose behaviour we are studying" (p. 303). These attributes of actors include both the condition of cognition, and self-interestedness (Williamson, 2000, p.600). Bounded rationality refers to the fact that when making decision, individuals are limited by the information they have, the cognitive limitations of their minds, and the finite amount of time they have to make a decision (Simon, 1947); opportunism refers to actors' willingness to seek their self-interest possibly by voluntarily deceiving their transaction counterpart. Both these attributes of actors need to be taken into account as they introduce hazard in the relationship and entail costs for actors when undertaking, monitoring, and enforcing transactions. For conciseness reasons, we nevertheless focus in this introduction on the attributes of the transactions, deemed to be of critical importance for the explanation of governance structures, especially in the biodiversity offsetting sector.

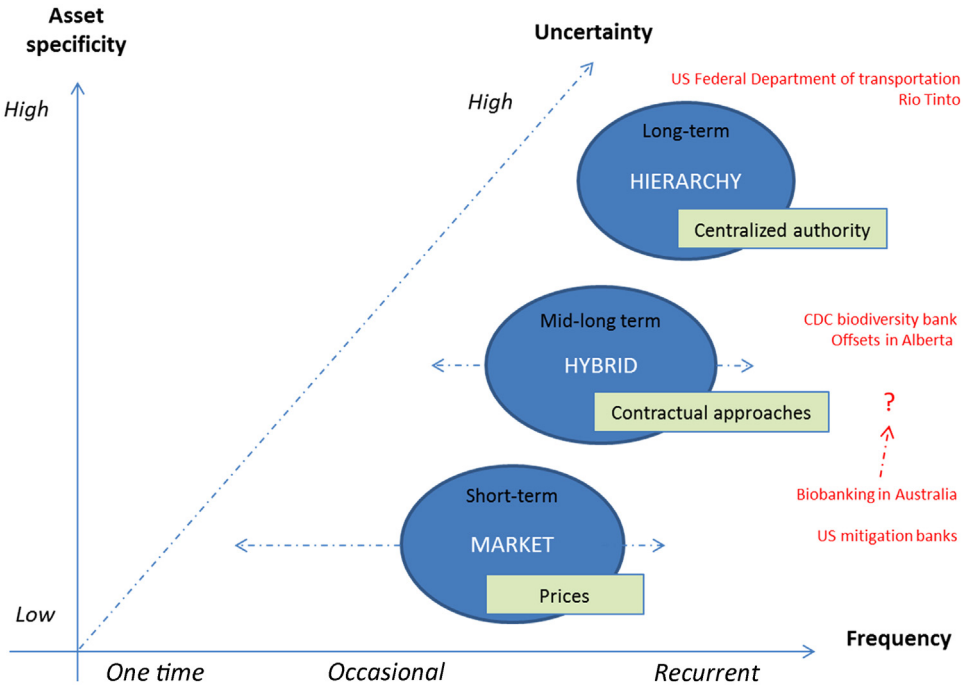

Fig. 1. Institutional arrangements for transactions-including illustrations with biodiversity offset schemes.

be characterized as one time, recurrent or occasional, which refers to buyer and seller activity on the market (Williamson, 1979).

In this context, new institutional economics contends that, based on the human attributes (behavioural hypotheses), the attributes of each transaction under scrutiny determine the mode of governance which will be crafted in order to economize on transaction costs and allow for efficient relationships. Building on a discrete structural analysis, Williamson (1991) distinguishes three generic forms of economic organization, namely market, hybrid, and hierarchy, whose institutional and economic characteristics are displayed in Fig. 1 and explained in greater details below.

On the one hand, hierarchy refers to unified governance within one firm or organization, where authority and order (the 'visible hand' of the manager), characterized by the law of forbearance (subordination), are used as a very long term mechanism for frequent internal coordination in the presence of very specific assets and high uncertainty. Economic incentives are very low, while bureaucratic constraints and costs are important.

