

Institutions for governing biodiversity offsetting: An analysis of rights and responsibilities



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ABSTRACT

Offsets for compensating biodiversity loss are increasingly suggested as a system for allocating responsibilities onto those actors who contribute to the loss. As the mechanism is outlined as a new opportunity, the expectations need to be analyzed relative to the ensuing changes in rights and responsibilities over biodiversity degradation, conservation and restoration. In this paper we conduct an analysis of rights and responsibilities using literature and empirical material. Our empirical case is in Finland, where ecological compensation and biodiversity offsets represent an emerging avenue for conservation. We find that rights to conservation, property and economic activity have generally not been explicitly addressed in parallel, and that the focus has been on evaluating biodiversity loss through ecological assessment or as an ethical notion. Offsetting literature focuses on developer rights to a predictable operational environment rather than on human rights to biodiversity or the property rights of offset suppliers. At the same time, the literature on offsets analyzing the responsibilities over management, avoiding degradation and meeting societal expectations, has placed much emphasis on governance and control by authorities. These analyses result in doubts and criticism of the capacity of governance arrangements to reach the set targets. Echoing the literature, the Finnish case shows that even though the mechanism is framed as a way to place the responsibility onto developers, numerous responsibilities are expected to be taken by authorities or a yet non-existing mediating actor, while developer rights are expected to be secured and land-owner rights are either mostly assumed not to change, or not addressed at all. Our study shows that the assumptions on rights and responsibilities need to be exposed to empirical analysis, to support the design of meaningful new institutional arrangements.

1. Introduction

Who holds the rights to a biodiverse sustainable world, and whose responsibility is it to secure sustainability by safeguarding biodiversity? Offsets for compensating biodiversity loss are increasingly suggested as a system for allocating conservation responsibilities onto those actors who contribute to biodiversity degradation (ten Kate et al., 2004; Madsen et al., 2010; Wende et al., 2018). Developing and applying such a mechanism requires an understanding of who currently holds the rights and responsibilities, and how the new mechanism would rearrange them. Importantly, if the aim of the mechanism is to reassign rights and responsibilities over biodiversity – that is, over degradation, conservation and restoration – we need to recognize the means by which the existing policy instruments and instrument-mixes currently assign rights and responsibilities. As we identify

what the expectations for offsets as an emerging mechanism are, we can infer the conflicting expectations, which point to the issues that require governance solutions. Our institutional analysis of rights and responsibilities combines literature review and empirical material from Finland, where offsets have recently entered the policy discourse.

Ecological compensation is a mechanism through which the actors causing biodiversity degradation offset this degradation by restoring and/or conserving biodiversity elsewhere, often nearby. Ecological compensation can be mandatory, mostly connected to permit procedures, or voluntary, with some third party support. The mechanism places responsibility on the degrading actors, and thereby might strengthen the rights of those who benefit from biodiversity. Our analysis tackles the ways in which these definitions are operationalized in the literature and in practice.

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In addition to the apparent failure in protecting biodiversity with traditional public policy-mixes, the excitement about biodiversity offsets to compensate for ecological losses rests on the increasing emphasis on (neo-) liberal policies with growth promises, and a shared responsibility across public and private sectors (Salzman and Ruhl, 2000; Boisvert, 2015; Coralie et al., 2015; Lapeyre et al., 2015). The expectations range from additional conservation and informed policy, to efficiency and equity in resource allocation more generally. Clearly these expectations are partially conflicting, as has been observed in specific offsetting development settings (Madsen et al., 2010; Sullivan and Hannis, 2015). Additional conservation would strengthen citizens' constitutional rights to sustainability and clean environment (Boyd, 2011). It would also likely secure citizens' access rights and possibly strengthen the management rights of conservation administration, at least as an authority defining the appropriate management activities and rules. The expectations regarding liberalization, on the other hand, might strengthen the use rights of developers, assuming they carry the responsibility of caring, whilst the government responsibilities shift toward liability governance (Pellizzoni, 2004). Liberalization might strengthen the rights of offset buyers and sellers, allowing them to contract for conservation. The ways in which ecological compensation and offsets (re)allocate these types of rights (e.g., Schlager and Ostrom, 1992), has not been an explicit target of analysis in the fast growing literature on the mechanism.

The main expectation placed on ecological compensations and offsets is that we can tap onto those activities that cause loss and hence can maximize societal welfare by matching the amount of loss with improvements in the status of biodiversity generated by offsets (ten Kate et al., 2004; Wende et al., 2018). Embedded in this logic is the idea that the economic actors whose profits are cut by the new conservation responsibilities could transfer the cost of conservation to their value chains, thereby indirectly engaging numerous more actors in covering the cost of conservation. Restoration and conservation as well as the knowledge management and intermediary activities would in turn generate new business opportunities and turnover (ten Kate et al., 2004; Madsen et al., 2010), as long as the initial and recurring transaction costs were accounted for and internalized into the mechanism (Coggan et al., 2013a). As an abstraction, offsetting sounds like an appealing win-win opportunity for biodiversity governance but what it advocates pay less attention to, is the losers: those actors who initially lose rights or get new responsibilities. These crucial questions are often framed as suspicions (e.g., ten Kate et al., 2004) or costs (Coggan et al., 2013a, 2013b) but they constitute a genuine feasibility challenge for the policy designer and implementer, as is shown in analyses of discourses around offsets by e.g. by Mann (2015) and Sullivan and Hannis (2015).

Despite the excitement, the ideas of compensating biodiversity degradation with offsets have been a target of fierce criticism (e.g., Burgin, 2008; Maron et al., 2012; Moreno-Mateos et al., 2015; Spash, 2015; Apostolopoulou and Adams, 2017). Often, the discussion circulates around whether the expected no-net loss of biodiversity can be met (Curran et al., 2014), whether there is even an intention to meet this target (Maron et al., 2012) or whether giving developers a license to degrade biodiversity is altogether wrong (Spash, 2015). These arguments are partly philosophical, drawing on the human-nature relationship, partly technical and evaluative focusing on the mismatch between promises of no-net-loss and the outcomes of real-life offsetting, and partly political, favoring certain type of development. Finally, the institutional design and control mechanisms have been criticized as inefficient, poorly implemented and giving leeway to actors causing net-degradation (McKenney and Kiesecker, 2010; Bull et al., 2013).

To organize the potential and empirically evidenced consequences on actors' rights and responsibilities ensuing from the establishment of an offset mechanism, this paper sets out to analyze the underlying assumptions about rights, responsibilities and institutional roles for different actors, identified and assumed in literature. We then explore these assumptions against a real-world setting, in which biodiversity

offsetting is being explored by the government, corporations, consultants and researchers. The empirical analysis of offsets uses workshop material from Finland, where offsets are not on the formal policy agenda but they have been deliberated for several years.

2. Methods

We develop a framework drawing on literature on institutional and environmental governance, focusing on rights and responsibilities – how they are formally defined – and how different actors' rights and responsibilities are governed. We sought for papers that addressed rights and responsibilities in ways that were relevant for biodiversity conservation, and iterated the relevance of the literature threads among the authors. We then sought and analyzed ecological compensation and biodiversity offset literature against these theory-driven notions on rights and responsibilities. In particular, we paid attention to how different actors' rights and responsibilities could be expected to change when an offsetting mechanism is established.

