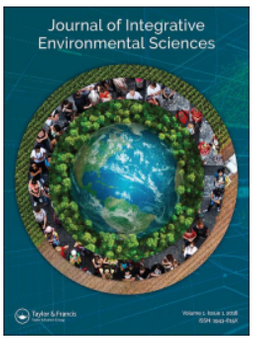

Taylor & Francis
Taylor & Francis Group

Journal of Integrative Environmental Sciences

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/nens20

Topical themes in biodiversity financing

Nowella Anyango-van Zwieten

To cite this article: Nowella Anyango-van Zwieten (2021) Topical themes in biodiversity financing, Journal of Integrative Environmental Sciences, 18:1, 19-35, DOI: 10.1080/1943815X.2020.1866616

To link to this article: https://doi.org/10.1080/1943815X.2020.1866616

Published online: 21 Mar 2021.

JOURNAL OF INTEGRATIVE ENVIRONMENTAL SCIENCES
2021, VOL. 18, NO. 1, 19–35
https://doi.org/10.1080/1943815X.2020.1866616

Topical themes in biodiversity financing

Nowella Anyango-van Zwieten

Forest and Nature Conservation Policy Group, Wageningen University, Wageningen, The Netherlands

ABSTRACT

One of the often-cited challenges in biodiversity conservation is financing. But publications on financing are mostly confined to specific financial mechanisms, regions and actors. Fewer attempts have been made to find overall trends. Through a thematic review of 64 peer-reviewed articles, covering different disciplines and published since 2010, this study found three dominant themes recurring around the topic of biodiversity financing: underfunding, inefficient funding distribution and the pursuit for innovative financial mechanisms. Estimates of the funding gap are much higher than previously calculated and continuously increasing given the acceleration of new threats. Proposals for better targeting of available finances advocate for the use of priority protocols focussed on objectivity and efficiency. However, in practice funding allocation does not seem to follow objective indicators and remains quite inconsistent with conservation needs. This analysis shows that at the core of innovative financial mechanisms are new strategic networks between governments, civil society and businesses. Understanding these new networks is crucial for better capturing the patterns of pooling, mixing and directing financial flows, and the subsequent implications for policy and prioritization criteria. This paper argues that theories focusing on networks and flows could present a useful perspective for future studies on biodiversity financing.

ARTICLE HISTORY
Received 26 August 2019
Accepted 4 December 2020

KEYWORDS
Biodiversity finance; conservation finance; conservation networks; funding gap; innovative financial mechanisms; underfunding

Introduction

In biodiversity conservation there is an urgent plea for innovative, often international, market-based and experimental financing mechanisms that are intended to gradually build on or replace existing financing mechanisms emanating from governments and non-governmental organizations (NGOs) (Huwyler et al. 2014). In academic and grey literature these new developments are typically narrowed down to topics such as specific financial mechanisms, their combinations or comparisons (for example, Pattanayak et al. 2010; Buckley 2010; Gockel and Gray 2011), in specific geographical regions or ecosystems (Brockington and Scholfield 2010; Baral and Dhungana 2014; Bos et al. 2015; Hermoso et al. 2016), involving specific actors (Armsworth et al. 2012; Larson et al. 2016) or coming from specific academic perspectives (Ando and Shah 2016). Fewer efforts have been made to find broader trends. Exceptions are studies that have tried to capture the scope of

CONTACT Nowella Anyango-van Zwieten nowella.anyango-vanZwieten@wur.nl Environmental Sciences Group, Wageningen University & Research, Postbus 47, Wageningen 6700 AA, The Netherlands

global financial mechanisms by classifying them according to the degree to which they are innovative or traditional, market or non-market-based, taxes, subsidies or voluntary (Emerton et al. 2006; Gutman and Davidson 2007; Parker et al. 2010; Pirard and Lapeyre 2014). While important details and useful information have come out of these studies, there is still much need for studies that provide broader overviews. Biodiversity finance at its current stage requires moments of stepping back from the numerous efforts and discussions taking place, to keep track of key changes and major developments. This paper contributes to this effort by presenting results of a thematic review of research on financing for biodiversity conservation in the recent past to highlight dominant themes and therefrom to unveil some underlying assumptions and suggest alternative ways of investigating biodiversity finance.

This review paper proceeds by explaining the process of selecting and analysing peer-reviewed literature, followed by a description of three topical themes that emerged: underfunding, distribution of finances and innovative financial mechanisms. The principle finding is that the main challenge in biodiversity financing is not only underfunding, but that quite often available funds do not go where they are most needed. Conservation networks play a crucial role in determining where and how finances are distributed and set the agenda and activities that facilitate connections to key sources of biodiversity financing. This paper therefore argues that networks are at the heart of biodiversity financing and reflects on their practical implications. It discusses how conservation finance networks often face mismatches between investor and conservation needs (and capacities) and provide space for agendas of powerful players outside biodiversity conservation to influence it in directions that do not prioritize conservation needs over other interests. The findings of this paper open up new ways of studying and understanding biodiversity finance that take cognizance of the complex social networks that determine how and where finances flow.