On the other, market governance is "the classic nonspecific governance structure within which faceless buyers and sellers meet for an instant to exchange standardized goods at equilibrium prices" (Williamson, 1979, p. 247–248). The medium in the exchange remains here the sale rather than the contract. It is characterized by one-time, occasional and frequent (though mostly occasional to recurrent) short-term transactions (exchange) involving standard goods and services with low asset specificity and low uncertainty. Here, the specific identity of the parties is of negligible importance, the substantive content of the exchange is determined by reference to formal terms of prices (decentralized mechanism), formal documents, and legal rules apply (Ménard, 2005); litigation is solved in courts without necessary deep knowledge of respective actors transacting. Within market governance, economic incentives are very strong whereas bureaucratic control is inexistent.

In between, hybrid governance can be characterized by a medium or high level of asset specificity. In this context, the identity of parties is critical and principals to such transactions have strong incentives to see the contract through to completion as they invest in specific goods and non-transferable physical and human assets (Williamson, 1979). As a result, the ill-defined, non-standardized, nature of these transactions makes primary reliance on market governance hazardous. On the contrary, the long duration and mixed to high frequency (occasional to recurrent) nature of these transactions make parties to prefer signing mid to long-term bilateral contracts (agreements) so as to tackle complexity and opportunism. Here legal disputes do not resort immediately to strict reliance on litigation, but rather on third-party assistance (arbitration), a more flexible way to resolve disputes (Williamson, 1979).

Such continuum, divided into three types of governance structures and associated modes of coordination, could seem arbitrary. Each category, we contend, is indeed not completely homogeneous, and thus the diversity within each, especially the hybrid category, should further be researched. Nevertheless at this stage, we believe this is useful to distinguish, at least, between occasional and short-term market relations on the one hand and contractual, longer-term agreements on the other. For each, as we will see, advantages and risks are different; hence policy debates and responses should vary in each specific case.

Most empirical studies testing this theory were applied within the industrial and distribution economic sectors. Yet, apart from studies looking broadly at transaction costs in environmental policy formulation (McCann et al., 2005; McCann, 2013; Coggan et al., 2010), such new institutional analysis has been so far applied only occasionally to the management and economic use of renewable natural resources and ecosystem services at the local level. At the theoretical level, while Birner and Wittmer (2004) have theoretically applied transaction cost economics to the analysis of governance structures for natural resource management in a context of decentralization and devolution, Vatn (2010) as well as Muradian and Rival (2012), as mentioned earlier, have analytically studied, although broadly, payments for ecosystem services as markets, hierarchies and hybrid structures. At the empirical level, few authors have rigorously tested the existence and significance of transaction costs in environmental management programmes. In fisheries Kuperan et al. (1998) evidenced transaction costs to be lower in co-management structures where local farmers participate in decisions. On the contrary, Mburu (2002), Mburu and Birner (2002) and Mburu et al. (2003) estimated transaction costs to be higher in community-based governance structures in the case of

wildlife while Adhikari and Lovett (2006) found similar results in the field of forest management. For nature tourism finally, though these studies are more qualitative, Rodríguez-Dowdell et al. (2007) showed that a community concession system in whale shark watching would lower transaction costs thanks to group self-regulation, whereas Lapeyre (2011) found the contrary, i.e. subleasing rights to a private partner would rather save on transaction costs, when community's capacity is limited and its property rights are secure.

Below, we intend to apply this framework to the analysis of the various heterogeneous instruments for biodiversity offsets on the ground. Such attempt is not isolated. Through this lens, Coggan et al. (2013a, 2013b) study development offset schemes in Australia, while Scemama and Levrel (2013) analyse the characteristics of transactions in compensatory measures in the one case of aquatic ecosystems in the United States. However, this piece rather aims at comparing different case studies so as to point at heterogeneity in institutional governance and characteristics of offsetting activities.

2.3. *Applying the framework: Biodiversity offsets as various governance structures*

Far from confirming the existence of a single unified category of so called 'MBIs' grouped under the umbrella label of 'biodiversity compensation', articles presented in this special issue rather display heterogeneity in practical institutional arrangements designed to govern and implement biodiversity offsets. Below we explore such grid of so-called market instruments through the lens of new institutional analysis. This will actually allow us to partly deconstruct the alleged link between biodiversity offsets and market mechanisms and thus show that 'biodiversity offsets' are neither a unified category of instruments, nor often genuine market-based instruments (see illustrations from this special issue in Fig. 1).