We then evaluated the observations from the literature with an empirical analysis of material from two sets of four stakeholder focus group workshops in Finland in March and May 2016, with 60 and 42 participants, representing administration, business, research, consultants, land-owners, industry and professional unions and environmental NGOs (Table 1).

The workshops took place at a time when the offsetting discussion emerged in the Finnish administration. In particular the first set of workshops functioned as a kick-off for administrative and stakeholder considerations and networking on the topic in Finland. Prior to the workshops, the scientist team hosting the workshops (the authors of this paper) had developed the offsetting idea in a science idea challenge competition, Helsinki Challenge (<http://challenge.helsinki.fi/teams-2014-2015>), and been awarded the second prize. After the workshops that produced the text data for our analysis, the Ministry of the Environment assigned a report on the legal conditions for biodiversity offsetting (Primmer et al., 2017; Similä et al., 2017), and a report on the key considerations for biodiversity offsetting (Moilanen and Kotiaho, 2017). The Ministry of Agriculture and Forestry started a project on offsetting of environmental effects with a preliminary report published in 2017 (in Finnish: <https://mmm.fi/luonto-ja-ilmasto/kompensaatiomekanismit>), and in 2018 the Prime Minister's Office assigned an assessment of Finnish regulation relative to offsetting. These reports and projects signal the momentum of the time during which the data were collected.

The first set of workshops, held on 30 March 2016 and advertised broadly, started with a seminar with presentations from representatives of science community, business, administration, and advocacy organizations. Seminar topics included examples of both successful and problematic compensation cases from the business sector (Fingrid Plc, Rudus Plc), identification of potential risks and benefits both from the perspective of science (University of Helsinki), and economic actors (The Central Union of Agricultural Producers and Forest Owners, MTK and The Confederation of Finnish Construction Industries, RT), and a general overview of ecological compensations and offsetting within the

Table 1
Workshop participants in March and May 2016.

Stakeholder type	March	May
Administration	6	1
Business	10	14
Research	26	9
Consultants	5	5
Metsähallitus	1	4
Industry and professional unions	6	8
Environmental NGOs	5	1
Private persons	1	0
Total	60	42

framework of current legislation and governance (Finnish Environment Institute). The Ministry of Agriculture and Forestry and The Ministry of the Environment gave commentaries. Out of the 115 attendees in the seminar, 60 participated in the workshops (Table 1). The four parallel one-hour workshops participated by researchers, administration, industry, consultant, environmental NGOs, and a representative of the state forest managing enterprise, Metsähallitus (Table 1), aimed to scan the opportunities, risks and institutional conditions of compensations. They addressed the following questions (each starting with a different question and proceeding to the next in order): (1) Why would we opt for ecological compensations? Why not? (2) What should be in the scope of compensations? (3) What risks could ecological compensation come with? (4) How should compensations be governed? The facilitated workshops were recorded in shorthand on Powerpoint, viewable to the participants, during the workshop and summarized in a plenary. The shorthand sentences resulting in altogether 11 pages of font 12 text constituted the material for analysis.

The second set of workshops was organized on 23–24 May 2016. The participants were invited based on attendance to the first workshops, complemented with those who had expressed an interest in participating but had not made it. The participants included less authority and NGO representatives than the March workshops. The participating industry and professional unions represented forestry, energy industry, mining, game and wildlife, and gardening. These four consecutive 3-hour workshops, scanning opportunities and risks, the roles for different actors and institutional conditions, addressed the following topics: (1) Readiness and willingness to start pilot projects immediately focused on actor roles, (2) needs and wishes of business and progressing in practice focused on opportunities and institutions, (3) risks and insecurities related to ecological compensations and overcoming them and (4), practical experiences, successes and problems in ecological compensations. All workshops were run as free flowing discussions with structuring themes. The workshops were facilitated by a chair and recorded in detail by a rapporteur (not fed back to the participants). This material of 27 pages, constituted the second set of data.

The reporting was not word to word, but the rapporteurs aimed at capturing the core idea of each comment and the key terminology used by the person making the comment. In the first workshops, the comments were not connected with the actor type; in the second, the actor type was also recorded.

Our analysis was designed to understand the range of arguments, rather than the volume or repetition (Silverman, 2001). We read all the text data and split complex sentences into single message arguments, altogether > 200 arguments. We then tabled these arguments under the headings: “Expectations”, “Rights” and “Responsibilities”. Some of the arguments (< 30 arguments) did not fit into this classification, they were more tentative questions or technical statements about conservation practice. These arguments were considered in the interpretation, to support the continuous data triangulation we carried out.

All arguments were then coined with the actor types on whom the argument expressed expectations, or placed rights or responsibilities. In our analysis of the organized arguments, we sought for patterns relative to expectations, rights and responsibilities.

Before reporting our empirical results, we turn next to literature, to conceptually organize rights and responsibilities, as well as the expectations on changes in them that come along with the ecological compensations.

3. Rights and responsibilities

3.1. Rights

Rights to biodiversity are defined in varying ways: biodiversity is a commons, and is recognized to hold intrinsic value. The substantive human right to a healthy environment has been promoted globally for more than thirty years, as a principle (Bosselmann, 2001; Shelton,

2006), and to counter-balance economic globalization (Cullet, 1995). Beyond a commons, or a human right interpreted in our current societies, maintaining biodiverse nature is justified with the rights of future generations, and the rights of nature itself and its processes (Norton, 2000). Indeed, environmental rights appear in numerous constitutions (Boyd, 2011). Environmental rights are explicit and clear in writing but their application can be challenging because of the relatively short history of their recognition, and they can clash with the often stronger property rights (Grinlinton and Taylor, 2011). Because environmental rights are not connected to resources, because they communicate equal distribution and societal values, and because they protect people against private economic interests, their interpretation compares with that related to human rights. Environmental rights are interpreted and enforced by administrations and courts, and also in societal discourse.

The global and national commitments to biodiversity conservation testify that respect for nature is institutionally supported – albeit not sufficiently to halt biodiversity loss (UNCBD, 2010; EC, 2011). In utilitarian terms, biodiverse ecosystems and their well-functioning processes benefit humans, and humans can be perceived as the holders of the rights to these benefits. This would entail that the policies safeguarding biodiversity would indeed be in place to secure people's rights, now and in the future. As a target of policy, rights to nature and biodiversity have been most clearly identified through the rights to genetic resources in the CBD (Richerzhagen, 2011), while the analytical attention has focused more on the environmental justice consequences of conservation policies (Taylor, 1998).

The idea of offsetting is to strengthen people's rights to nature, and limit those of developers (Salzman and Ruhl, 2000). However, this does not seem to be a starting point of the application of the schemes, as offsets are often located far from the degraded sites and they are used to secure the developers rights to proceed (Ruhl and Salzman, 2006; Sullivan and Hannis, 2015). Indeed, the criticism of offsets shows that mostly the assumed transfer of rights would be from nature to developers (Spash, 2015; Apostolopoulou and Adams, 2017). People's rights and distributional impacts have been the specific target of analysis in transnational mechanisms, in particular in the forest degradation related offsetting schemes under the REDD +¹, showing that transnational offsets can strengthen people's rights to nature but also pointing to several unresolved challenges in considering local rights, equity and benefit sharing (Schroeder and McDermott, 2014). In line with these messages, a recent analysis of offsets shows the mechanism can treat locals inequitably, generating losses of rights at the local level (Bidaud et al., 2018).