Methods

This review is carried out using the method of thematic analysis by "identifying, analysing, and reporting patterns (themes) within data" (Braun and Clarke 2006, p. 79). This method is well suited for processing data from a wide spectrum of sources while staying focussed on topics (Guest et al. 2011, p. 17). The analysis is guided by the question, "What major themes on funding for biodiversity conservation are covered by academic literature published between 2010–2016?". Using the Scopus database, the search criteria were the keywords "biodiversity finance", the combination "conservation finance" and "biodiversity", or their variants (e.g. financing, funding, funds). Broad terms were used to avoid narrowing down to specific financial mechanisms, regions, actors or disciplines and to distil broad patterns from representative literature. Only peer-reviewed papers were selected as a mark of the quality of research. The search was limited to the period 2010 to 2016. 2010 was an important year for biodiversity with the United Nations declaring it as the beginning of the Decade on Biodiversity. In both peer-reviewed and grey literature, several updates on funding estimates required to sufficiently conserve biodiversity have also been done since 2010 (IUCN 2012; Parker et al. 2010; CreditSuisse and McKinsey 2016). This search was carried out in June 2016.

This review follows the six-step approach proposed by Braun and Clarke (2012), which begins with familiarizing oneself with the data. In the first step, the search retrieved 150 papers out of which 110 peer-reviewed articles were retained based on relevance after screening titles and abstracts. After screening full texts of these remaining papers, 64 were retained (see Supplementary Materials). The papers that were excluded had little or no focus on biodiversity finance. Biodiversity finance refers to "expenditure that contributes – or intends to contribute – to the conservation, sustainable use and restoration of biodiversity" (OECD 2020, p. 7). The number of retained papers was lower than expected which indicates that academic writing on conservation finance is often specific and not broad in scope, especially in comparison to grey literature from sources such as conservation practitioners, professionals and alliances. The author immersed in the data by reading through a random selection of papers and writing memos in the papers. This initial stage of note-taking is "observational and causal rather than systematic and inclusive" and the notes act as "memory aids and triggers for coding and analysis" (Braun and Clarke 2012, p. 61).

This set the stage for the second step of the data analysis process, beginning with generating initial codes. Braun and Clarke (2012, p. 61) define codes as "the building blocks of analysis … [that] identify and provide a label for a feature of the data that is potentially relevant to the research questions". Codes are both influenced by the language in the data and the researcher's position within the continuum along which qualitative research approaches are located (Braun and Clarke 2012). As Holloway & Galvin (2016, p. 38) argue, "researchers" minds are not a *tabula rasa*, a blank sheet, especially when they are already experienced professionals." Prior to starting this review the author had spent at least 2 years studying both academic and grey literature written on conservation finance and part of this time was also spent as a guest researcher on the same topic in an international nature conservation organization. The tentative framework that guided this stage of the analysis was guided by three questions: where does the money come from, where does it go, and how does money move between source and destination? The initial codes therefore were "sources of funding", "financial mechanisms" and "targets of funding." During the coding process, other codes emerged that included "allocation", "discourse" and "coalitions". Assisted by Atlas.ti, line-by-line coding was performed on the full texts of the retained 64 papers using both the initial and emerging codes.

The third step involved searching for themes among the coded data (Braun and Clarke 2012). A theme "captures something important about the data in relations to the research question, and represents some level of *patterned* response or meaning within the data set" (Braun and Clarke 2006, p. 82, italics in original). This step involved the process of "collapsing and clustering codes that seem to share some unifying feature together, so that they reflect and describe a coherent and meaningful pattern in the data" (*ibid)*. During this step the codes were assembled and reassembled into different categories, seeking patterns. This was followed by the fourth step, in which the different categories that were generated were extensively reviewed together with two senior colleagues. This is the "quality checking" phase (Braun and Clarke 2012, p. 65) through which credibility of the study was achieved. This paved way for the fifth step in which three themes are defined and named as discussed below. Writing this review paper is the sixth and final step of the process.

Thematic analysis is a highly flexible and accessible method (Braun and Clarke 2012; Nowell et al. 2017). However, as with other qualitative research methods, the researcher is the key instrument of analysis, making the conclusions subject to one's epistemological position (Holloway and Todres 2003). Generally, methods of reviewing literature – including systematic reviews – have been found to differ in "extent, detail, epistemology and approach" (Gough and Thomas 2012, p. 36). Epistemological differences in particular cannot be resolved at the level of method (Clegg 2005) and this paper also does not make that attempt, except by being transparent on the steps that guided data search, retrieval and analysis.

