Ecosystem Services 15 (2015) 143–151

Contents lists available at ScienceDirect

Ecosystem Services

journal homepage: www.elsevier.com/locate/ecoser

The biodiversity offsets as market-based instruments in global governance: Origins, success and controversies

Marie Hrabanski *

UMR ARTDEV, CIRAD, France

ARTICLE INFO

Article history:
Received 10 June 2014
Received in revised form
18 November 2014
Accepted 10 December 2014
Available online 16 January 2015

Keywords:
Biodiversity offset
Market-based instrument
Policy entrepreneurs
Policy transfer
Global governance

ABSTRACT

The recent surge in the popularity of biodiversity offsets is particularly interesting since the idea of compensation with respect to biodiversity can be traced as far back as the 1970s in Europe and the United States, as part of the Ramsar Convention (1972), which recommended compensation for damage to biodiversity. The view of compensation has nevertheless evolved since the turn of the century, and new programs of biodiversity compensation have developed through a mechanism called "biodiversity offsets". Compensation mechanisms have thus undergone a 'renovation' on both the international and national environmental policy scenes. In this article, we use the term 'renovation' to represent the active modification and adaptation of existing mechanisms as market-based instruments to facilitate their implementation in different contexts. What is the origin of this renovation? How has it been disseminated? And what actors have precipitated it? We put forward the hypothesis that this renovation could be explained by the convergence between old national dynamics focused on the original definition of compensation mechanisms and more recent transnational dynamics that follow the 1990s appearance of dialog centered on the "market-based instrument" concept.

1. Introduction

At both the international and national scales, since the 1990s, the international environmental community has been increasingly interested in market-based instruments (MBIs) as mechanisms for environmental progress (OECD, 1993, 1995, 1997). MBI development occurred later in the biodiversity sector (OECD, 1996,1999,2001, 2003,2004), but the advent of the ecosystem service concept in the Millennium Ecosystem Assessment (MA) in 2005 highlighted the economic value of biodiversity and the value of ecosystem services. MA encouraged, in this way, the introduction of market mechanisms in biodiversity sector (Pesche et al., 2013). Though there are no agreed definitions of "market based instruments" (Pirard, 2012, Karsenty and Ezzine de Blas, 2014) and several established list of their constituent elements (European Commission, 2011, Pirard, 2012, OECD, 2003, Sterner, 2003), proponents of MBIs assume that environmental problems are best conceptualized as externalities. In this way, payment for environmental services instruments became an emblematic market based instruments for ecosystem services (Gómez-Baggethun et al., 2010, Pesche et al., 2013) and few years later, 'biodiversity offsets' were also presented as instruments which rapidly became an indispensible policy solution to meet the challenges of maintaining biodiversity.

The recent surge in the popularity of biodiversity offsets is particularly interesting since the idea of compensation with respect to biodiversity can be traced as far back as the 1970s and as part of the Ramsar Convention (1972), which recommended compensation for damage to biodiversity. The compensation aspect was only considered as the final step in an environmental damage management process. The first steps were to prevent damage or, when unavoidable, to limit damage resulting from human interventions, 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 initiatives that could have an environmental impact. Compensation was achieved through action by the developers themselves or relegated to specialized third parties. However, these regulatory devices were non-binding and seldom applied. The view of compensation has nevertheless evolved since the turn of the century, and new programs of biodiversity compensation have been developed and called 'biodiversity offsets'. These mechanisms were immediately considered as market based instruments by national and international actors. However, MBIs constitute an extremely heterogeneous group that makes little sense from an economic theory perspective. These instruments do not share many characteristics and show a very loose relation to markets as defined by standard economic

* Tel.: +33 609515140; fax: +33 467614415.
E-mail address: Marie.hrabanski@cirad.fr

http://dx.doi.org/10.1016/j.ecoser.2014.12.010
2212-0416/

theory. MBIs as a category look more like an asylum country for all tools with a price component (Pirard, 2012, Boisvert et al., 2013). Despite this, the promoters of biodiversity offset (Hartig and Drechsler, 2009; Jenkins et al., 2004; Whitten et al., 2003) as 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 "Biodiversity Offsets" such as market based instruments. Furthermore, biodiversity offsets have often been defined as a unified umbrella category of market-based instruments under which different mechanisms, variously named by scholars, decision-makers and practitioners, e.g. compensatory mitigation, new kinds of in-kind compensation, mitigation banking, habitat banking, species banking, wetlands mitigation, etc., would fall. 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 compensation are most often theoretically grouped into one homogeneous category of policy instruments called 'biodiversity offsets', and defined as a particular MBI.

In this way, compensation mechanisms have thus undergone a 'renovation' on both the international and national environmental policy scenes. In this article, we use the term 'renovation' to represent the active modification and adaptation of existing mechanisms as market-based instruments to facilitate their implementation in different contexts. We address the following questions. What is the origin of this renovation? How has it been disseminated? And what actors have precipitated it? We put forward the hypothesis that this renovation could be explained by the convergence between old national dynamics focused on the original definition of compensation mechanisms and more recent transnational dynamics that follow the 1990s appearance of dialog centered on the MBI concept. At the interface between these flows of thought, compensation mechanisms evolved through this renovation process and emerged as MBIs or regulatory mechanisms, or as various hybrids. Beyond the type of instruments used, the article is based on a political analysis of the diffusion process of compensation mechanism renovation.

The first section presents the theoretical background on policy transfer to analyze the renovation and diffusion of 'compensation mechanisms' and some methodological elements. The second section deals with the origins of compensation mechanism renovation in the US and with some policy entrepreneurs who promoted compensation mechanisms renovation as market-based instruments at the international level. The last section analyses the success of compensation mechanisms in the scientific landscape and in global biodiversity governance and also the recent controversies on the use of biodiversity offsets.

2. Policy transfer to analyze the diffusion of biodiversity offsets as market-based instruments: some theoretical and methodological elements

The rise of globalization and centralized regional bodies led to a growing body of literature on policy transfer (Dolowitz and Marsh, 2012; Benson and Jordan, 2011; Dumoulin and Saurugger, 2010). According to Dolowitz and Marsh, policy transfer is a process by which: "knowledge about policies, administrative arrangements, institutions and ideas in one political setting (past or present) are used in development of policies, administrative arrangements, institutions and ideas in another political setting" (Dolowitz et al., 2000). Policy transfer studies are organized around six questions: Who Transfers Policy? Why Engage in Policy Transfer? What Elements of Policy are Transferred? Are There Different Degrees of Transfer? From where are Policies Transferred? What Factors Enable and Constrain Transfer? Concerning biodiversity conservation policies, compensation mechanisms have been subject of a worldwide diffusion process over the last decade and could be analyzed through the following question: who transfers compensation policy renovation? This question is just one of the set of questions in the transfer literature, which is why our article does not deal with elements which are transferred in different countries and with the factors which enable or constrain transfers. We decided to focus only on policy entrepreneurs who favored the diffusion of compensation renovation. To answer to the first 'Who transfers' question, policy transfer studies originally identified six types of actor that could potentially engage in transfer activities: 'elected officials; political parties; bureaucrats/civil servants; pressure groups; policy entrepreneurs/experts; and supra-national institutions'. The first four types had, they claimed, already been widely discussed, so they focused on the role of policy entrepreneurs, i.e. "public entrepreneurs who, from outside the formal government, introduce, translate and help implement new ideas into public practice" (Roberts and King, 1991). In this way, policy transfer studies place emphasis on actors that enable, facilitate or implement the transfer, as well as the reception of the transfer. PTS show that non-state actors aiming to impose, promote or facilitate the import–export of specific solutions can be supranational structures such as the European Union (EU), international organizations (international financial institutions, United Nations organizations), transnational enterprises (banks in particular), consultancy agencies, or non-governmental organizations (Evans, 2004). There are also collective less institutionalized actors, but which are structured in networks, such as epistemic communities (Haas, 1992), advocacy coalitions (Keck and Sikkink, 1998) or global public policy networks (Stone, 2008).