Property rights that come with ownership are commonly considered to include a right to access the area, and typically also rights to extract resources, manage the area and the resources as well as exclude others from using the area and transferring the rights (Schlager and Ostrom, 1992). Indeed, transfer and exchange can be considered to generate rights but the institutions for exchanging, formalizing and securing these rights can vary notably (Demsetz, 1964). The typical methods constraining property rights, as redemptions and restrictions, have not solved the conflicts between property rights and rights to biodiversity. It is this conflict, that biodiversity offsetting aims to solve.

The compensating actors, i.e. the developers or offset buyers, give up or lose some of the rights to degrading activity, and the offset they buy imposes a restriction on the use rights of an actor who used to hold them (Salzman and Ruhl, 2000; Table 2). The compensating actor might also lose a right to manage the site if the compensation requirement is a newly established policy, but this limitation of rights is partly mitigated by the offset (Mann and Abasher, 2014). Indeed,

¹ Reducing emissions from deforestation and forest degradation (REDD), and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries (REDD+).

Table 2
Actor types and their institutional positions in offsetting.

Actor type	Examples	Expectations	Rights	Responsibilities	Institutions	Sources
Developer / compensator / offset buyer	Mining Construction Infrastructure Energy Farming Forestry	Permit, social license, reputation, competitive advantage, legitimacy, improving stakeholder relationships, predictability, stability	Property, acquiring a permit, development, entrepreneurship, profit	Impact avoidance and mitigation, precaution, compensation, restoration, protection	Legislation, permits, industry standards	Salzman and Ruhl, 2000; Ten Kate et al., 2004; Boiral and Heras-Saizarbitoria, 2017; Whitten, 2017
Land-owner offset provider / seller	Farmer Forest owner Land-manager Community	Business opportunity, conservation, new profits and income, predictability	Property, management, income	Management, refraining from extraction and other use, conservation	Legislation, sustainability standards, contract terms	Ten Kate et al., 2004; Wissel and Wätzold, 2010; Coggan et al., 2013a, 2013b; Mann and Absher, 2014; Boisvert et al., 2015; Whitten, 2017
Authority / administration	National authority, permit authority, city council	No net loss, net improvement, conservation, resources for conservation, legitimacy	Management, transfer of rights, exclusion	Standard setting, monitoring, evaluation, sanctioning	Legislation, mandate, policy	Salzman and Ruhl, 2000; McKenney and Kiesecker, 2010; Wissel and Wätzold, 2010; Bull et al., 2013; Sullivan and Hannis, 2015; Van Teeffelen et al., 2014; Martin et al., 2016; Bull et al., 2017; Wende et al., 2018
Knowledge intermediary, Trader / broker	Consultancy, university, bank	Business opportunity, predictability, stability	Entrepreneurship, trading	Provision of valid and reliable knowledge, and metrics matching of sites, monitoring	Academic institutions, accreditors, legislation, contract, auditor	Salzman and Ruhl, 2000; Coggan et al., 2013a, 2013b; Martin et al., 2016
Citizens	Neighbors, local inhabitants, voters, tax-payers, future generations, consumers, tourists	No net loss, net improvements, conservation, economic security, transparency	Ecological sustainability, social sustainability, participation rights	Only moral responsibilities, constitutional responsibility	Legislation, permits	Salzman and Ruhl, 2000; Ruhl and Salzman, 2006; Sullivan and Hannis, 2015; Bidaud et al., 2018

entering the compensation scheme critically redefines management rights, and typically places them on the offset provider, a third party manager or, in many cases, the authorities (Whitten, 2017; Wende et al., 2018). The offset providers and their rights have not been at the focus of much analysis; yet there is an understanding that clarity of landowner rights is a precondition for establishing offset markets (Coggan et al., 2013a, 2013b; Mann and Absher, 2014; Whitten, 2017). The rights of the offset provider need to be clear in particular as regards the uses and users they exclude (Wissel and Wätzold, 2010; Boisvert, 2015). As the offsetting literature on the rights of the offset buyer or provider has not consolidated, the rights must be derived rather from analyses of the expectations that the developers hold toward the offsetting mechanism (ten Kate et al., 2004; Madsen et al., 2010; Sullivan and Hannis, 2015), or of costs experienced by the developer or the potential offset providers (Wissel and Wätzold, 2010; Coggan et al., 2013a).

3.2. Responsibilities

The ideas of sustainable development connect human and environmental rights to responsibility and the consideration of future generations (Taylor, 1998; Shelton, 2006; Boyd, 2011; Richerzhagen, 2011). Perhaps the most ambitious responsibility framing is that of humans and mankind having duties toward the environment, to secure intrinsic value and for the benefit of nature in its own right (Norton, 2000). In this philosophical sense, responsibility is not bound to limiting actions in relation to someone else's right. Rather, it implies that biodiversity should be protected for reasons beyond subjective rights. In practice, however, the responsibility to protect biodiversity is the operationalization of people's rights to clean environment, stated in constitutions, and implemented by authorities and courts, or through enforcing social norms in societal discussion (Boyd, 2011). Holding individuals or companies accountable for breaching against environmental rights, sustainability or biodiversity conservation in a legally binding manner faces challenges (Giorgetta, 2002; Shelton, 2006). Yet, the definition of environmental rights has led to clearer responsibilities of public and private sector actors (Boyd, 2011). Depending on the national governance system, the emphasis on public and private sector actors' responsibilities varies but a general tendency of shrinking administrative responsibility and increasing emphasis on liability and accountability can be observed (Pellizzoni, 2004; Boyd, 2011).

Corresponding with the establishment of environmental rights resulting in responsibilities, also property rights are coupled with responsibilities, either through obligations to refrain from some activity, or through management responsibilities (Demsetz, 1964; Schlager and Ostrom, 1992). In other words, those actors who have a management right hold the responsibility to manage as well.

In the analysis of offsetting-related responsibilities, the focus is largely on the interface between the authorities setting the rules for the compensation mechanism and the developers needing to compensate (Salzman and Ruhl, 2000; Martin et al., 2016; Table 2). The formalization of the developers' responsibilities is regularly assumed to take place via the mitigation hierarchy that explicates the duties of developers prior to the consideration of offsetting, including avoidance and mitigating activities on site (McKenney and Kiesecker, 2010; Bull et al., 2013; Arlidge et al., 2018; Wende et al., 2018). The mitigation hierarchy places the responsibility to avoid and mitigate biodiversity degradation on the compensating actor and, once the precautionary activities of integrated management and care have been fully completed, the degrading actor carries the final responsibility over the degradation by offsetting all remaining loss. In this sense, the responsibility is with the developer, even if the developer is a public sector actor. Despite the focus on developer responsibilities, the mechanism needs to accurately define also the offset providing landowners' and authorities' responsibilities (Salzman and Ruhl, 2000; Wissel and Wätzold, 2010; Coggan et al., 2013b; Mann and Absher, 2014; Whitten,

2017). The responsibility extends also to carrying the financial risk and risk of inadequate conservation outcomes although this is not always explicated (Coggan et al., 2013b).