Topical themes in biodiversity finance

Underfunding

Underfunding continues to dominate recent discussions but with added gravity and specificity. Recent estimates show that the global conservation funding gap has escalated from previous calculations (e.g. James et al. 2001; Balmford et al. 2002; Bruner et al. 2004; Emerton et al. 2006) to current estimates reaching as high as 7 trillion dollars per year (Bos et al. 2015). Bos et al. (2015) argue that this is the "resultant gap between the economic costs of environmental degradation estimated globally at 7.3 USD trillion USD per year and increasing (TEEB 2013) and the available global funding for biodiversity and ecosystem services estimated between 36-38 USD billion USD per year (Parker et al. 2010) and 51 USD billion USD per year (Parker et al. 2010)". New findings also emphasize that underfunding is not just confined to developing countries, but is a problem of every country, region and ecosystem (Waldron et al. 2013). Waldron et al. (2013) concluded that underfunding is so ubiquitous that all 124 countries in their study were underfunded. The funding gap is exacerbated by an accelerating increase in habitat destruction and species extinction (Buckley et al. 2016). However, discussions on underfunding are tempered by reports showing increases in certain kinds of financing. For example rigorous studies done by Miller (2014) and Bare et al. (2015) found increases in conservation aid both globally and regionally. Miller (2014, p. 349) even suggests that some concerns for decreased funding of international aid for conservation "may be overstated" because the proportion of global biodiversity-related aid increased in tandem with the increase of international aid between 2000 and 2008. Bare et al. (2015) found an increase of conservation aid to sub-Saharan Africa between 1996 and 2008.

Related to underfunding are concerns that data on financing of biodiversity conservation are not always available or reliable, specifically that quite often required data are not accessible, only available as aggregates, not recorded at all, or not recorded in standard ways that can be compared over time, between organizations or countries (Miller 2014; Zentelis and Lindenmayer 2015; Bos et al. 2015; Bare et al. 2015). Other opinions are that not everything that should be measured is being measured, for example, willingness to pay, opportunity costs of forfeiting development for conservation, or ecosystem services (Ando and Shah 2016). To tackle these challenges, several researchers recommend standardization, transparency and accountability (for example, Lung et al. 2014; Pilgrim and Bennun 2014; Githiru et al. 2015; Larson et al. 2016; Hermoso et al. 2016).

Although there is a general consensus in identifying underfunding as the main problem, there is no agreement on defining it as there are wide discrepancies in measurements of the funding gap. This is not just about methodological differences (Feger and Pirard 2011) but much more about defining adequate funding. The assumption is that an adequate level of funding not only exists, but that it can be objectively measured and quantitatively attained.

Funding

A second dominant theme in the literature emphasizes funding distribution and allocation. To optimize limited finances, recent studies show an increase in the sophistication and detail of objective prioritization protocols for effective conservation planning and targeting of threatened species, endangered species, species richness and their habitats (for example, see Cimon-Morin et al. 2013; Lin et al. 2014). However, in practice funding distribution remains quite inconsistent with conservation needs (Holmes et al. 2012; Larson et al. 2016).

For example, Singapore receives significant conservation aid despite having low biodiversity needs and a relatively strong economy (Miller 2014). EU LIFE-Nature funds privilege globally non-threatened species over 72% of globally threatened species (Hermoso et al. 2016). Northern and Central European countries with low or very low conservation needs receive high or very high funding compared to countries in southern Europe with high or very high conservation needs but low or very low funding (Lung et al. 2014; Hermoso et al. 2016). In spite of richer biodiversity, the global South attracts much less biodiversity finance than the North, with Africa, Latin America and the Caribbean, and Asia (excluding China) each receiving only 6–7% of overall biodiversity finance (Parker et al. 2010). A closer examination of where available funds end up exposes a tendency to concentrate in certain territories while ignoring others. Globally, 40% of conservation aid goes to 10 countries only (Miller 2014) and in Africa, 63% of the aid also goes to only 10 recipient countries (Bare et al. 2015). Also, vertebrate species are preferred over plants, fungi or others and receive 80% of all funds (Hermoso et al. 2016). Developed nations generate and retain most of the finance (Larson et al. 2016; Dempsey and Suarez 2016). This also occurs within countries. For example, a study of the distribution of financing within The Nature Conservation in the USA, shows that funds are spent close to the regions from where they are fundraised (Larson et al. 2016). In short, spending on financing tends to occur closer to source, not need.

It therefore appears that in spite of advanced prioritization protocols, other factors carry more significant weight in determining how financing is actually distributed. These other factors can be classified more broadly as political and economic factors.

Beginning with political factors, donors seem to favour countries in which they have geo-strategic interests, be they geographic, military or political (Ahrends et al. 2011; Miller 2014). For example a bad relationship with donor countries could lead to no financing (e.g. the war between Iraq and some key donor countries), while political and national security concerns have been found to be important determinants for environmental aid allocation (e.g. by USA in Egypt and Israel) (Figaj 2010; Miller 2014). However, environmental aid is limited in its usefulness as a tool for advancing geostrategic interests compared to other much more effective tools such as defence, diplomacy and

development (Figaj 2010; Miller 2014). Decisions to allocate financing is also affected by perceptions of "good governance" in a recipient country (Bagley 2010; Miller 2014; Bare et al. 2015). However, it is important to note that in practice these aspects are not always linked to desirable conservation outcomes as shown by Bare et al. (2015) who found that high democracy scores in sub-Saharan African countries were associated with increased forest loss in the short-term. They argue that this could be a symptom of "countries in the early stages of the forest transition" (experiencing land-use transitions and agricultural expansion) or the result of a "peace dividend" in countries getting out of war (Bare et al. 2015, p. 6). Also, recipient countries with higher political leverage tend to exercise greater bargaining power not only in securing more financing, but also in negotiating for conditions that favour economic development and other national priorities (Miller 2014). Other political factors that emerged from this review include social pressure from citizenry or power relationships between key actors (Wang and Berman 2014; Borgström et al. 2016).