We used two different methods to identify these different kinds of actors. First, since 1996, we systematically collected and analyzed publications on compensation mechanisms, biodiversity offsets and mitigation banking published by global actors (Organisation for Economic Co-operation and Development (OECD), Convention on biological diversity (CBD), NGOs, etc.). We analyzed these publications through a large database based on the authors' names, year and title of the publication, and the use or not of a market-based approach. This constructivist and historical method allows identification of the genesis and renovation period of compensation mechanisms and the main organizations involved in the diffusion. Second, via this method, we interviewed some key individuals from these organizations, especially from OECD, Business and Biodiversity Offsets Program (BBOP), Forest Trends, The Nature Conservancy, ECOROPA, International Union for the nature conservation (IUCN), Friends of the Earth (FOE), World wildlife fund (WWF) and CBD. Two American and French government representatives were interviewed and two business representatives also accepted to be interviewed. Finally, more than 15 ecology, economics and law specialists were contacted. Through this empirical framework, we analyzed some policy entrepreneurs involved in the compensation mechanism renovation process.

3. Historical analysis of compensation mechanisms renovation: global dynamics in favor of MBIs and policy entrepreneurs

Historical analysis of compensation mechanism renovation primarily concerns the United States. We will show the connection between compensation mechanism renovation and the success of market-based instruments in US. Then, some policy entrepreneurs, and especially OECD and few years later, BBOP, subsequently promoted this trend in global arenas.

3.1. Compensation mechanisms renovation as market-based instruments in the US

In the early 1970s, environmental policy came to the forefront of American consciousness through a series of legislations (the Clean Air Act of 1970, the Federal Water Pollution Control Act of 1972, the Safe Drinking Water Act of 1974, the Toxic Substances Control Act of 1976, the Resource Conservation and Recovery Act of 1976,[1] etc.) based on mechanisms of command and control in response to environmental concerns. However, over the course of the 1980s, the Clean Air Act provisions appeared to be incapable of resolving sulfur dioxide pollution issues (acid rain) that worried both the government sectors and NGOs concerned about environmental protection (Méral, 2013). Responding to this ongoing apprehension, the conclusions of Project 88 and Stavins (1989) reports profoundly renewed interest in American environmental policy instruments largely by introducing market-based incentive concepts . Although these discussions were principally concerned about controlling air pollution, they still had a considerable influence on conservation policies in general, particularly on the transformation of compensation mechanisms.

Since the beginning of the 1990s, the United-States developed its conservation policy by reinforcing the regulatory framework, extending compensation mechanisms, and adding flexibility through mitigation banking. Mitigation banking is an American process where developers could compensate their environmental damages on wetlands (Weems and Canter, 1995), by purchasing biodiversity credits to intermediary entities in charge of realizing compensatory measure. The mitigation banking reached a peak in 1995 with the publication of the Federal Guidance for the Establishment, Use and Operation of Mitigation Banks (USA Corps). This guidance lays down the foundation of biodiversity banking such as the impact studies, the different steps of mitigation banks' implementation, the competent authorities, the monitoring, financial insurances, etc. The Environmental Protection Agency and the USA Corps have hugely contributed to spread the notion of mitigation banking and by this way the renovation of compensation mechanisms as market based instruments.

3.2. OECD, a strong supporter of market-based instruments for environment

By the end of the 1980s, interest in economic-oriented environmental instruments began to intensify. The 1984 OECD Conference on Environment and Economics framed recommendations that led to a 1985 ministerial declaration calling for a “more effective use of economic instruments in conjunction with regulations” (OECD, 1985). This declaration led to a systematic survey initiated in 1986–1987 (OECD, 1993; Opschoor and Vos, 1989) and updated in 1992–1993 (Opschoor et al., 1994). In these surveys, OECD identified more than a hundred instruments as MBIs in OECD countries, showing ample evidence of the success of the organization's efforts to promote the use of MBIs and discredit command and control approaches. The MBI concept was also promoted in the 1987 Bruntland report, and at the Rio Summit, which strongly encouraged the establishment of economic incentives to address environmental challenges, particularly with Principle 16 of the Rio Declaration in 1992 and Chapter 21 of Agenda 21.[2]

Compensation mechanisms were not behind the origins of the environmental MBI concept. Starting in the mid-1990s, OECD began to integrate the idea of diversified types of compensation mechanisms as it expanded its MBI concept to include biodiversity. This triggered a process that grouped forms of compensation based on mitigation banking with forms of regulatory indemnities used to establish protected environments in Europe to create a spectrum of market-oriented instruments that OECD would advocate as a means to protect biodiversity. OECD was clearly promoting environmental MBIs, and then the inclusion of biodiversity. Since the mid-2000s, ‘biodiversity offset’ has become one of the main tools promoted by OECD.

In the realm of international organizations, the biodiversity offsets concept appeared in 2005 at an OECD workshop on links between multilateral environmental agreements (MEAs) and private sector investment activities. As we showed, OECD has focused specifically on economic instruments and compensation mechanisms insofar as they relate to economic dimensions consistent with the organization's mission. OECD publications in 2008 and 2010 granted even more importance to compensation, as seen by at least 39 references to the term in its 2008 publication (OECD, 2008). Furthermore, at the end of the decade, OECD launched or participated in a number of working groups more or less directly concerning compensation issues. The head of the OECD department of water and biodiversity participated in the “No net loss” group of the European Commission (created in 2012 and guided by the Directorate-General for the Environment). The extent of OECD involvement shows that the compensation mechanisms promoted are systematically associated with economic instruments. More recently, during the seventh Trondheim Conference[3] on Biodiversity in May 2013, 330 experts from governments, international organizations, academia, civil society and the private sector participated and the conference focused on the first goal of the Strategic Plan for Biodiversity 2011–2020, adopted by the CBD Conference of the Parties (COP) and endorsed by several conventions, which addresses the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society. During the conference, Katia Karousakis (OECD) shared the results of an OECD study on “Scaling-up Finance Mechanisms for Biodiversity” and presented a systematic review of the scope, source, and principles of finance mechanisms for biodiversity. She highlighted particular challenges to each of the mechanisms, for example, the need for PES and biodiversity offset mechanisms to establish business as usual baselines and monitoring, verification, and reporting systems to support program evaluation. Furthermore, OECD representatives are involved in several working groups at the global level and at the European level to promote biodiversity banking, which corresponds to a market-based instrument.