The analysis of responsibilities in offsetting is hampered by the complex connections between different rule systems (Boisvert, 2015). For example, budgetary and state aid rules are connected to competition rules, the compliance with which tends to override the consideration of environmental rules that are expressed more as principles (Raitanen et al., 2013). At the same time, market rules set strict responsibilities on companies, and could constitute the basis of clarifying the compensating companies' responsibilities alongside and beyond the mitigation hierarchy. Furthermore, the definitions of conservation responsibilities evolve also in practice, as a new mechanism is designed, piloted and implemented, and this evolution is shaped by the informal norms about conservation held by different actors (Primmer et al., 2013).

3.3. Actors' expectations for changes in rights and responsibilities

Because rights and responsibilities have received fairly limited attention in offsetting literature, it is helpful to consider the expectations and benefits that have been documented or that can be inferred from literature, as they point to rights and responsibilities indirectly. As described in the introduction, the expected benefits of ecological compensations and offsets center on additional or alternative forms of conservation as well as new business opportunities and reputational benefits for developers. Clearly, the developers will expect to get a permit and a formal license to operate (Salzman and Ruhl, 2000; Wissel and Wätzold, 2010; Table 2), but the expectations are that those meeting standards would also go beyond the minimum and “over-comply”, to get stakeholder acceptance and a social license to operate (ten Kate et al., 2004; Madsen et al., 2010; Boiral and Heras-Sazarbitoria, 2017). More analytically and technically, the expectations relate to policy and administration increasingly relying on science-based evidence (Moilanen et al., 2009; Quétiér and Lavorel, 2011), and the society gaining in overall efficiency in conservation and resource allocation (Wissel and Wätzold, 2010; Kroeger, 2013; Boisvert, 2015).

While global level considerations of the application of compensation ideas exist (Arlidge et al., 2018), further down the value chain considerations involving also consumers are still missing. This signals that the awareness or excitement about these mechanisms has not spread to the public or the market. At the same time, conservation in general is a popular societal concern and has entered corporate responsibility reporting (WBCSD, 2010; Houdet et al., 2012; Cardinale et al., 2012). Growing environmental awareness is expected to result in external pressures on reputation and thus, create incentives for businesses to act (Boiral, 2016). In addition to reaping the reputational benefits, the frontrunner companies going green might have other first-mover advantages in the face of new regulations (Porter and Van der Linde, 1995; ICMM, 2006; Liang et al., 2016). More specific benefits regarding the reputational and business advantages that may follow biodiversity offsetting and which various developers have recognized in their Corporate Social Responsibility (CSR) programs, include: ethical concerns and exemplifying corporate good practices; improving relationship with stakeholders; seizing economic opportunities and complying with legal or non-regulatory requirements (Boiral and Heras-Sazarbitoria, 2017).

In the operational environment, both buyers and sellers clearly expect predictability and good governance of the investment they commit to through offsetting or providing offsets (Wissel and Wätzold, 2010; Whitten, 2017). For example, developers may seek improved access to capital; lower their costs of compliance or transfer liability to another entity (Salzman and Ruhl, 2000; ten Kate et al., 2004). Certain sectors, such as the extractive industry, which depends on good local relationships, have shown more interest in the mechanism, parallel to increasing regulatory requirements for offsets (Boiral and Heras-

Sazarbitoria, 2017; IUCN, 2017). Stakeholders in general expect the offsetting mechanism to be ambitious and well managed, to meet the expectations laid out (Martin et al., 2016).

4. Empirical findings from workshops in an emerging ecological compensation and biodiversity offsetting

The arguments in the workshops portrayed the novelty of the ecological compensations and biodiversity offsets for Finnish biodiversity governance. Offsets were not on the formal policy agenda, other than through European Union regulation (Leino, 2015; Similä et al., 2017). Hence, the discussions in the stakeholder workshops were mainly focused on expressing and evaluating tentative ideas for guidance for the development of a compensation and offsetting mechanism. Some practical examples from companies that had been involved in small-scale voluntary compensations were brought up, but no direct conclusions on a general framework for compensations in Finland could be made from these exemplary experiences.

The workshop participants brought up both positive expectations and reservations. They framed ecological compensations and offsets as an opportunity to improve biodiversity conservation and its effectiveness (Table 3). Also the opportunity to deepen private sector participation in conservation was highlighted, putting emphasis on broader engagement and increased resources to conservation. Business representatives stated that they wished that compensations would give them the opportunity to demonstrate that combining conservation with economic activities was possible, and conservation-minded landowners were expected to access new income sources. At the same time, the participants clearly stated that compensations should only be considered as one instrument among many other conservation instruments, rather than a substitute to traditional government driven conservation. Also the importance of the entire mitigation hierarchy was highlighted. The concerns brought up included the establishment of the mechanism resulting in cuts from the existing government funding commitments to conservation, and compensations becoming a “license to trash” for developers.

The rights and responsibilities that were brought up in the workshops usually reflected the expectations that actors had either for the entire mechanism or for a specific feature of it (Table 3). The March workshops that had a wider representation of participants triggered more governance oriented arguments expressing responsibilities, while the May workshops discussing role-division generated more arguments on rights. Indeed, in the smaller and more focused workshops with also relatively more private sector actors, interests were expressed in more detail and with more nuance.

In general, the participants were keener to assign responsibilities and express expectations toward other actors and ensure rights for themselves, than to take responsibility or give rights to other actors. As a clear example, the May workshops with dominantly business and consultant participants identified a number of expectations regarding responsibilities for the administration and a possible broker or intermediary type actor, while highlighting the rights of business and offset buyers. There were only few very general mentions on what the rights of the intermediary might be (Table 3), possibly signalling the hypothetical nature of these types of actors but consultants seemed to expect new opportunities to operate as experts in assessment and mediation. This also reflected the tendency of participants to bring up the rights of their own organization type. Additionally, opportunities to conduct support and management activities were identified by actors familiar with nature and game management.

Rights were often described by implicit references to responsibilities of other actors, for example business actors would often express their right to clear principles and guidance, or their compensation efforts being verified by an outside impartial organization (Table 3), thus implying that someone, a legislator or intermediary, would have the responsibility to provide the standard as well as assessment and

Table 3

Expectations on rights and responsibilities placed on different actor types, brought up by Finnish stakeholder participants in the two sets of workshops.