On economic factors, "finance begets finance," to borrow the phrase from Ahrends et al. (2011). This means that acquired funding usually attracts additional funding so that more is given to those who have, not those who have not. An important factor that contributes to this is existing infrastructure which is linked to cost-effectiveness, accessibility and logistical feasibility. Conservation investments tend to be made in places with established road networks, field stations, institutional contacts and proximity to human populations (Gubbi 2010; Ahrends et al. 2011; Ando and Shah 2016; Hermoso et al. 2016). Yet the counter-effect of this is that these are also often places that are accessible to greater threats such as destructive land-uses and invasive species (Gubbi 2010; Ahrends et al. 2011). Also, there is an inclination to target places that have been tried before by others and are therefore deemed less risky, and where there is an indication of commitment by recipients demonstrated by attracting other donors (Ahrends et al. 2011). Other economic factors that play a role in determining where finances end up are the economic leverage of a country (based on its GDP), return on biodiversity gains per dollar invested in biodiversity conservation, socio-economic factors and research niches (Larson et al. 2016). While organizations like the World Bank and IMF target the least developed countries to disburse biodiversity funds, the bulk of biodiversity finance flows typically take on a "home bias" so that the greater part of it still remains in wealthier nations (Hickey and Pimm 2011). As put by Holmes et al. (2012, p. 602), "there are economic, political, cultural, historical, biological, and practical reasons why current spending patterns may not align with priority sites."

Innovative financial mechanisms

The third dominant theme in the reviewed literature is innovative financial mechanisms. The main argument here is that to close the funding gap new and additional financial mechanisms are required to supplement existing funding. Three key examples of attempts made to generate innovative financing are attracting private and often market-based finances, finding new forms of public financing or making a new financial mechanism out of combinations of different mechanisms.

First, there is an increased emphasis on markets as new sources of private financing. In essence, this means shifting funding prioritization from frequently used indicators of biodiversity threats to new indicators of human benefits that can be derived from the

ecosystem. Payments for Ecosystem Services exemplify these endeavours. Connected to market-based mechanisms is the emergence of businesses as new players in biodiversity conservation as investors, financial experts and third-party partners: as investors the expectation is straightforward, injecting private finances into biodiversity conservation (Bos et al. 2015; McFarland 2015); as financial experts providing much-needed knowledge and expertise required to manage market-based mechanisms (Bos et al. 2015; Ando and Shah 2016; Dempsey and Suarez 2016); and as third-party partners in ensuring transparency, accountability and high standards are maintained (Bode et al. 2011; Little et al. 2014; Githiru et al. 2015; Chow 2015). Some also see business as the new conservationists taking over management from government, and bringing improvements in productivity and efficiency. For example, there are debates on whether better regulation and management of biodiversity and its habitats should move away from state parastatals to joint management between business and other actors such as non-governmental organizations, tour operators, private land owners and indigenous communities (Bruner et al. 2004; Borie et al. 2014; Whitelaw et al. 2014; Rosendal and Schei 2014). But others critically view this as shifting government responsibility to private sources (Pilgrim and Bennun 2014).

Related to markets and innovative financial mechanisms are new and increased risks, for example, the risk of underperformance of new financial mechanisms, increased uncertainties, non-permanence and poor quality projects (Githiru et al. 2015). To manage and control these risks, there are recommendations for knowledge transfer on risk management from finance theories, for example in the use of biodiversity derivatives and insurance (Armsworth et al. 2010; Hein et al. 2013; Whitelaw et al. 2014; Little et al. 2014).

However, alliances between conservationists and businesses are impeded by "language barriers". Science is considered to have a critical role in mediating between the two by better informing, engaging and highlighting opportunities for businesses, and nurturing friendly partnerships between conservation groups and business (Armsworth et al. 2010; Bos et al. 2015; Buckley et al. 2016). The coalition between science and business introduces new forms of valuation, for example the "scientific discoveries dividend" where scientific research and discoveries, such as those producing pharmaceutical materials or identifying rare species, are quantified to give a value to the protected area (Whitelaw et al. 2014). The valuation of ecosystem services in itself is seen as a form of translation of environmental issues into "the language of politics and economics" (*ibid*).