Characterized by very specific transactions implemented by one single agent, a single-user biodiversity bank is best theoretically seen as a unified firm, whose organization of activities relies on a complex set of arrangements coordinated by hierarchy, command, and internal transactions within a single firm rather than by a price system. As a legal entity, it operates and is liable as one single agent when it comes to the transfer of rights. In this situation, Froger et al. (2015) illustrate that State Agencies (for example State Agencies of the federal Department of transportation in the US) and large industrial corporations establish their own bank to enable them to offset several of their own project. Practically, these entities stockpile wetland credits for their own later use. Far from being an exception, such arrangements were common until recently. In 1992, out of 46 banks permitted within the Wetland and Stream Mitigation framework in the US, almost all were publicly-sponsored single-user banks (United States Environmental Protection Agency-EPA website). Similarly, Bidaud et al. (2015) show that mining companies Rio Tinto (through QMM) and Ambatovy have respectively decided to manage some of their mitigation sites through their own environmental teams. In these cases, as physical assets become more specialized to a single use – i.e. offsetting under long term conditions is undertaken to meet one entity's own needs only and cannot be transferred to other uses or redeployed to any other partner – transactions are idiosyncratic and economies of scale can be as fully realized by the developer itself as by an outside supplier. In this very specific situation, hierarchy (a single organization) allows adaptations in offsetting projects to be made in a sequential way without the need to consult, complete, or revise inter firm agreements at a significant transaction cost.

On the other side of the spectrum, some commercial biodiversity banks are shown by Froger et al. (2015) to meet the characteristics of market governance. Managed by entrepreneurs, those entities sell biodiversity credits to buyers in need of compensation sites. Wetland mitigation banks in the US were for instance one of the first initiatives to create biodiversity commodity markets. Such banks are responsible for producing biodiversity units and ensuring the economic viability, the development performance, maintenance and monitoring of mitigation sites. They also set the price of biodiversity units, taking into account the minimum prices established by experts to cover the cost of mitigation. Similarly, Biobanking in Australia links, via a Biobank website, credit purchasers to landowners who sell biodiversity credits. In this latter case, the system enables impacts from a developer to be compensated in a different area than the one originally affected, though with a similar type of vegetation. In both those cases in the US and Australia, the identity of actors within the transaction is of negligible importance, units are fungible and flexible. Also, compensation liabilities (obligations) are transferred, through the sale, from the developer to the biodiversity bank and as a result, relationships regulated through market governance do not involve long-term contracts. Assets invested by the bank are not specific to the transaction with a particular buyer and can be recurrently deployed, through price mechanism, to another transaction, with a different developer also in need of compensation. As characterized above, the medium here in the exchange remains the sale rather than the contract.

Critically important, the emergence of such market governance structures relies on rules and regulations concerning the conditions attached to mitigation activities required from the developer (related to location and measures of equivalence). As stated by Sullivan and Hannis (2015) in the case of biodiversity offsetting in England, proponents of genuine market governance aim at modifying policy arrangements. They believe that advantages from market liquidity in commoditized offset products will only be felt if more flexibility is permitted for offset location, and if value-to-value (or value-to-cost) assessment is preferred to strengthened bureaucratic planning and like-for-like local exchanges, as lobbied at the opposite by a number of conservation charities.

In between hierarchies and market governance, what is mainly observed in most empirical biodiversity offsetting cases is however the design of hybrid modes of governance. Indeed, while many biodiversity offsets instruments might label themselves as market mechanisms, apparently resembling mitigation banks, these actually use bilateral longer-term contracts that are specific to actors involved in the transaction, their identity, location, and legal obligations. In this case, commodification of biodiversity units is limited because transactions are idiosyncratic; assets (biodiversity offsets) are characterized by physical (e.g. equivalence in species) and site (local like-for-like) specificity. In France for example, developers, who are legally forced to compensate their residual impacts, are administratively constrained in their freedom to buy any biodiversity credit to comply with the law. In this context, even if the CDC biodiversity bank (*Caisse des dépôts et consignations*), as illustrated by Froger et al. (2015) acquires land, restores biodiversity on it, and finally monetizes it through units it offers for sale on the open market, the specificity and non fungibility of assets to be exchanged, due to strict administrative requirements, forces actors into a longer-term contract in order to precisely agree on the terms and contingencies of the exchange. When looking in more details, the same institutional arrangement is actually designed on the ground in the Biobanking system; indeed, Froger et al. (2015) also show in this issue that while the BioBank sells 'credits' on the website (see above), in real facts developers and landowners supplying offsets sign a long-term bilateral contract (in general 15 to 40 years), as BioBanking requires a "like-for-like" trade of credits.