Actor type	Expectations	Rights	Responsibilities
Developer / compensator / offset buyer	<ul style="list-style-type: none"> • Biodiversity to lay the basis for sustainable business • Ecological compensation to increase business opportunities • Offsetting to help with bottlenecks in permit processes • Offsetting to work on a voluntary basis, without rigid authority –driven processes • To bring new funding to conservation • To offer a gateway for non-governmental actors to join negotiations on conservation • Companies to channel their willingness to pay 	<ul style="list-style-type: none"> • To benefit from compensation • To compete with good reputation • The costs to be predictable • Security for investment, through clear verification and monitoring • Legal security and equal treatment by the authorities 	<ul style="list-style-type: none"> • To carry responsibility over biodiversity loss • To secure effectiveness with a legal responsibility • To extend the influence of compensation onto companies' activities, rather than just specific projects • To compensate biodiversity loss in urban areas as well • To go beyond just meeting the standards
Land-owner offset provider / seller	<ul style="list-style-type: none"> • Land-owners to realize their interest in nature management • To welcome new incentives • To have access to new income 	<ul style="list-style-type: none"> • To provide offsets (on small sites) • To generate income 	<ul style="list-style-type: none"> • To carry out restoration and management • To conserve biodiversity outside protected areas • Also state as a land-owner to provide offsets
Authority / administration	<ul style="list-style-type: none"> • Offsetting to make the permit processes smoother • Measuring to be systematic and reliable • Mitigation hierarchy to be in full use, and compensation only on residual impacts • To recognize those sites that have nature values but are not endangered • To get compensation going through piloting, rather than just wait 	<ul style="list-style-type: none"> • To set the criteria for compensation and offsetting • To verify the compensation mechanisms • To access an overhead of compensation to cover the costs of planning and monitoring 	<ul style="list-style-type: none"> • To require compensation in environmental impact assessments • To set clear procedures for compensation and offsetting, and provide guidelines • To run the permit process fast and smooth • To apply the same criteria for all, and be equal and fair • To require compensation only for residual impact
Knowledge intermediary, trader/broker	<ul style="list-style-type: none"> • To function as a facilitator between buyers and providers 	<ul style="list-style-type: none"> • To generate added value on nature values • Pilot and share experiences 	<ul style="list-style-type: none"> • To have sufficient expertise to act as a broker • To act as an impartial broker • To carry out verification, as a consultant • To carry the responsibility over compensations and their failure, as a bank • To secure compensations in the long-term, as a foundation
Citizens, society at large	<ul style="list-style-type: none"> • To allow consumers to show new behaviors 	<ul style="list-style-type: none"> • To have impacts compensated nearby • To recreate in offsets • To gain rural income 	<ul style="list-style-type: none"> • To carry the cost of conservation as consumers and a part of the entire society

monitoring services. This can also be interpreted as a right for the administration – or the intermediary – to construct the rules and regulations according to which compensations would be applied. It could also imply the right of exclusion extending to the authorities, by specifying habitats or activities that cannot be compensated.

The question of how a new compensation mechanism would be funded was brought up repeatedly especially in the first workshops. In many arguments, the ideal was framed as a polluter pays model in which any developer that destroys habitats through its activities, would be responsible for the cost of compensation, and also contribute to the setup and running costs of the entire mechanism. In exchange, they would gain the right to go forward with the development. Examples included mining and construction businesses, or a city. Taxes or other public funding mechanisms in which the society would be responsible for covering the costs were framed as less favourable options and unlikely in the current economic situation. Yet, the risk of compensation costs eventually falling onto the society was also recognised by the participants. Land-owners were seen as beneficiaries of the system, being able to generate income with conservation and possibly with restoration work. Indirectly, through many references of conservation extending to managed areas and complementing protected area networks, landowners were assumed to give up the use of the restored sites, at least partly. The discussion touched upon the small size of the valuable patches that could serve as offsets, highlighting that also (collections of) small sites should be accepted and possibly indicating a need for collecting several land-owners to provide the required amount of offsets.

Citizens were mentioned as stakeholders for the social license of

development projects. According to the experience of those who had participated in compensations as a part of a permit process, local people had expected the offsets to take place close by the development sites. Recreational use, new rural employment opportunities and even the possibility of reviving rural areas were mentioned as rights and benefits for citizens and society. Citizens were not directly considered to have responsibilities in relation to ecological compensations. There was an indirect mention that the entire value chain and the entire society were responsible for biodiversity degradation and could therefore be expected to carry some responsibility over conservation. Integrating an assessment of social factors into a compensation mechanism was considered challenging, but necessary for securing the reputational benefits for the developers.

The workshop participants assigned the responsibility of creating the basis for ensuring ecological equivalence, to be applied in monitoring and evaluation, to research, administration and the possible intermediary (Table 3). Risks were also suggested to be carried by the intermediary, in particular if it was to function as a bank.

In general, the arguments made in the workshops portrayed an air of novelty. With new actors suggested, new opportunities for collaboration and new role division, there was a spirit of innovation and visioning. The institutional aspects brought up by the participants reflected the open setup with no mechanism in use or in the pipeline. Arguments for stronger or clearer legal responsibility indicated an expectation that there would be new regulation or at least new ways of interpreting the existing regulation with requirements for developers (Table 3). These would likely be applied in the existing permit processes. New regulation with obligations for land-owners was not

brought up. On the contrary, according to the participants, land-owners would only benefit from the opening demand for offsets as a new source of income. References to standards and verification pointed toward more contractual or banking type mechanisms.

5. Discussion

The combination of review of theoretical and offset specific literature and an empirical case of an emerging compensation and biodiversity offset scheme allows us to make pertinent observations on how rights and responsibilities are addressed. The two inquiries show some blind spots and some notions that appear to hold across analyses and envisioned practice. Some notions in literature are not backed by the observations in the Finnish case.

The literature on current and future citizen's environmental rights – and the institutions securing these rights, clearly reports an increasing institutionalization of rights to nature and biodiversity but acknowledges the relatively weaker position of these rights as compared to property rights (Boyd, 2011). Although compensation and biodiversity offsetting strengthen people's rights to nature (Salzman and Ruhl, 2000), this kind of equity concerns have not been central in the design of compensation mechanisms (Ruhl and Salzman, 2006; Sullivan and Hannis, 2015; Bidaud et al., 2018). Rather, the attention is focused on ecological assessment, and ethical notions. The emerging Finnish mechanism shows that citizens generally are not a central player in offsetting but within the Finnish open-access (so-called everyman's right) setting, the consideration of recreational benefits would be important. For individual companies, legitimacy among locals appears to be an important bottleneck for development, and seeking social license to operate is one main motivator to engage in compensation, as has been recognized also in the literature (Boiral and Heras-Saizarbitoria, 2017). Interestingly, the Finnish stakeholder workshops also produced an idea of consumers driving offsetting, or even the society at large being responsible for biodiversity loss, making the point that the entire value chain should experience the increased cost of development, and hence participate in offsetting.

The rights of developers as offset buyers are clearly most pertinent in literature, possibly as a motivator for the entire mechanism (ten Kate et al., 2004; Wende et al., 2018), and possibly because the rights of authorities and also the property rights of land-owners are assumed to build on existing governance arrangements. Yet also the rights of authorities and offset suppliers are clearly reassigned with the introduction of an offset mechanism (Salzman and Ruhl, 2000; Boisvert, 2015). Literature assigns general governance rights on authorities, and expects more stringent interpretation and use of these rights (McKenney and Kiesecker, 2010; Bull et al., 2013, 2017; Wende et al., 2018). Both in the literature and in the Finnish case, a secure and predictable operational environment appears foremost to be the right of developers entering compensations. The forerunning actors entering the discussions on a new mechanism in Finland claim the right to benefit from their responsible approach, and a level playing-field. The tendency to focus on developer rights in literature shows that the neo-liberal ideology claimed to be used to advocate the mechanism has some grounding (Spash, 2015; Boisvert, 2015; Apostolopoulou and Adams, 2017), and that this signals developers possibly having a stronger hold over authorities and government institutions than what these actors would formally state (McKenney and Kiesecker, 2010; Martin et al., 2016). Our empirical case making use of two types of workshops shows that business actors' rights are brought up but in a more targeted fashion than authorities' rights; enclosed in-depth discussions triggered developer-rights arguments more than open-invitation based workshops.