Secondly, the reviewed literature shows how creating innovative financial mechanisms also involves finding new ways of dealing with more traditional financial mechanisms and sources, with particular reference to public finance. One way that this is being discussed is through proposals for strategic intra-governmental changes. Governments are envisioning ways of expanding biodiversity conservation beyond the traditional confinement within ministries of environment to attain a "whole-of-government approach" (Roe 2013; Rosendal and Schei 2014; Adenle et al. 2015). Such visions are motivated in part by the Convention for Biological Diversity (CBD) through its National Biodiversity Strategy and Action plans and the World Bank through its REDD+ programme. The main focus of these new intra-governmental connections is to include ministries with greater political and financial leverage, particularly ministries of finance, planning and economics. The goal is to achieve "mainstreaming of biodiversity" by foregrounding biodiversity in governmental agenda and diversifying funding streams. An example of such

a collaboration is the co-financing for biodiversity projects between the UK Department for International Development (DFID) and Department for Environment, Food and Rural Affairs (DEFRA) (Roe 2013). Related to these new linkages is the formulation of new policies, such as a requirement to meet additional poverty-related criteria in the DFID–DEFRA case.

Another way that traditional financial mechanisms are being renewed is through governments making connections with other governments to form new intergovernmental networks. Within the biodiversity-rich global South, Adenle et al. (2015, p. 107) predict that the "working paradigm of the future" will become the formation of new ties as the "richer south" funds the "poorer south". In addition, recent changes in aid architecture are resulting in new strategic partnerships between donor countries and players in recipient countries. Roe (2013) recommends that these new partnerships should include players from the civil society, parliamentarians and policy makers in developing countries to ensure prioritization of biodiversity at the national level. However, where networks exist sub-nationally, as in the case of REDD+ among tropical countries, there are aspirations to strengthen national networks for greater success (Lin et al. 2014). New linkages have also been seen in the case of supra-governmental initiatives such as the European Union Habitats Directive for the Natura 2000 network.

Lastly, the reviewed literature also shows that forming innovative financial mechanisms involves new combinations of financial mechanisms. For example, a mechanism often referred to as innovative, Payments for Ecosystem services (PES), is used generically to include a plethora of financing mechanisms depending upon the definition adopted for PES. Some authors categorize REDD+ as PES mechanisms, for example Hein et al. (2013) who use the earlier definition from Wunder (2005), while others consider REDD+ as distinct from PES (Loft 2011; Stadler 2011; Rosendal and Schei 2014). By limiting the definition of PES to benefits to humans, others include tourism but exclude environmental mortgages and derivatives (Cimon-Morin et al. 2013; Whitelaw et al. 2014). These kinds of PES mixtures have been referred to elsewhere as PES bundling (Wendland et al. 2010).

Discussion

Although the predominant starting point of most of the 64 papers analysed in this review was the lack of adequate funds for biodiversity conservation, deeper analyses show that quite often available funds are not spent where they are most needed. Conservation financing is not unique in this respect. For example, Harrigan and Wang (2011, p. 1291) also found a "bandwagon" effect in aid allocation, that is, aid from one donor may also attract more aid from other donors. Proposals for better targeting of available finances advocate for increased measurement, standardization, objectivity and efficiency. However, in practice economic and political relationships seem to play a much stronger role in determining where biodiversity finance is spent. Therefore, conservation networks are important for understanding financial flows (Brockington and Scholfield 2010). Recent studies show an increase in the formation of new conservation networks between states, markets and civil society (Corson 2010; MacDonald 2010; Igoe et al. 2010). As networks change, so do the patterns of pooling, mixing and directing financial flows. By following the "patterns and processes by which money flows into, out of, and around a protected

area [for example] … it becomes clear that the 'problem' is not simply 'there's not enough,' although quantity is certainly part of the story" (Johnson 2009, p. 713).

Towards a networking perspective

There are at least three ways in which the dynamics of networking affects biodiversity conservation finance.

First, the three topical themes discussed above are linked to the main global agenda and activities that facilitate access to key sources of biodiversity financing. Underfunding and subsequently the themes of efficient use of available funds and innovative ways of finding new and additional finances reflect, in one form or another, the funding goals and missions of the central nodes in the global biodiversity network (defined here as the nodes that enjoy high connectivity and volumes of financial flows). These include the CBD (see the Aichi biodiversity targets), the United Nations Environment Programme (through the Biodiversity Finance Initiative), World Bank (via Global Environmental Facility) and well-funded international nature conservation organizations (The Nature Conservancy, World Wide Fund for Nature, Wildlife Conservation Society, Conservation International). For example, the championing of market-based instruments, particularly Payments for Ecosystem Services (PES), is dominant in the Resource Mobilization Strategy agreed on at the Nagoya conference (COP10) as a key funding source for biodiversity conservation. PES is also among CBD's top list of innovative financial mechanisms that are backed by The Organization for Economic Co-operation and Development (OECD 2013). MacDonald (2018) further explains how market-based mechanisms are institutionalized through events, such as the World Conservation Congress, that convene dominant actors. Similarly, the upcoming Post-2020 Global Biodiversity Framework is expected to address new and additional financial resources, corporate sector accountability and rigorous safeguards for private sector engagement (Ching and Lin 2019).