[1] More precisely, the Clean Air Act of 1970 strengthened the Air Pollution Control Act of 1955 followed by the Clean Air Act de 1963. These two texts have above all facilitated the funding of studies on identifying and controlling atmospheric pollution. This 1970 Act led to the drawing up of a true environmental policy. But it is often acknowledged, principally regarding environmental policy, as being the first formal placement of emission standards.

[2] “National authorities should endeavor to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment (Principle 16)”.

[3] Since 1993, the Trondheim Conferences on Biodiversity have sought to enhance cross-sectoral dialog on biodiversity research and management, and to establish the best possible scientific basis for policy and management decisions in relation to the CBD implementation. The seventh Trondheim Conference was hosted by the Norwegian government in collaboration with the UN Environment Programme (UNEP), the Convention on Biological Diversity (CBD), the UN Food and Agriculture Organization (FAO), the UN Development Programme (UNDP) and the World Bank.

3.3. "Biodiversity offset" to promote compensation as a market-based instrument: the BBOP influence

The year 2004 was a turning point in compensation mechanism renovation. It was the year of the Ten Kate, Bishop and Bayon publication on biodiversity offsets (Ten Kate, Bishop, & Bayon, 2004), and in a large sense marked the beginnings of enthusiastic support for the idea of biodiversity offsets even though they remained somewhat unfocused and broadly defined as a concept.

As part of the growing international dynamics supporting compensation mechanism renovation, the Kerry ten Kate et al. 2004 publication contributed to the establishment of a non-governmental platform, the BBOP, the same year. BBOP describes itself as an international collaboration between NGOs, companies, financial institutions, and government agencies dedicated to developing efforts in favor of biodiversity offsets. Directed by Kerry ten Kate, BBOP is a satellite organization established by the NGO Forest Trends, which in turn was created in 1996 by Michael Jenkins, who was previously an economist at the World Bank in the environmental department. Forest Trends advocates market instruments in the biodiversity sector in general. In 2000, Forest Trends created a satellite organization, i.e. the Katoomba Group, which is an international network of heterogeneous actors (NGOs, private sector, national government agencies) aimed at providing expertise on biodiversity market instruments. The Katoomba Group initially focused on issues regarding payment for environmental services (PES), but later broaden its scope. In the framework of the Katoomba Group meetings in 2003, Kerry ten Kate gave a presentation entitled "Biodiversity offsets:Mileage, methods and (maybe) markets – in the seminar "Beyond carbon – emerging markets for ecosystem services" organized by Forest trends and the Katoomba group" . In this seminar, she championed the advantages of compensation mechanisms. As the title indicates, the presentation was inspired by carbon market mechanisms, with the suggestion of using them as examples and adapting them to biodiversity. In 2004, BBOP was created as a satellite of Forest Trends which, along with the Wildlife Conservation Society (WCS), werves as the Secretariat for the organization. In the years that followed, Forest Trends created additional satellite organizations (Ecosystem Marketplace in 2005 and Speciesbanking.com in 2008), with each one being specialized on certain aspects of biodiversity market instruments.

To date, BBOP is the only organization that pools companies, government agencies, financial institutions and NGOs with the goal of supporting two types of compensation: mandatory compensation in a national or supranational regulatory framework, and voluntary compensation, where decision makers choose to participate in compensation beyond their legal obligations. To achieve its goals, BBOP has to convince national governments and international actors on the need to renovate existing compensation mechanisms, while also boosting the awareness of private actors on the advantages of voluntary compensation mechanisms. BBOP organizes a general meeting annually between all BBOP members, and additional thematic meetings as they as required. They also solicit certain members to publicize mechanisms existing in one country which allows other members to benefit from the information gathered in the experiment. With the evaluation of these experiments, their weaknesses, strengths and the questions they raise, BBOP attempts to develop standards and regulations for what they consider defines a "good" biodiversity offset. Compared to 'compensatory measures', biodiversity offsets must comply with no net loss requirements and the 'avoid, reduce, compensate' principle. In this way, BBOP promotes all kinds of biodiversity offsets schemes (compensatory mitigation, biodiversity offsets, mitigation banking, habitat banking, species banking, wetlands mitigation, etc.) but strongly focus on biodiversity banking. Indeed, created as an innovative incentive, biodiversity banking generates a supply of biodiversity units by realizing compensatory measures before building owners' degradations. With the creation of a biodiversity unit supply, this economic instrument should theoretically enable the achievement of no net loss, in other words, to reach ecological equivalence. However, integrated in the mitigation hierarchy (avoid impacts on biodiversity, reduce them as far as possible and compensate residual impacts), biodiversity banking is presented an emblematic market based instrument, even if it still depends on legal and regulatory national frameworks Fig. 1.

The success of market-based instruments for environment and the promotion of biodiversity banking in US lead to the renovation of compensation mechanisms at the international level. Consequently, the term "biodiversity offset" appeared in 2004 and was a turning point in compensation mechanism evolution. The analysis also points to the strong interactions between national (US) and international levels (OECD). In an international context favorable for environmental economic instruments (OECD publications, Bruntland report, etc.), the 'success' of MBI type devices for battling acid rain in the US opened a window of opportunity for the renovation of US conservation policy through mitigation banking, while reinforcing the advancement of environmental MBIs and the biodiversity cause at an international level. Furthermore, the establishment of mitigation banking in the US inspired, among other factors, the renovation of Australian compensation mechanisms within the timely context favorable for environmental MBIs. Indeed, more than a top/down dynamic, we can also observe some transnational logistics (state to state) through for example the policy transfer of mitigation banks from US to Australia (Sheahan, 2001). Environmental MBIs thus fueled thinking on mitigation banking in the US, and the establishment of mitigation banking returned the favor by advancing thinking on environmental MBIs and biodiversity offsets–as a term to mark the focus on compensation–beyond the US borders. OECD played a central role in diffusion of the market-based approach in general and also of biodiversity policy.

4. Success and controversies of biodiversity offsets as market based instruments in scientific arenas and global environmental governance

In this section, we analyses the success of compensation mechanisms in the scientific landscape and in global biodiversity arenas and also the controversies which emerged.

The new global conservation strategy based on market-based instruments and the promotion of biodiversity banking in US lead to the renovation of compensation mechanisms at the international level. Consequently, the term "biodiversity offset" appeared in 2004 and was a turning point in compensation mechanism evolution. The analysis also points to the strong interactions between national (US) and international levels (OECD). In an international context favorable for environmental economic instruments (OECD publications, Bruntland report, etc.), the 'success' of MBI type devices for battling acid rain in the US opened a window of opportunity for the renovation of US conservation policy through mitigation banking, while reinforcing the advancement of environmental MBIs and the biodiversity cause at an international level. Furthermore, the establishment of mitigation banking in the US inspired, among other factors, the renovation of Australian compensation mechanisms within the timely context favorable for environmental MBIs. Indeed, more than a top/down dynamic, we can also observe some transnational logistics (state to state) through for example the policy transfer of mitigation banks from US to Australia (Sheahan, 2001). Environmental MBIs thus

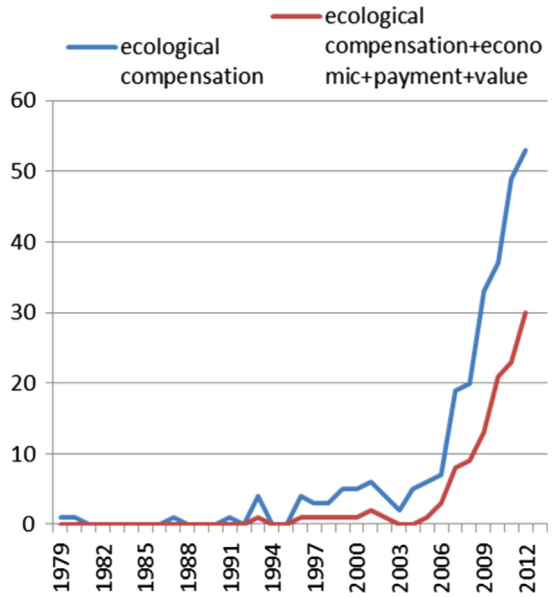

Fig. 1. Number of scientific publications with "ecological compensation" and economics terms. Source: author's analysis based on SCOPUS's data.