In the Case of Alberta, Canada, Hackett (2015) also demonstrates that rather than adhering to genuine market principles, private companies rather sign bilateral (collaborative) agreements with NGOs so as to compensate their disturbances. In this sense, the

instrument is better thought as a form of industry-NGO corporate social responsibility program which modifies the discourse on biodiversity offset, the actors involved, the games of rules and the power relationships. Practically, the Boreal Habitat Conservation Initiative (BHCI) is a financial partnership between the Alberta Conservation Association (the ACA) and major oil industry firms who provide the ACA with long term funding agreements so as to purchase conservation lands to offset their terrestrial impacts. Hence, despite being discursively constructed by the State as a market in tradable mitigation credits, it does not feature characteristics of market governance: transactions are specific, recurrent, the identity of contracting actors is crucial and biodiversity assets created by NGOs through offsetting activities cannot be redeployed. In order to protect themselves against opportunism, firms and NGOs need as a result to sign long-term collaborative partnerships.

Mining companies in Madagascar tend to resort to the same type of bilateral agreements with NGOs so as to secure long-term offsets. No price mechanism is mobilized to monetize and sell biodiversity units on the market, and site and human specificity is critical. As a result, according to Bidaud et al. (2015), as Rio Tinto and Ambatovy partner respectively with Missouri Botanical Garden (MBG) and Birdlife International, and MBG and Conservation International, no market reference was ever made in the two cases studied despite being often classified as market-based instruments; nonetheless the initiative led to new policy arrangements at least in terms of actors and discourses.

3. Discussion

Although these are most often closely associated in discourses, articles in this special issue, analyzed through the lens of our analytical framework, actually reveal a more complex relationship between the concepts and empirical practices of biodiversity offsets and those of markets and market-based instruments. Three main messages uncovered in these articles need to be mentioned.

First, biodiversity offsets, by gradually replacing like-for-like and service-to-service assessment approaches by value-to-value and value-to-cost ones, indeed involve a trend of partial commodification of nature. This in turn highly simplifies the value of biodiversity and ecosystem services as the latter is appraised through economic and monetary assessments, as shown by Froger et al. (2015) as well as Bidaud et al. (2015), under-estimating the complexity of ecosystem relationships, interdependences and irreversibilities. Further, while discourses in biodiversity compensation focus on complex ecosystem services, on the ground offsets are based on methodologies that prioritize estimating habitats and species rather. This over-simplification causes some significant loss in biodiversity's complexity and might jeopardize the possibility of equivalence and permanence. In England, Sullivan and Hannis (2015) contend, critics of such valuation exercises voice that this way of attributing value has precisely resulted in biodiversity decline, and will cause new layers in the 'race to the cheapest' through which nature currently is devalued. Hence they contest the simple metric for compensation set up by DEFRA (UK's Department for Environment, Food and Rural Affairs), because it ignores the realities of ecological and biodiversity's complexity, including the dynamic requirements of species; rather they propose to keep market frictions (e.g. planning) and to impose closeness between offsets and development sites so as to conserve ecological similarity.