Secondly, the overriding goal of attaining new and additional financing is carried out by forming strategic linkages to dominant public and private finance networks. Perhaps the most championed mechanisms in these new networks are PES and market-based mechanisms, but attempts to form both face difficulties. For example, the bundling of PES often involves funding from traditional sources like the government and World Bank but is still predominantly discussed as a market mechanism. This has raised criticism from others who call it a "subsidy in disguise" that has "little to do with markets" (Fletcher and Breitling 2012; Pilgrim and Bennun 2014). In spite of much discussion about market-based mechanisms in practice they have shown poor performance in attracting financing (Dempsey and Suarez 2016), confirming earlier predictions that public, and not private and market-based financing, will continue to be the mainstay of financing, especially in the tropics (Balmford and Whitten 2003). While some do not expect the flows of finances through PES to close the gap in biodiversity funding, others point out that they open up new funding sources and, as seen in Costa Rica, can significantly increase domestic funding (Hein et al. 2013; Rosendal and Schei 2014). In general, investors have cited lack of "bankable projects" as a key impediment to investing in biodiversity conservation. Through a survey of 128 investors in conservation, Ecosystem Marketplace found USD3.1 billion undeployed at the end of 2015 due to lack of deals (Hamrick 2016, p. ix).

Surprisingly, blended finance did not appear in any of the papers analysed in this review, although it is extensively discussed in practice. Blended finance is the strategic use of public funds to leverage private finances (European Commission 2012). An idea behind blended finance is that public funds can be used to cushion and de-risk biodiversity investments, especially at the initial stages of the project, thereby providing an incentive for private investor involvement. This trend of linking public and private financing mechanisms and sources of finance is not unique to biodiversity conservation, but is also reflected in other domains such as climate change and international development, incidentally both being targeted sources for additional biodiversity finance. For example, the Organization for Economic Co-operation and Development (OECD) and the World Economic Forum (WEF) recommend the strategic use of blended finance in mobilizing "private capital flows to emerging and frontier markets" seeking to attract (foreign) private finance investments, open up new markets and access credit for small local businesses (OECD & WEF 2015, p. 4). Blended finance is seen as a means of "financing more projects with less public money" by catalysing international private finance (Romero 2016, p. 59) and is becoming the working model of many bilateral and multilateral development finance institutions (Romero and Van de Poel 2014). However, in practice they do not have "a great track record" (Romero 2016, p. 59) in addressing pro-poor activities and wide stakeholder participation, and have been accused of giving preferential treatment to donors' own private sector firms and failing on transparency and accountability (Romero 2013, 2016; Pereira 2017).

Finally, the new linkages sometimes happen between disparate networks necessitating translation, for example in the identification and valuation of biodiversity as noted by the Natural Capital Coalition[1]:

> "When it comes to valuing the natural world, biodiversity has always been a thorny issue. It is a key component of natural capital 'stock' … However, when it comes to quantifying [its] values, biodiversity is often a major challenge … "

To bridge this gap, science is expected to mediate and translate between conservation and business networks. Terms such as "Natural Capital" and "Ecosystem Services" exemplify scientifically backed efforts to tackle the above issue using protocols advocated by conservation networks such as The Economics of Ecosystems and Biodiversity (TEEB) and Natural Capital Coalition. Underlying these terms are efforts to deal with concerns over data availability, accessibility, reliability and completeness, and discords in methodologies and definitions. The idea is to increase transparency, quantification and standardization, i.e. to make conservation more efficient and business-like. In 2012 the United Nations Development Programme (UNDP) and the European Commission launched the Biological Finance Initiative (BIOFIN) to seek new methodologies for "optimal" and "evidence-based" biodiversity finance plans and solutions, particularly those that make a strong "business case" for "biodiversity investments".[2]).

The emphasis on evidence also stems from the broader context of development finance, a key source of funding for biodiversity. Terms such as Results Based Aid (Klingebiel 2012), Results Based Financing (Correa et al. 2019), Performance-based aid (Paul 2015), Payment By Results (Clist 2019) and more than 34 other similar terms (Angelsen 2017) are increasingly in use since the establishment of the Paris Declaration on Aid. In general these terms stress that funding should be based on the condition of

measurable results, whether past or expected. This is "portrayed as a compromise solution between market-based mechanisms and unconditional donations" (Van der Hoff et al. 2018, p. 433). However, finding the "evidence base" is often problematic for several reasons including the complex nature of issues in the "real world", challenges in accurately attributing results to interventions, untimely and unreliable data, and high costs of design and implementation (Pearson et al. 2010).

This review also found a growing shift in biodiversity discourses towards benefits that can be accrued from an ecosystem service and the expected returns that can be made from investments. This would potentially drive financial flows towards marketable ecosystem services and further away from biodiversity threats. For example, PES flows would bypass high-biodiversity ecosystems that are not economically profitable but reach new recipients such as landowners and indigenous communities (Hein et al. 2013; Rosendal and Schei 2014).