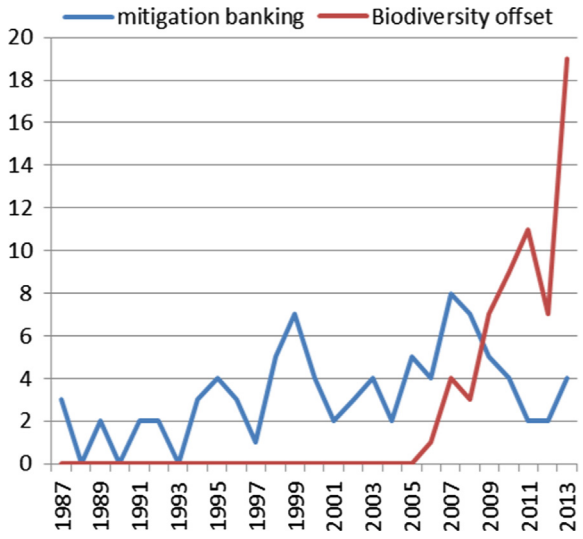

Fig. 2. Number of scientific publications with "mitigation banking" and "biodiversity offset" in SCOPUS. Source: Author's analysis based on Scopus's data.

fueled thinking on mitigation banking in the US, and the establishment of mitigation banking returned the favor by advancing thinking on environmental MBIs and biodiversity offsets—as a term to mark the focus on compensation—beyond the US borders. OECD played a central role in diffusion of the market-based approach in general and also of biodiversity policy.

4.1. Bibliometrics of terminology: the success of compensation as a market-based instrument since the mid-2000s

Using the SCOPUS database, an analysis of the scientific literature identified 321 publications including the terms 'ecological compensation'. The first publication appeared in 1979 and confirms that this idea is not new. From 1979 until the mid-2000s, in the first articles on 'ecological compensation', compensation was clearly not linked to any kind of market-based mechanism (Bottcher et al., 1979; Eiberle, 1980; Sibly and Calow, 1987). However, publications on 'ecological compensation' have increased from the mid-2000s and are more connected to economic approaches (Fig. 2). Indeed, we searched for publications with the associations 'ecological compensation/economic', 'ecological compensation/payment' or 'ecological compensation/value' and found that since 2005 more than half of all publications on 'ecological compensation' also deal with economic approaches. Furthermore, since 2005, economists are more involved in compensation mechanisms in analyzing compensation mechanisms as an economic tool and even as a market-based instrument. This confirms our first hypothesis that compensation mechanism renovation is linked to the success of market-based approaches.

This trend was confirmed by our second SCOPUS survey focused on the use of the terms 'mitigation banking' and 'biodiversity offset' which are well established in scientific landscapes. A bibliometric search in SCOPUS revealed that from 1987 until 2013, 61 publications included the term 'biodiversity offset' in the title and/or abstract and 92 results included 'mitigation banking'.

From 1987, the 'Mitigation banking' notion first appears in three articles in SCOPUS (Boesch, 1987; Heagerty, 1987; Knatz, 1987). These articles deal with some ecological 'credits', and the term 'bank' shows that these kinds of instruments are presented as market-based mechanisms. The results also showed that scientific output on mitigation banking has been strongly anchored in the US since 1987. Then, beginning in 2006, the biodiversity offset concept emerged in Scopus, closely associated with ecological compensation and market-based instruments. Indeed, the first article that included the term 'biodiversity offset' was published in 2006 and deals with biobanking in Australia. It shows that "the design and implementation of this [biobanking] type of environmental market requires consideration of a number of legal and regulatory issues, including the design of a new market 'currency', new property rights, monitoring and verification of biodiversity management plans and strategies to ensure the permanence of biodiversity gains" (Curnow and Fitz-Gerald, 2006). Blundell and Burkey's (2007) article also focuses on 'business and biodiversity', while Norton's (2007) article deals with "using biodiversity offsets to obtain 'win–win' outcomes for biodiversity conservation and economic production. The two others articles published in 2007 deal with some biobanking projects[4] in Australia (Farrier et al., 2007, Nelson and Sharman, 2007). After 2007, biodiversity offset mechanisms have always been analyzed as a market-based mechanism focused only on the compensation step, even in criticizing these instruments (Maron et al., 2010,2012a).

However, this corpus of literature does not necessarily reflect the influence of the scientific community on policy issues. Differences in the ecosystem service concept (Pesche et al., 2013), as well as the emergence and success of biodiversity offsets in the development of environmental policy, did not emanate from dynamics instigated by the scientific community. The growth in literature on the biodiversity offset concept by scientific actors seems to be more of a reflection of the theme's proliferation on the environment policy scene, and it was revealed as such in the chronological analysis.

4.2. The success of the 'biodiversity offsets' approach in global biodiversity governance

Few studies have attempted to understand the biodiversity regime complex as a whole since the complex is scattered among

[4] In Australia, developers can buy biodiversity 'credits' that have been generated (before impact or damage) from landowners who improve or maintain biodiversity by creating or restoring natural spaces and species' habitats. This kind of mechanism may be classified as a market-based instrument. Pirard, R. (2012) Market-based instruments for biodiversity and ecosystem services: a lexicon. Environmental Science & Policy, 19–20, 59–68.

several sub-groups, all of which address specific dimensions of biodiversity while still being conducted to deal with the same themes (Le Prestre, 2004). Several international conventions treat biodiversity in a sectoral fashion, such as the Convention on Wetlands (the Ramsar Convention, 1971), the Convention on International Trade in Endangered Species (CITES, 1973), the Convention on Migratory Species (CMS) adopted in 1979 and in place since 1983, and the International Convention for the Protection of New Varieties of Plants (UPOV) first established in 1961, and of course the Convention of Biological Diversity (CBD) in 1992. The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) created in 2012 is also part the biodiversity regime.