The rights of land-owners as offset providers are not defined in

literature, other than when the developer is the property owner (Boisvert, 2015). Yet, clarity about offset providers' rights is deemed important (Wissel and Wätzold, 2010; Coggan et al., 2013b). As suppliers of offsets, land-owners give up use and management rights (Whitten, 2017), but most of the literature simply expects offsets to emerge, once the demand exists, and likely the land-owners therefore being in a strong position. In settings where property rights are weak, offsetting appears to further restrict people's rights to land (Bidaud et al., 2018). Among the Finnish stakeholders participating in our workshop, the argumentation about offset supplier rights was also vague, simply assuming landowners to benefit through new income streams, hoping the mechanism aligns with possible conservation motivations among landowners. This limited attention to landowner rights is not in line with the experience from earlier biodiversity conservation innovations in Finland, which has placed a significant weight on land-owner rights; entire instruments are framed as regards whether they restrict or secure these rights (Primmer et al., 2013).

Although compensation and biodiversity offsets are framed as market-based or market-like instruments, assigning new responsibilities onto developers, their establishment and evaluation puts much emphasis on the responsibilities of the governing authorities (van Teeffelen et al., 2014). This can be a typical position relative to emerging mechanisms, as the Finnish case illustrates with numerous responsibilities suggested for authorities. It is possible that some of the stakeholders are strategic in their arguments and push for a stringently regulated system, as a negotiation tactic, securing at least some level of regulatory ambition, while others might be suggesting voluntary actions simply to put this on the agenda. As piloting is explicitly proposed, some of the discussion draws toward starting with voluntary activities. In line with the observations from literature, also the critical evaluations of existing mechanisms, suggest strengthening the governing responsibilities of the administration (McKenney and Kiesecker, 2010; Maron et al., 2012; Bull et al., 2017). In the Finnish case, possible intermediary or broker organizations drawing on scientific and practical knowledge are suggested to potentially carry some of these responsibilities. Although intermediaries have been studied empirically (Coggan et al., 2013b), it appears that the literature is not consolidated about the types of actors who hold these roles. In Finland the intermediary role is envisioned mostly as a third-party actor verifying, brokering, and guaranteeing the functioning of the offsets, even though such an actor does not exist.

Indeed, the Finnish case of an emerging compensation and offsetting mechanism shows the diversity of institutional forms that a new mechanism can take, which is apparent also in the literature. The arguments clearly lay out a need for an authority driven process that sets the basic rules and principles but this process is more accurate about the relationship between the authority and the developer than the authority and landowners or the potential intermediary (Fig. 1). A second alternative development that some of the arguments speak for, would be a mechanism developed and run by a habitat bank like intermediary, which would have the capacity to buffer against risks and failures. Our analysis signals that also this actor is more clearly positioned relative to the developer than the land-owner. The third alternative institutional form could be a voluntary contracting mechanism, in which negotiations and trading with offsets happens between the developers as buyers and the land-owners as sellers. This alternative would benefit from verified procedures set up by the authorities or run by the intermediaries. Finally, in particular the literature on environmental rights and the industry experience on local legitimacy playing a crucial role in allowing development, some kind of a loose social license arrangement might kick off offsetting. However, although our analysis shows that active citizens or consumers might play a role, it reveals little about the connection between citizens and offset suppliers and buyers.

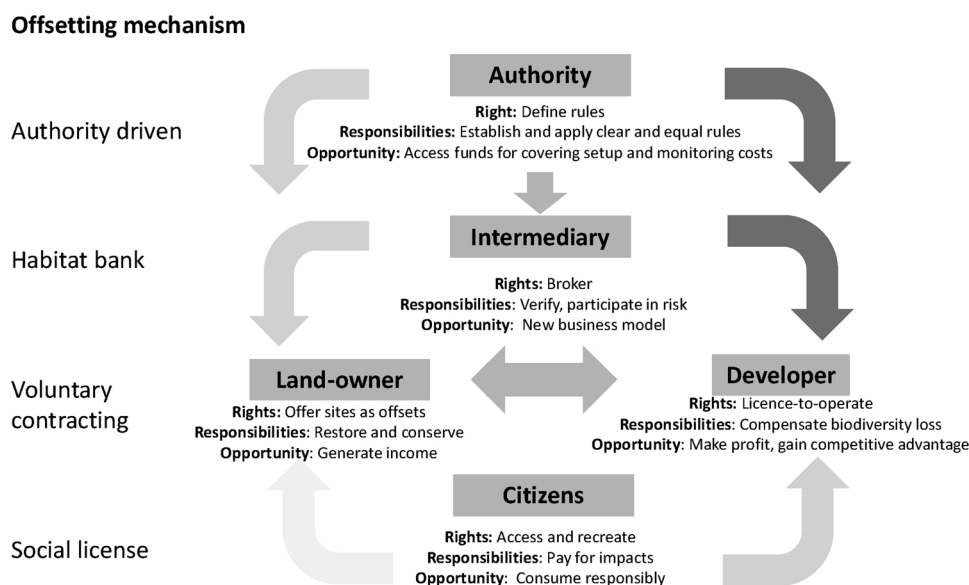


Fig. 1. Possible institutional arrangements for an offsetting mechanism. The arrows point the expectations for taking on responsibility (securing rights) by one actor type over another. The darkness of the arrows signals the literature and case-based evidence for these expectations.

6. Conclusion

Offsets for compensating biodiversity loss are increasingly suggested as a system for allocating responsibilities onto those actors who contribute to biodiversity degradation. Our analysis reveals that although developing a new conservation mechanism is about reassigning rights and responsibilities, there is little systematic analysis to draw on. Based on theory-driven notions and review of offsetting literature, we find that rights to conservation, property and economic activity have generally not been explicitly addressed in parallel, and that the focus has been evaluating biodiversity loss through ecological assessment or as an ethical notion. Offsetting literature focuses on developer rights to a predictable operational environment rather than on human rights to biodiversity or the property rights of offset suppliers.

Although offsets are framed as a market-based instrument, our analysis shows that much of the expectations are about a predictable operating environment for developers, provided by the public sector. This is apparent in the literature on offsets analyzing the responsibilities over management, avoiding degradation and meeting societal expectations, which places much emphasis on governance and control by authorities, mostly doubting or criticizing the capacity of governance arrangements to secure the reaching of the set targets. The Finnish empirical case repeats the expectation for authorities to take the responsibility for the reliability of the mechanism, suggesting also a possible central role for an intermediary organization. Indeed, the coordinating roles, which come with rule setting and management rights, open different avenues for operationalizing the institutional arrangement of the offsetting mechanism.

An emerging mechanism can take the form of an authority driven formal conservation and development permit system, a habitat bank type intermediary coordinated system, an evolving and iteratively developing contract arrangement, or even be a less organized, through citizen and consumer driven social license to operate. The Finnish case shows that at an early stage of an emerging mechanism, innovation and excitement coincide with shying from responsibility. Indeed, the establishment of a new biodiversity conservation instrument would require collective effort and commitment, and actors taking responsibility themselves.