Practical implications

Several considerations arise from the above dynamics. To begin with, while the intention for connecting biodiversity conservation to dominant networks in public and private finance is to inject new and additional financing for conservation, this comes with other intended and unintended consequences. This can be seen in the recommendations for more standardization, measurements and transparency; objectivity and quantification becoming the ideal. Perhaps this is because objectivity is considered to represent neutrality, or probably because this is the language of the new entrant into conservation – businesses and markets. However, these recommendations overlook the additional costs that would be involved and that in practice private financial investors are themselves also reluctant to self-disclosure (Klimpel et al. 2017). In addition, business measurements are not necessarily commensurate with conservation measurements. This emphasis on objectivity and neutrality overlooks the "exercise of power … [in making] critical choices about what to measure and how" (Turnhout et al. 2014, p. 583). Also, by "narrowly revolving around the problem of lacked capital" it produces a "depoliticized formulation of biodiversity loss" (Dempsey and Suarez 2016, p. 665).

In addition, transparency is increasingly difficult to attain when mixed financial flows are involved. Financial flows then become even harder to trace, raising the question about long-term effectiveness if they cannot be specifically attributed to on-the-ground biodiversity protection (Bruner et al. 2004; Borie et al. 2014). Already a key difficulty in analysing biodiversity finances arises from the challenge of unbundling funds, for example distinguishing "pure" conservation funds from development funds (Brockington and Scholfield 2010). Should it even be possible to disentangle mixed flows if the combination proves ineffective in practice, then serious consideration should be given to the impact this would have, for example, on local livelihoods if biodiversity funding is disentangled from developmental aid.

With a growing diversification of networks linking to biodiversity financing, another key challenge is attaining standardization and accountability. A case in point is in South-to-South funding where transfers occur within biodiversity-rich countries bypassing the financially richer North (Borie et al. 2014; Adenle et al. 2015). South-to-South cooperation is already occurring in Development both bilaterally (e.g. Azerbaijan, Brazil, China, India,

Korea, Kuwait, Singapore and South Africa) and multilaterally (e.g. ASEAN+3 bank, BRICS bank, the Asian Infrastructure Investment Bank and the Eurasian Development Bank). South-to-South cooperation has been found to change the rules of the game in development aid allocation, notably by erasing neo-colonial interferences in the form of stringent rules about good governance and accountability (Mawdsley 2012). It has therefore been blamed for supporting "rogue states" and fuelling corruption (Woods 2008).

Further, prioritizing biodiversity by connecting to more dominant networks may prove counterproductive if they result in diluting the biodiversity agenda. Mainstreaming of biodiversity in government could lead to abrogating the conservation responsibilities of environment ministries (Pilgrim and Bennun 2014; Adenle et al. 2015). Also, incorporating biodiversity financing within mechanisms that focus on issues that attract more attention like poverty or carbon, exposes biodiversity to the risk of marginalization as has been seen in developmental aid and REDD+.

Conclusion

Three topical themes on biodiversity financing recurred in the 64 papers analysed in this review: underfunding, ineffective funding distribution and seeking innovative financial mechanisms. These also represent the main agenda and activities of dominant biodiversity conservation networks. The process of forming strategic alliances with dominant economic, political and social players has opened up new avenues for thinking up innovative financial mechanisms, although some of these efforts do not appear to go beyond repackaging. An analysis of these new networks has also exposed a mismatch between investor and conservation needs (and capacities) and provided space for agendas of powerful new players in the network to influence biodiversity conservation in directions that might further exacerbate the existing problem of not prioritizing conservation needs in allocating available funds.

This paper also concludes that the focus on underfunding of biodiversity financing can lead to a depoliticizing effect as shown by aspirations to achieve greater "objectivity" through better measurements, standardization, transparency and accountability. However, in practice finances do not necessarily follow objectivity but are driven by networks along economic and political lines, among others. Future research could trace biodiversity financial flows through new networks within different ministries of government, through new South-to-South cooperation, and through new networks between traditional and emergent actors. In addition, a topical issue that did not feature in the papers reviewed here, but which needs attention, is blended finance.

Finally, there is need for more interrogation of underlying assumptions that dominate academic discussions about biodiversity financing. After all, whether underfunding, political will to act or weak institutional arrangements, "whichever threat is conceived most pressing, there is a shortage of time in which to act, an immensity of tasks to accomplish, and the absolute necessity of taking precautionary action to prevent the very worst" (Goede and Randalls 2009, p. 859).

Note

1. https://naturalcapitalcoalition.org/projects/biodiversity/

Acknowledgments

I am grateful to Prof. René van der Duim and Dr. Machiel Lamers from whom I have received significant support and feedback on this paper.

Disclosure statement

No conflict of interest.

Funding

This work was supported by the Wageningen School of Social Sciences [Open Round].

References

Adenle AA, Stevens C, Bridgewater P. 2015. Global conservation and management of biodiversity in developing countries: an opportunity for a new approach. Environmental Science and Policy. 45:104–108. doi:10.1016/j.envsci.2014.10.002.

Ahrends A, Burgess ND, Gereau RE, Marchant R, Bulling MT, Lovett JC, Platts PJ, Wilkins Kindemba V, Owen N, Fanning E, et al. 2011. Funding begets biodiversity. Diversity and Distributions. 17 (2):191–200. doi:10.1111/j.1472-4642.2010.00737.x.