In a CBD meeting, biodiversity offsets were first broached in 2005 within the framework of the SBSTTA[5]-11 side event, entitled "The Role of Biodiversity Offsets in Conservation – an open Roundtable Discussion". The objective of this SBSTTA-11 side event is to convene key stakeholders from the conservation, business, and scientific communities to explore and resolve some or all of the issues surrounding the offsets concept[6]. The meeting was organized by the IUCN and structured around the 2004 work of the International Union for the conservation (IUCN) and the Business and Biodiversity Offsets Program (BBOP), a collaborative platform created to promote biodiversity offsets. The following year three other side events were organized[7] and covered the biodiversity offset theme and presented it as a market based instrument. An event focusing exclusively on biodiversity offsets was organized by Forest Trends, which managed and created the BBOP, the collaborative platform in favor of biodiversity offset. Then, 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 a market-based instrument. 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 nonmarket-based mechanism[8] (IUCN, 2008). By 2008, 'biodiversity offsets' represented an integral part of the recommendations which came out of the CBD[9] (COP 9,4.2, 2008): "To consider biodiversity offset mechanisms where relevant and appropriate while ensuring that they are not used to undermine unique components of biodiversity". Here again the increased importance given to the biodiversity offsets concept was affirmed by their integration in discussions on economic incentives. Economic-incentive instruments are regulations that encourage behavior through price signals rather than through explicit instructions on pollution control levels or methods (Stavins, 1997). Biodiversity compensation has often been defined as an economic incentive because it encompasses different kinds of market-based instruments such as compensatory mitigation, biodiversity offsets, mitigation banking, biodiversity banking, which are all based on different mechanisms. This took full advantage of the general surge in the popularity of these incentives and of MBIs in general, and this trend progressed even further by 2010 in discussions focused on innovative financial mechanisms. At the 2010 CBD meeting, a new group, i.e. Financial Resources and Mechanisms, studied the functionality of six 'innovative financial mechanisms' covered under the CBD Strategy for Resource Mobilization: environmental fiscal reform, PES, biodiversity offsets, markets for green products, biodiversity in climate change funding, and biodiversity in international development finance.[10] This group actively promotes such approaches within national governments, international governments and civil society. Similarly, the BBOP experienced ascension enough to be recognized as an indispensable actor during the 2010 COP of the CBD in Nagoya. This endorsement went as far as a recommendation by COP members through their X/21 decision on business engagement, which encourages the identification of "a range of options for incorporating biodiversity into business practices that take into account existing developments under various forums, including relevant institutions and non-governmental organizations, such as the Business and Biodiversity Offsets Programme".

There is currently no mention of biodiversity offset in CITES, CMS and UPOV but concerning the Ramsar Convention, the RAMSAR's COP (2012) adopted the principle of No net loss,[11] measures of biodiversity offsets and of mitigation banking. No net loss as a goal for wetlands policy was recommended in 1987 at the National Wetlands Policy Forum and was first adopted by President George H.W. Bush's administration in 1989. The policy, which represented compromise between development and conservation, was based on the need to protect wetlands by creating, restoring, enhancing or preserving them. During the 2000s, no net loss was expanded into the total concept of biodiversity and was adopted by the CBD and RAMSAR. In this way, biodiversity offsets have become relevant to an increasing number of ecosystems and to achieve no net loss and preferably a net gain of biodiversity.

The biodiversity offset approach is also gaining ground in the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) process. Indeed, since 2012, the UN has officially launched IPBES, an initiative that aims to strengthen the science-policy interface on biodiversity and ecosystem services. However, some stakeholders have tried to influence the debate in favor of some instruments such as IUCN and the World Business Council for Sustainable Development[12] (WBCSD), who both declared at the IPBES Nairobi meeting in 2011 that "the provision of knowledge from IPBES could set the foundations for market-based mechanisms like biodiversity offsets frameworks[13]".

More generally, on the part of major international NGOs concerned about conservation, there has been a veritable race to embrace biodiversity MBIs, and they "naturally" moved to integrate the dynamics of biodiversity offsets into their programs. In 2004, IUCN published the first document on biodiversity offsets through its relationship with Joshua Bishop, who is currently coordinator of a TEEB report on business and biodiversity. Flora and Fauna and Birdlife International are working on an experimental compensation project conducted with Rio Tinto, which is supported by the BBOP. The World Wide Fund for Nature (WWF) has now become a passionate supporter of the same market type compensation mechanisms which, in 2006 at the COP of CBD, it had proclaimed was too risky and limited. In the same time, BBOP also promotes its standards at the international level through the private sector which has recognized that strategic beyond-compliance biodiversity programs can generate competitive

[5] Article 25 of the Convention on Biological Diversity establishes an open-ended intergovernmental scientific advisory body known as the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) to provide the Conference of the Parties (COP) and, as appropriate, its other subsidiary bodies, with timely advice relating to the implementation of the Convention.

[6] http://www.cbd.int/kb/record/sideEvent/558?FreeText=%22biodiversity%20offset%22&SearchWebContent=true.

[7] http://www.cbd.int/kb/Results?q=%22biodiversity%20offset%22.

[8] These are: Global environment facility; Debt-for-nature swaps; Conservation trust funds or environmental funds; Taxes; Compensation to communities for opportunity cost and damages.

[9] http://www.cbd.int/decisions/cop/?m=cop-09.

[10] http://www.iisd.ca/biodiv/tcb/2013/html/crsvol88num4e.html.

[11] http://www.ramsar.org/pdf/cop11/dr/cop11-dr09-e-avoid-rev1.pdf.

[12] The World Business Council for Sustainable Development (WBCSD) is a global association of some 200 international companies dealing exclusively with business and sustainable development.

[13] http://www.ipbes.net/stakeholders/private-sector.html.

advantages such as Rio Tinto, ERAMET, New Britain Palm Oil Ltd., and through international financial institutions such as the International Finance Corporation (IFC),[14] which has adopted BBOP guidelines in a socially and environmentally sound manner. Finally, this dynamic is also developed by national governments. In 2014, nearly 20 national ministries are officially involved in the BBOP network, but the extent to which the 'biodiversity offset' model would be appropriate differs from one country to another. Indeed, it depends mainly on the political history of the biodiversity policies and on the capacity of states and national policy makers to frame compensation mechanisms promoted at the international level (Hrabanski et al., 2013).

4.3. Reformist and radical criticism of biodiversity offsets approaches

Today, the biodiversity offsets approach, i.e. the use of compensation mechanisms as a market-based instrument, is disseminated among international policy actors and venues. However, this approach has also led to several controversies. An analysis of the scientific and NGO literature highlighted two types of criticism. The first type is reformist criticism, mainly promoted by scientists in scientific articles. In these publications, risks related to the use of biodiversity offsetting, defined in a broad way, in encompassing all kinds of compensations are identified and the authors propose some recommendations. This first criticism is based on six ideas: 1– the lack of monitoring of biodiversity projects and underreporting on biodiversity offsets projects which failed (Bernhardt et al., 2007; Hobbs, 2009; Tischew et al., 2010), 2 – the difficulties to assess the biodiversity offsets projects (Robertson, 2006, Maron et al., 2012b; Palmer and Filoso, 2009; Zedler and Callaway, 1999; Hilderbrand et al., 2005; Bendor, 2009; Benayas et al., 2009; Quigley and Harper, 2006; Suding, 2011), 3 – the difficulty to replace the same thing that is to say that there are some problems of simplification of metrics to make them fungible and means they end up not being accurate (Tordjman and Boisvert, 2012; Hilderbrand et al., 2005; Maron et al., 2012b; Bas et al., 2013), 4 – biodiversity offset allows stakeholders to focus only on compensation rather than on avoidance and minimization (Clare et al., 2011, Hough and Robertson, 2009), 5 – there are some governance problems because some reports show that biodiversity offsets have weakened the existing legislation (Chabran and Napoléone, 2012; Walker et al., 2009; Robertson, 2004), and 6 – displaces biodiversity away from people and local communities (BenDor et al., 2008, Hillman and Instone, 2010, Hannis and Sullivan, 2012).