It is curious that much of the analytical attention focuses on determining biodiversity losses and gains, without explicit consideration of who are the losers and winners. With empirical analysis missing,

many ideas about rights and responsibilities are based on assumptions. Our study shows that these assumptions need to be exposed to systematic analysis. Indeed, there would be room for empirical analysis of the experiences of the actors participating in compensations and their perceptions of losses and gains, in contexts where experience has already started to accumulate. Our framework would offer a starting point for such analyses.

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References

- Apostolopoulou, E., Adams, W.M., 2017. Biodiversity offsetting and conservation: re-framing nature to save it. *Oryx* 51 (1), 23–31.
- Arlidge, W.N., Bull, J.W., Addison, P.F., Burgass, M.J., Gianuca, D., Gorham, T.M., Jacob, C., Shumway, N., Sinclair, S.P., Watson, J.E.M., Wilcox, C., Milner-Gulland, E.J., 2018. A global mitigation hierarchy for nature conservation. *BioScience* 68 (5), 336–347.
- Bidaud, C., Schreckenbach, K., Jones, J.P., 2018. The local costs of biodiversity offsets: comparing standards, policy and practice. *Land. Use Policy* 77, 43–50.
- Boiral, O., 2016. Accounting for the unaccountable: biodiversity reporting and impression management. *J. Bus. Ethics* 135 (4), 751–768.
- Boiral, O., Heras-Saizarbitoria, I., 2017. Corporate commitment to biodiversity in mining and forestry: identifying drivers from GRI reports. *J. Clean. Prod.* 162, 153–161.
- Boisvert, V., 2015. Conservation banking mechanisms and the economization of nature: an institutional analysis. *Ecosyst. Serv.* 15, 134–142.
- Bosselmann, K., 2001. Human rights and the environment: redefining fundamental principles? *Governing for the Environment*. Palgrave Macmillan, London, pp. 118–134.
- Boyd, D.R., 2011. *The Environmental Rights Revolution: a Global Study of Constitutions, Human Rights, and the Environment*. UBC Press.
- Bull, J.W., Suttle, K.B., Gordon, A., Singh, N.J., Milner-Gulland, E.J., 2013. Biodiversity offsets in theory and practice. *Oryx* 47 (3), 369–380.
- Bull, J.W., Lloyd, S.P., Strange, N., 2017. Implementation gap between the theory and practice of biodiversity offset multipliers. *Conserv. Lett.* 10 (6), 656–669.
- Burgin, S., 2008. BioBanking: an environmental scientist's view of the role of biodiversity banking offsets in conservation. *Biodivers. Conserv.* 17 (4), 807–816.
- Cardinale, B.J., Duffy, J.E., Gonzalez, A., Hooper, D.U., Perrings, C., Venail, P., Narwani,