However (this is our second point), such attempt to systematically put value on biodiversity in order to allow for cost-efficient biodiversity offsets does not translate into a movement towards genuine marketization on the ground. Although discourses characterize biodiversity offsetting as a unified category of market-based instruments for ecosystem services, a different picture is to be observed in reality. On the one hand, rather than one single institutional structure, empirical cases presented in the issue tend to illustrate the existence of a number of diverse modes of governance in biodiversity offsets. From single-user banks mobilizing hierarchies to coordinate compensation activities (Froger at al., 2015), through bilateral agreements mobilizing hybrid structures for instance to link companies and NGOs (Bidaud et al., 2015; Hackett, 2015), to mitigation banks attempting to sell standardized biodiversity credits, various different institutional arrangements are emerging. On the other, we contend that very few of these structures display features of market governance. Indeed, as we deconstructed through the lens of new institutional economics, transactions in biodiversity offsets are currently better characterized by asset and site specificity and by the importance of parties' identity. Few offsetting instruments are really mobilizing markets (wetland mitigation banks in the US, see Froger et al., 2015) while others, e.g. in France the *CDC Biodiversité*, although alleged in discourses to offer commoditized units on the market, actually sell credits which lack the features of flexibility, fungibility and liquidity.

Against this backdrop, what we observe is the continued practice of collaboration and partnerships, though with some modification in power relations within policy arrangements. In Madagascar as well as in Alberta, Canada, big extraction companies stabilize specific bilateral agreements where NGOs implement conservation and restoration activities on the ground. Though some market proponents show this as an evidence of institutional innovation where State influence is minimized and private actors' role is growing, for the good, we believe this actually resembles a relabelled practice of corporate social responsibility (CSR) and outsourcing on-the-ground tasks to local NGOs. Yet, a new added complexity lies in the unexpected change in power and relationships between the different actors in the offsetting chain. In Madagascar for example, Bidaud et al. (2015) interestingly show that after joining forces with the BBOP (Business and Biodiversity Offsets Programme), an NGO, during the development of their offset strategy, the company Rio Tinto then preferred to team up with the International Union for Conservation of Nature (IUCN) and proceed with its own methodology, as it estimated to be more advanced in addressing offsetting issues. Here, partnerships and coordination between companies and NGOs and between NGOs themselves are replaced by competition in methodologies and schemes. As a result, we contend, such competition, together with the continued mobilization of specific and ad-hoc bilateral structures in biodiversity offsetting, might prevent any really unified and harmonized metrics and market to emerge in the future so as to freely exchange biodiversity units across actors within the sector.

Third, in such a context of reorganization, the strengthening of hybrid structures (partnerships) as well as the limited emergence of market governance are not accompanied by a significant rolling back of State influence in the biodiversity offsetting sector. In France, State regulations constrain and precisely define the way biodiversity offsets are to be implemented on the ground, whether ad hoc ('on-demand') or in anticipation ('on 'supply'); while in Germany biodiversity banks are still largely controlled by the public sector and set up by local authorities (Froger et al., 2015). Similarly, according to Sullivan and Hannis (2015), in England many actors plea for a strict and strong regulatory framework, through Local Planning Authorities, with clear national guidelines and a system of national offsets accreditation and registration. In Alberta, Canada, the provincial government, through its control over most available lands in the area, also highly constrains industry-NGO partnerships and thus prevents a clear shift from state-centred management to markets. This, Hackett (2015) believes, and despite an official discourse of MBI development in the offsetting sector, is actually a conscious a strategy by the provincial government to actually grow its influence and avoid sterilization of extractive resources.

In total, this special issue aims, through policy and institutional analysis, at deconstructing discourses about biodiversity offsetting policy instruments and exploring practices precisely on the ground; in particular it gives evidence that biodiversity offset programs are mainly characterized as a variety of different institutional arrangements with limited features of market governance. On the contrary, hybrid structures, through long-term bilateral agreements and partnerships between parties whose identity is crucial, are the rule rather than the exception. Companies, NGOs and the State are all included in these various modes of governance and compete for influence within these structures in creating some new policy arrangements. Compensating for residual damages on biodiversity cannot be viewed and organized only as an instant exchange of a standard commodity between two 'black boxes', i.e. organizations as production functions; instead, as attempted in this special issue, one has to understand discourses, interests and behaviours of all rent-seeking actors and thereafter analyse the way the latter are coordinated within governance structures, so as to "craft order, thereby to mitigate conflict and realize mutual gains" (Williamson, 2000, p. 599).

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