Some of these arguments are also used by some actors in the second category, i.e. radical criticism. However, contrary to the previous category, the main argument of this type of criticism is based on the opposition of what some activists call the 'commodification of nature'. More specifically, their discourses are based on six types of arguments. The first deals with their opposition to a kind of commodification of nature. Moreover, they refuse to use the term 'natural capital' which they claim is not based on real economic roots and not ecological. They are against the idea that capitalism could have a positive impact on environment. The second argument is based on two ideas: first on the analogy between climate market-based instruments such as REDD and the Clean Development Mechanism (CDM) and biodiversity offsets. They also consider that biodiversity offsetting is a promise to replace nature destroyed and lost in one place with nature somewhere else. As with schemes for reducing emissions from deforestation and forest degradation (REDD), biodiversity offsetting is a way to "pretend you can trade places". The third argument is based on the idea that some people are beneficiaries of this innovative instrument: they think that some companies, intermediary conservation consultants, bankers and traders and investors could profit from of biodiversity offsetting. Biodiversity offsetting first represents a new business opportunity for these people, but not an opportunity for conservation. The fourth argument concerns the lack of efficiency of biodiversity offsetting: "Biodiversity offsetting would not prevent biodiversity loss". The fifth argument concerns the negative impact of biodiversity offsetting on local communities and indigenous communities. Finally, the last argument is that biodiversity offsetting is a permit to destroy, which is also one of the risks formulated by the first criticism.

In this way, in November of 2013, more than 140 organizations signed a statement opposing biodiversity offsetting. In 2013, The World Forum on Natural Capital was organized in Edinburgh, Scotland, by the Scottish Wildlife Trust, the United Nations Environment Programme (UNEP), IUCN, WBCSD, TEEB[15] for Business Coalition, and The Wildlife Trusts. This was a major event, with 500 people from 35 countries taking part. A counter workshop and evening conference organized by the World Development Movement, Re-Common, Counter Balance and Carbon Trade Watch, also took place in Edinburgh this week, in parallel with the World Forum on Natural Capital. The evening conference, "Forum on Natural Commons", gave rise to the statement "No to biodiversity offsetting![16]", signed by 140 organizations from around the world. Among the 140 signatories, six types of organization could be identified which are sometimes linked. The first type of organization consists of some generalist and alter-globalization organizations, such as ATTAC. The second type of organization consists of local organizations that are directly concerned about local infrastructure projects, such as ACIPA, a French organization mobilized against the construction of the Airport Notre Dames des Landes. The third category consists of some climate organizations. The fourth involves some critical organizations interested in conservation and environmental issues such as Friends of Earth,[17] CEE WEB,[18] Econexus[19] or Ecologistas in Accion.[20] The fifth comprises some indigenous organizations and the last some developmental organizations. In the radical criticism, there are clearly some relationships between these organizations and some scientists. Some scientists are involved in some of these organizations or in this petition and, in the same way, some organizations use some

[14] The International Finance Corporation (IFC) was created in 1956 and is a member of the World Bank Group. IFC is an international financial institution that offers investment, advisory, and asset management services to encourage private sector development in developing countries.

[15] The Economics of Ecosystems and Biodiversity (TEEB) is a global initiative focused on drawing attention to the economic benefits of biodiversity which started in 2008. The Natural Capital Coalition, formerly TEEB for Business Coalition was launched in December 2012 and will bring together global stakeholders to study and standardize methods for natural capital accounting and enable its valuation and reporting in business.

[16] http://no-biodiversity-offsets.makenoise.org/list-of-signatories/.

[17] Friends of the Earth (FOE) was founded in 1969. The FOE's campaigns stretch beyond the traditional arena of the conservation movement and seek to address the economic and development aspects of sustainability. Originally based largely in North America and Europe, its membership is now heavily weighted toward groups in the developing world.

[18] CEEweb for Biodiversity was founded in 1994 (under the name of Central and East European Working Group for the Enhancement of Biodiversity), with the support of the European Union and two Hungarian NGOs. This is a network of non-governmental organizations in the Central and Eastern European region and his mission is the conservation of biodiversity through the promotion of sustainable development.

[19] EcoNexus was founded in February 2000 and is based in the UK. This NGO includes scientists who are specialised in biology, genetics, livestock and ecology, and people who have worked for many years on issues of social and environmental justice.

[20] Ecologists in Action was established in 1998 as a coalition of ecologically oriented groups. The confederation is structured along territorial lines, with a different federations organized based on the autonomous communities of Spain.

scientific publications to legitimate their opposition to biodiversity offsetting.

The biodiversity offsets concept has lead to controversy, certainly in part by virtue of the wide range of mechanisms that it encompasses. But in the scientific community, economists, geographers and certainly American, Australian, and French ecologists, still insist that there are risks and limits to the monetary evaluation of biodiversity and the reduction of damage evaluations to compensation based solely on the market. Some hesitation on the international scene can be seen in an FAO[21] report (FAO, 2011) in which biodiversity and carbon compensation were thoroughly addressed, but the techniques and strategies proposed are varied and not limited to monetary or market valuations. From other perspectives, even though BBOP is unchallenged in the field of biodiversity, neither the organization nor its ideas have penetrated far into the fields of agriculture. One NGO (EcoNexus) that was heard at the CBD was firmly opposed to the idea of biodiversity offsets,[22] estimating that they "enable companies to continue destroying biodiversity". And in the framework of the negotiations of the Intergovernmental Science-Policy Platform, some countries have shown their opposition to any form of economic evaluation of nature. A few Latin American countries belonging to the Bolivarian Alliance of the Americas (ALBA) have categorically rejected market-based biodiversity instruments, including compensation mechanisms.

5. Conclusion: biodiversity offsets—an elastic concept for the advancement of market instruments?

We put forward the idea that the rapid rise in support for compensation mechanism renovation is supported by actors interested in boosting the presence of MBIs. Since an instrument of public action is an intervention method that gives preference to specific actors and private interests to the detriment of others (Lascoumes & Le Galés, 2004), we believe it is useful to study actors who have promoted the renovation of compensation mechanisms and their dissemination.

We have seen that compensation mechanism renovation has not evolved in a streamlined way. It is the enticing but imperfect fruit of a multifaceted process, a tangled and complex diffusion of fuzzy logic. This article has attempted to characterize the recent enthusiasm for the biodiversity offsets concept, its origins and rapid diffusion among international policy actors and venues.

The compensation mechanisms originated in the US in a context of international support for market-based instruments. The US developed its conservation policy by reinforcing the regulatory framework, extending compensation mechanisms, and adding flexibility through mitigation banking. The implementation of mitigation banking in turn fueled the discourse on biodiversity MBIs at the international scale, particularly in Australia.

As a popular policy tool, biodiversity offsets saw a dramatic rise in 2004, most notably with the foundation and influence of BBOP. Once on the international scene, the concept quickly stirred interest among a range of international actors, as well as BBOP, whose support would be very important. The concept did not fail in its vocation to rally a diverse set of compensation mechanisms—whether economically oriented—under the biodiversity flag.