- A., Mace, G.M., Tilman, D.D., Wardle, D.A., Kinzig, A.P., Daily, G.C., Loreau, M., Grace, J.B., Larigauderie, A., Srivastava, D.S., Naem, S., 2012. Biodiversity loss and its impact on humanity. *Nature* 486, 56–67. <https://doi.org/10.1038/nature11148>.
- Coggan, A., Buitelaar, E., Whitten, S., Bennett, J., 2013a. Factors that influence transaction costs in development offsets: who bears what and why? *Ecol. Econ.* 88, 222–231.
- Coggan, A., Buitelaar, E., Whitten, S.M., Bennett, J., 2013b. Intermediaries in environmental offset markets: actions and incentives. *Land Use Policy* 32 (1), 145–154.
- Coralie, C., Guillaume, O., Claude, N., 2015. Tracking the origins and development of biodiversity offsetting in academic research and its implications for conservation: a review. *Biol. Conserv.* 192, 492–503.
- Cullet, P., 1995. Definition of an environmental right in a human rights context. *Neth. Q. Hum. Rights* 13 (1), 25–40.
- Curran, M., Hellweg, S., Beck, J., 2014. Is there any empirical support for biodiversity offset policy? *Ecol. Appl.* 24 (4), 617–632. <https://doi.org/10.1890/13-0243.1>.
- Demsetz, H., 1964. The Exchange and enforcement of property rights. *J. Law Econ.* 7, 11–26.
- EC, 2011. Our Life Insurance, Our Natural Capital: an EU Biodiversity Strategy to 2020. Communication from the European Commission to the European Parliament. The Council, The European Economic and Social Committee and the Committee of the Regions, Brussels 3.5.2011COM(2011) 244 final.
- Giorgetta, S., 2002. The right to a healthy environment, human rights and sustainable development. *Int. Environ. Agreements* 2 (2), 171–192.
- Grinlinton, D., Taylor, P. (Eds.), 2011. *Property Rights and Sustainability: the Evolution of Property Rights to Meet Ecological Challenges*, vol. 11. Martinus Nijhoff Publishers.
- Houdet, J., Trommter, M., Weber, J., 2012. Understanding changes in business strategies regarding biodiversity and ecosystem services. *Ecol. Econ.* 73, 37–46.
- ICMM, 2006. Good Practice Guidance for Mining and Biodiversity. International Council on Mining and Metals 0-9549954-8-1.
- IUCN, 2017. Understanding Government Biodiversity Offset Policies in the Mining Sector. Summary of Preliminary Analysis. Available at: 1.6.2018. https://www.iucn.org/sites/dev/files/content/documents/understanding_government_biodiversity_offset_policies_in_the_mining_sector_november_2017.pdf.
- Kroeger, T., 2013. The quest for the optimal payment for environmental services program: ambition meets reality, with useful lessons. *For. Policy Econ.* 37, 65–74.
- Lapeyre, R., Froger, G., Hrabanski, M., 2015. Biodiversity offsets as market-based instruments for ecosystem services? From discourses to practices. *Ecosyst. Serv.* 15, 125–133.
- Leino, L., 2015. Korvaavat toimenpiteet pienialaisten luontokohteiden suojelusta poikettaessa. *Ympäristöjuridiikka* 9–34 1/2015 s.
- Liang, J., Crowther, T.W., Picard, N., Wiser, S., Zhou, M., Alberti, G., Schulze, E.D., Mcguire, A.D., Bozzato, F., Pretzsch, H., Paquette, A., Hérault, B., Scherer-lorenzen, M., Barrett, C.B., Glick, H.B., Hengeveld, G.M., Nabuurs, G.J., Pfautsch, S., Viana, H., Vibrans, A.C., Ammer, C., Schall, P., Verbyla, D., Tchebakova, N., Fischer, M., Watson, J.V., Chen, H.Y.H., Lei, X., Schelhaas, M.J., Lu, H., Gianelle, D., Parfenova, E.I., Salas, C., Lee, E., Lee, B., Kim, H.S., Bruelheide, H., Coomes, D.A., Piotto, D., Sunderland, T., Schmid, B., Gourlet-Fleury, S., Sonké, B., Tavani, R., Zhu, J., Brandl, S., Baraloto, C., Frizzera, L., Ba, R., Oleksyn, Peri, J., Gonmadje, P.L., C. Marthy, W., Brien, T.O., Martin, E.H., Marshall, A.R., Rovero, F., Bitariho, R., Niklaus, P.A., Alvarez-loayza, P., Chamuya, N., Valencia, R., Mortier, F., Wortel, V., Engone-Obiang, N.L., Ferreira, L.V., 2016. Positive biodiversity-productivity relationship predominant in global forests. *Science* 354 (6309) aaf8957.
- Madsen, B., Carroll, N., Moore Brands, K., 2010. State of Biodiversity Markets Report: Offset and Compensation Programs Worldwide. Available at: . <http://www.ecosystemmarketplace.com/documents/acrobat/sbdmr.pdf>.
- Mann, C., 2015. Strategies for sustainable policy design: constructive assessment of biodiversity offsets and banking. *Ecosyst. Serv.* 16, 266–274.
- Mann, C., Absher, J.D., 2014. Adjusting policy to institutional, cultural and biophysical context conditions: The case of conservation banking in California. *Land Use Policy* 36, 73–82.
- Maron, M., Hobbs, R.J., Moilanen, A., Matthews, J.W., Christie, K., Gardner, T.A., et al., 2012. Faustian bargains? Restoration realities in the context of biodiversity offset policies. *Biol. Conserv.* 155, 141–148.
- Martin, N., Evans, M., Rice, J., Lodia, S., Gibbons, P., 2016. Using offsets to mitigate environmental impacts of major projects: A stakeholder analysis. *J. Environ. Manage.* 179, 58–65.
- McKenney, B., Kiesecker, J., 2010. Policy development for biodiversity offsets: A review of offset frameworks. *Environ. Manage.* 45 (1), 165–176.
- Moilanen, A., Kotiaho, J.S., 2017. Ekologisen Kompensaation Määrittämisen Tärkeät Operatiiviset Päätökset. Suomen Ympäristö 5/2017. Available at: Ympäristöministeriö, pp. 58. <http://julkaisut.valtioneuvosto.fi/handle/10024/160211>.
- Moilanen, A., van Teeffelen, A., Ben-Haim, Y., Ferrier, S., 2009. How much compensation is enough? Explicit incorporation of uncertainty and time discounting when calculating offset ratios for impacted habitat. *Restor. Ecol.* 17, 470–478.
- Moreno-Mateos, D., Maris, V., Béchet, A., Curran, M., 2015. The true loss caused by biodiversity offsets. *Biol. Conserv.* 192, 552–559.
- Norton, B.G., 2000. Biodiversity and environmental values: in search of a universal earth ethic. *Biodivers. Conserv.* 9 (8), 1029–1044.
- Pellizzoni, L., 2004. Responsibility and environmental governance. *Environmental Politics* 13 (3), 541–565.
- Porter, M.E., Van der Linde, C., 1995. Toward a new conception of the environment-competitiveness relationship. *J. Econ. Persp.* 9 (4), 97–118.
- Primmer, E., Paloniemi, R., Similä, J., Barton, D.N., 2013. Evolution in Finland's forest biodiversity conservation payments and the institutional constraints on establishing new policy. *Soc. Nat. Resour.* 26 (10), 1137–1154. <https://doi.org/10.1080/08941920.2013.820814>.
- Primmer, E., Similä, J., Salokannel, V., Raitanen, E., 2017. Habitaattipankkiin Liittyvä Säätely Ja Toimintamalli Selvitys. 27.2.2017. Available at: <http://www.ym.fi/download/noname/%7BE8DC5E9F-1D8F-4FD2-BF5E-B87C4EF6BCDF%7D/125763>.
- Quétier, F., Lavorel, S., 2011. Assessing ecological equivalence in biodiversity offset schemes: key issues and solutions. *Biol. Conserv.* 144 (12), 2991–2999.
- Raitanen, E., Similä, J., Siikavirta, K., Primmer, E., 2013. Economic instruments for biodiversity and ecosystem service conservation & the EU State aid regulation. *Eur. Environ. Plan. Law* 10 (1), 6–28. <https://doi.org/10.1163/18760104-01001002>.
- Richerzhagen, C., 2011. Effective governance of access and benefit-sharing under the convention on biological diversity. *Biodivers. Conserv.* 20 (10), 2243–2261.
- Ruhl, J.B., Salzman, J., 2006. The effects of wetland mitigation banking on people. *Wetlands Newsl.* 28 (2) Published by the Environmental Law Institute. Pages 1 and 8-13.
- Salzman, J., Ruhl, J.B., 2000. Currencies and the commodification of environmental law. *Stanford Law Rev.* 607–694.
- Schlager, E., Ostrom, E., 1992. Property-rights regimes and natural resources: a conceptual analysis. *Land Econ.* 249–262.
- Schroeder, H., McDermott, C., 2014. Beyond carbon: enabling justice and equity in REDD + across levels of governance. *Ecol. Soc.* 19 (1).
- Shelton, D., 2006. Human rights and the environment: what specific environmental rights have been recognized? *Denver J. Int. Law Policy* 35, 129–172.
- Silverman, D., 2001. *Interpreting Qualitative Data: Methods for Analysing Talk, Text and Interaction*. Sage, London 2001.
- Similä, J., Primmer, E., Salokannel, V., 2017. Luonnonarvoja korvaavat toimenpiteet, markkinat ja säätely. *Oikeus* 46 (4), 416–441.
- Spash, C.L., 2015. Bulldozing biodiversity: The economics of offsets and trading-in nature. *Biol. Conserv.* 192, 541–551.
- Sullivan, S., Hannis, M., 2015. Nets and frames, losses and gains: value struggles in engagements with biodiversity offsetting policy in England. *Ecosyst. Serv.* 1–12. <https://doi.org/10.1016/j.ecoser.2015.01.009>.
- Taylor, P.E., 1998. From environmental to ecological human rights: a new dynamic in international law? *Georget. Int. Environ. Law Rev.* 10 (2), 352–353 344.
- ten Kate, K., Bishop, J., Bayon, R., 2004. Biodiversity Offsets: Views, Experience, and the Business Case. IUCN, Gland, Switzerland.
- UNCBD, 2010. Strategic Plan for Biodiversity and Aichi Biodiversity Targets. Decision X/2 (2010). <https://www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.pdf>.
- van Teeffelen, A.J., Opdam, P., Wätzold, F., Hartig, F., Johst, K., Drechsler, M., Vos, C.C., Wissel, S., Quétier, F., 2014. Ecological and economic conditions and associated institutional challenges for conservation banking in dynamic landscapes. *Landscape Urban Plan.* 130, 64–72.
- WBCSD, 2010. Effective Biodiversity and Ecosystem Policy and Regulation: Business Input to the COP10 of the 'Convention on Biological Diversity'. World Business Council for Sustainable Development.
- Wende, W., Tucker, G.M., Quétier, F., Rayment, M., Darbi, M. (Eds.), 2018. *Biodiversity Offsets: European Perspectives on No Net Loss of Biodiversity and Ecosystem Services*. Springer.
- Whitten, S.M., 2017. Designing and implementing conservation tender metrics: twelve core considerations. *Land Use Policy* 63, 561–571.
- Wissel, S., Wätzold, F., 2010. A conceptual analysis of the application of tradable permits to biodiversity conservation. *Conserv. Biol.* 24 (2), 404–411.