Offsets continued their foray into international conservation policy by virtue of the concept's flexibility, which permitted BBOP to promote different types of mechanism to a heterogeneous set of actors. At the international level, BBOP promoted biodiversity offsets as economic instruments and MBIs, and the concept is now undeniably one of the most prevalent tools in the international campaign for biodiversity. Biodiversity offsetting has shown itself to be an elastic concept which appears to be an asset to the progress of environmental MBIs.

However, compensation mechanism renovation at the national level has been a more diverse process, and it cannot be simply characterized by the flexibilization of mechanisms through the introduction of economic and market logic. In Europe, this renovation has seen a combination of flexibilization of mechanisms and reinforcement of regulations that have resulted in hybrid mechanisms. In Latin America the regulatory framework remains dominant, while in Africa, a number of countries provide sites for pilot voluntary compensation programs and propose to Business Companies to develop their own methods calculation of biodiversity offsets.

[21] Food and agriculture organization.

[22] http://www.cbd.int/financial/doc/ifrik-innovative-financial-mechanisms-01-2011-en.pdf.

References

Bas, A., Gastineau, P., Hay, J., Levrel, H., 2013. Méthodes d'équivalence et compensation du dommage environnemental. Revue d'économie politique 123, 127–157.

Benayas, J.M.R., Newton, A.C., Diaz, A., Bullock, J.M., 2009. Enhancement of biodiversity and ecosystem services by ecological restoration: a meta-analysis. Science 325, 1121–1124.

Bendor, T., 2009. A dynamic analysis of the wetland mitigation process and its effects on no net loss policy. Landsc. Urban Plan. 89, 17–27.

BenDor, T., Brozović, N., Pallathucheril, V.G., 2008. The social impacts of wetland mitigation policies in the United States. J. Plan. Lit. 22, 341–357.

Benson, D., Jordan, A., 2011. What have we learned from policy transfer research? Dolowitz and Marsh revisited. Polit. Stud. Rev. 9, 366–378.

Bernhardt, E.S., Sudduth, E.B., Palmer, M.A., Allan, J.D., Meyer, J.L., Alexander, G., Follastad-Shah, J., Hassett, B., Jenkinson, R., Lave, R., 2007. Restoring rivers one reach at a time: results from a survey of US river restoration practitioners. Restor. Ecol. 15, 482–493.

Blundell, A.G., Burkey, T.V., 2007. A database of schemes that prioritize sites and species based on their conservation value: focusing business on biodiversity. BMC Ecol., 7.

Boesch, R., 1987. Mitigation Banking – A Balance of Interests, pp. 2516–2529.

Boisvert, V., Méral, P., Froger, G., 2013. Market-based instruments for ecosystem services: institutional innovation or renovation? Soc. Nat. Resour. 26, 1122–1136.

Bottcher, J.J., Bussemaker, M., Merk, F., 1979. Functional changes in rural settlement areas: measures of adjusting rural settlement structures in Nordrhein-Westfalen to existing and future functions). Funktionswandel in landlichen Siedlungsraumen: Massnahmen fur Angelichung der landlichen Siedlungsstruktur Nordrhein-Westfalens an bestehande und zukunftige Funktionen.

Bräuer, I., Müssner, R., Marsden, K., Oosterhuis, F., Rayment, M., Miller, C., Dodoková, A., 2006. The Use of Market Incentives to Preserve Biodiversity. 51. Ecologic.

Chabran, F., Napoléone, C., 2012. Les conditions du développement des banques d'actifs naturels en France. Analyse du régime institutionnel de la première Réserve d'Actifs Naturels française. Développement durable et territoires. Économie, géographie, politique, droit, sociologie, 3.

Clare, S., Krogman, N., Foote, L., Lemphers, N., 2011. Where is the avoidance in the implementation of wetland law and policy? Wetl. Ecol. Manag. 19, 165–182.

Curnow, P., Fitz-Gerald, L., 2006. Biobanking in New South Wales: legal issues in the design and implementation of a biodiversity offsets and banking scheme. Environ. Plan. Law J. 23, 298–308.

Dolowitz, D., Hulme, R., Nellis, M., O'Neill, F., 2000. Policy Transfer and British Social Policy. Open University Press, Buckingham, Philadelphia.

Dolowitz, D.P., Marsh, D., 2012. The future of policy transfer research. Polit. Stud. Rev. 10, 339–345.

Dumoulin, L., Saurugger, S., 2010. Les policy transfer studies: analyse critique et perspectives. Crit. Int. 48, 9–24.

Eiberle, K., 1980. On the influence of the weather on the kill of some game species in the canton of grisons (Switzerland). Über den Einfluß der Witterung auf die Strecken einiger Wildarten im Kanton Graubünden (Schweiz) 26, 142–153.

European Commission. 2011. Our life insurance, our natural capital: an EU biodiversity strategy to 2020 (2011/2307(INI)). In: Communication from Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions.

Evans, M., 2004. In conclusion-policy transfer in global perspective. In: Evans, M. (Ed.), Policy Transfer in Global Perspective. Ashgate, Aldershot, pp. 221–226.

Farrier, D., Kelly, A., Langdon, A., 2007. Biodiversity offsets and native vegetation clearance in New South Wales: The rural/urban divide in the pursuit of ecologically sustainable development. Environ. Plan. Law J. 24, 427–449.

Gómez-Baggethun, E., de Groot, R., Lomas, P.L., Montes, C., 2010. The history of ecosystem services in economic theory and practice: from early notions to markets and payment schemes. Ecol. Econ. 69, 1209–1218.

Haas, P.M., 1992. Introduction: epistemic communities and international policy coordination. Int. Organ. 46, 1–35.

Hannis, M., Sullivan, S., 2012. Offsetting Nature? Habitat Banking And Biodiversity Offsets In The English Land Use Planning System.
Hartig, F., Drechsler, M., 2009. Smart spatial incentives for market-based conservation. Biological Conservation 142, 779–788.
Heagerty, D. D. 1987. Major offsite mitigation: batiquitos lagoon. In: Proceedings of the American Society of Civil Engineers, 2544-2548.
Hilderbrand, R.H., Watts, A.C., Randle, A.M., 2005. The myths of restoration ecology. Ecol. Soc. 10, 19.
Hillman, M., Instone, L., 2010. Legislating nature for biodiversity offsets in New South Wales, Australia. Soc. Cult. Geogr. 11, 411–431.
Hobbs, R., 2009. Looking for the silver lining: making the most of failure. Restor. Ecol. 17, 1–3.
Hough, P., Robertson, M., 2009. Mitigation under Section 404 of the Clean Water Act: where it comes from, what it means. Wetl. Ecol. Manag. 17, 15–33.
Hrabanski, M., Bidaud, C., Le Coq, J.-F., Méral, P., 2013. Environmental NGOs, policy entrepreneurs of market-based instruments for ecosystem services? A comparison of Costa Rica, Madagascar and France. Forest Policy Econ. 37, 124–132.
IUCN (2008) Economic instruments for financing conservation and poverty reduction. Retrieved from ⟨http://www.iucn.org/about/work/initiatives/sp_cprihome/index.cfm⟩.
Jenkins, M., Scherr, S.J., Inbar, M., 2004. Markets for biodiversity services: potential roles and challenges. Environment: Science and Policy for Sustainable Development 46, 32–42.
Karsenty, A., Ezzine de Blas, D., 2014. Du mésusage des métaphores – Les paiements pour services environnementaux sont-ils des instruments de marchandisation de la nature?. In: Halpern, C., Lascoumes, P., Le Galès, P. e. (Eds.), L'instrumentation de l'action publique – Controverses, résistances, effets. Presses de Sciences Po., Paris, pp. 161–189.
Keck, M.E., Sikkink, K., 1998. Activists beyond Borders : Advocacy Networks in International politics. Cornell University Press, Ithaca.
Knatz, G. 1987. Offsite habitat mitigation banking: the port of long beach experience. In: Proceedings of the American Society of Civil Engineers, 2530-2543.
Lascoumes, P., Le Galès., P., 2004. Gouverner par les instruments. Presses de Science po, Paris.
Le Prestre, P.G., 2004. Governing Global Biodiversity. Ashgate Publisking Compagny, Hampshire.
Maris, V., Mathevet, R., Béchet, A., 2010. Figures de style sur la destruction de la biodiversité. Espaces Naturels, 29.
Maron, M., Dunn, P.K., McAlpine, C.A., Apan, A., 2010. Can offsets really compensate for habitat removal? The case of the endangered red-tailed black-cockatoo. J. Appl. Ecol. 47, 348–355.
Maron, M., Hobbs, R.J., Moilanen, A., Matthews, J.W., Christie, K., Gardner, T.A., Keith, D.A., Lindenmayer, D.B., McAlpine, C.A., 2012a. Faustian bargains? Restoration realities in the context of biodiversity offset policies. Biol. Conserv. 155, 141–148.
Maron, M., Hobbs, R.J., Moilanen, A., Matthews, J.W., Christie, K., Gardner, T.A., Keith, D.A., Lindenmayer, D.B., McAlpine, C.A., 2012b. Faustian bargains? Restoration realities in the context of biodiversity offset policies. Biol. Conserv. 155, 141–148.
Méral, P. 2013. Emergence des MBIs dans les arènes scientifiques et politiques. In Working paper invaluable. Invaluable project.
Nelson, R., Sharman, B., 2007. More than tilting at windmills: a bird's eye view of a bio-offsets scheme under the EPBC Act. Environ. Plan. Law J. 24, 17–34.
Norton, D.A., 2007. Using biodiversity offsets to obtain "win-win" outcomes for biodiversity conservation and economic production. N. Z. J. For. 52, 36–40.
OECD, 1985. Declaration on Environment: ressources for the future. OECD and Environment, 20. OECD, Paris.
OECD, 1993. Economic instruments for environmental management in developing countries. OECD, Paris.
OECD. Environmental taxes in OECD countries. 1995, OECD; Paris. 99p.
OECD. Saving biological diversity: economic incentive 1996, OECD; Paris.
OECD. 1997. Evaluating economic instruments for environmental policy.
OECD, 1999. Handbook of Incentive Measures for Biodiversity, Design and Implementation.
OECD, 2001. Valuation of Biodiversity Benefits: selected Studies.
OECD, 2003. Harnessing Markets for Biodiversity: Towards Conservation and Sustainable Use. OECD, Paris.
OECD, 2004. Handbook of Market Creation for Biodiversity: Issues in Implementation.
OECD. 2008. People and Biodiversity Policies: impacts, Issues and Strategies for Policy Action, OECD, Paris.
Opschoor, J.B., de Savorin Lorhman, A.F., Vos, H.B., 1994. Managing the Environment: the Role of Economic instrument. OECD, Paris.
Opschoor, J.B., Vos, H.B., 1989. Economic Instruments for Environmental Protection, OECD, Paris,.
Palmer, M.A., Filoso, S., 2009. Restoration of ecosystem services for environmental markets. Science 325, 575.
Pesche, D., Méral, P., Hrabanski, M., Bonnin, M., 2013. Ecosystem services and payments for environmental services: two sides for the same coin? In: Muradian, R., Rival., L. (Eds.), Governing the Provision of Ecosystem Services. Springer, Netherlands.
Pirard, R., 2012. Market-based instruments for biodiversity and ecosystem services: a lexicon. Environ. Sci. Policy 19–20, 59–68.
Quigley, J.T., Harper, D.J., 2006. Effectiveness of fish habitat compensation in Canada in achieving no net loss. Environ. Manag. 37, 351–366.
Roberts, N.C., King, P.J., 1991. Policy entrepreneurs: their activity structure and function in the policy process. J. Public Adm. Res. Theory 1, 147–175.
Robertson, M.M., 2004. The neoliberalization of ecosystem services: wetland mitigation banking and problems in environmental governance. Geoforum 35, 361–373.
Robertson, M.M., 2006. The nature that capital can see: science, state, and market in the commodification of ecosystem services. Environ. Plan. D 24, 367.
Robertson, M., Mikota,Different, M., 2007. problems, different paths. Environmental Forum 24, 36–43.
Robertson, M. & N., 2008. HaydenEvaluation of a market in wetland credits: Entrepreneurial wetland banking in Chicago. Conservation Biology 22, 636–646.
Sheahan, M. 2001. Credit for conservation: a report on conservation banking and mitigation banking in the USA, and its applicability to New South Wales. ed. W. C. m. t. o. Australia.
Sibly, R., Calow, P., 1987. Ecological compensation-a complication for testing life-history theory. J. Theor. Biol. 125, 177–186.
Stavins, R.N., 1989. Harnessing market forces to protect the environment. Environment: Science and Policy for Sustainable Development 31, 5–35.
Stavins, R. N. 1997. Economic incentives for environmental regulation. In : Proceedings of the Belfer Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University.
Sterner, T., 2003. Policy instruments for environmental and natural resource management. Resour. Future.
Stone, D., 2008. Global public policy, transnational policy communities and their networks. Policy Stud. J.36.
Suding, K.N., 2011. Toward an era of restoration in ecology: successes, failures, and opportunities ahead. Ann. Rev. Ecol. Evol. Syst. 42, 465.
Ten Kate, K., Bishop, J., Bayon., R., 2004. Biodiversity offsets: Views, experience, and the business case. IUCN–The World Conservation Union.
Tischew, S., Baasch, A., Conrad, M.K., Kirmer, A., 2010. Evaluating restoration success of frequently implemented compensation measures: results and demands for control procedures. Restor. Ecol. 18, 467–480.
Tordjman, H., Boisvert, V., 2012. L'idéologie marchande au service de la biodiversité? Mouvements 2, 31–42.
Walker, S., Brower, A.L., Stephens, R., Lee, W.G., 2009. Why bartering biodiversity fails. Conserv. Lett. 2, 149–157.
Weems, W., Canter, L.W., 1995. Planning and operational guidelines for mitigation banking for wetland impacts. Environ. Impact Assess. Rev. 15, 197–218.
Whitten, S., M. Van Bueren & D. Collins. An overview of market-based instruments and environmental policy in Australia. In *AARES Symposium (The Australian Agricultural and Resource Economics Society), Market-Based Tools for Environmental Management*. Canbera, Australia, 2003.
Zedler, J.B., Callaway, J.C., 1999. Tracking wetland restoration: do mitigation sites follow desired trajectories? Restor. Ecol. 7, 69–73.