Ando AW, Shah P. 2016. The economics of conservation and finance: A review of the literature. International Review of Environmental and Resource Economics. 8(3–4):321–357. doi:10.1561/101.00000072.

Angelsen A. 2017. REDD+ as result-based aid: general lessons and bilateral agreements of Norway. Review of Development Economics. 21(2):237–264. doi:10.1111/rode.12271.

Armsworth PR, Armsworth AN, Compton N, Cottle P, Davies I, Emmett BA, Fandrich V, Foote M, Gaston KJ, Gardiner P, et al. 2010. The ecological research needs of business. Journal of Applied Ecology. 47(2):235–243. doi:10.1111/j.1365-2664.2010.01792.x.

Armsworth PR, Fishburn IS, Davies ZG, et al. 2012. The size, concentration and growth of biodiversity-conservation nonprofits. BioScience. 62:271–281.

Bagley F (2010) Rhinoceros and Tiger conservation fund. *Tigers of the World*. Elsevier Inc., 201–203.

Balmford A, Bruner A, Cooper P, Costanza R, Farber S, Green RE, Jenkins M, Jefferiss P, Jessamy V, Madden J. 2002. Economic Reasons for Conserving Wild Nature. Science. 297(5583):950–953.

Balmford A, Whitten T. 2003. Who should pay for tropical conservation, and how could the costs be met? ORYX. 37(2):238–250. doi:10.1017/S0030605303000413.

Baral N, Dhungana A. 2014. Diversifying finance mechanisms for protected areas capitalizing on untapped revenues. Forest Policy and Economics. 41:60–67. doi:10.1016/j.forpol.2014.01.002.

Bare M, Kauffman C, Miller DC. 2015. Assessing the impact of international conservation aid on deforestation in sub-Saharan Africa. Environmental Research Letters. 10(12).

Bode M, Probert W, Turner WR, Wilson KA, Venter O. 2011. Conservation Planning with Multiple Organizations and objectives. Conservation Biology. 25:295–304. doi:10.1111/j.1523-1739.2010.01610.x.

Borgström S, Zachrisson A, Eckerberg K. 2016. Funding ecological restoration policy in practice-patterns of short-termism and regional biases. Land Use Policy. 52:439–453. doi:10.1016/j.landusepol.2016.01.004.

Borie M, Mathevet R, Letourneau A, Ring I, Thompson JD, Marty P. 2014. Exploring the contribution of fiscal transfers to protected area policy. Ecology and Society:19(1).

Bos M, Pressey RL, Stoeckl N. 2015. Marine conservation finance: the need for and scope of an emerging field. Ocean and Coastal Management. 114:116–128. doi:10.1016/j.ocecoaman.2015.06.021.

Braun V, Clarke V. 2012. Thematic analysis. In: Cooper H, Camic PM, Long DL, Panter AT, Rindskopf D, Sher KJ, editors. APA handbooks in psychology®. APA handbook of research methods in psychology, Vol. 2. Research designs: quantitative, qualitative, neuropsychological, and biological. Washington, DC: American Psychological Association; p. 57–71.

Braun V, Clarke V. 2006. Using thematic analysis in psychology. Qualitative Research in Psychology. 3 (2):77–101. doi:10.1191/1478088706qp063oa.

Brockington D, Scholfield K. 2010. Expenditure by conservation nongovernmental organizations in sub-Saharan Africa. Conservation Letters. 3(2):106–113. doi:10.1111/j.1755-263X.2010.00094.x.

Bruner AG, Gullison RE, Balmford A. 2004. Financial costs and shortfalls of managing and expanding protected-area systems in developing countries. BioScience. 54(12):1119–1126. doi:10.1641/0006-3568(2004)054[1119:FCASOM]2.0.CO;2.

Buckley R. 2010. Conservation tourism. Wallingford: CAB International.

Buckley RC, Morrison C, Castley JG. 2016. Net effects of ecotourism on threatened species survival. PLoS ONE. 11(2).

Ching LL, Lin LL. 2019. Cornerstones of the post-2020 biodiversity framework. In: Adams B, Billorou CA, Bissio R, Ling CY, Donald K, Martens J, Prato S. Reshaping governance for sustainability: transforming institutions – shifting power – strengthening rights. Spotlight on Sustainable Development 2019. Beirut / Bonn / Ferney-Voltaire / Montevideo / New York / Penang / Rome / Suva: Social Watch, Global Policy Forum, Development Alternatives with Women for a New Era, Public Services International, Third World Network, Arab NGO Network for Development, Society for International Development, Center for Economic and Social Rights.

Chow J. 2015. Forests as capital: financial mechanisms for tropical forest conservation. Journal of Sustainable Forestry. 34(6–7):517–533. doi:10.1080/10549811.2015.1056372.

Cimon-Morin J, Darveau M, Poulin M. 2013. Fostering synergies between ecosystem services and biodiversity in conservation planning: a review. Biological Conservation. 166:144–154. doi:10.1016/j.biocon.2013.06.023.

Clegg S.2005. Evidence-based practice in educational research: a critical realist critique of systematic review. British Journal of Sociology of Education. 26(3):415–428.

Clist P. 2019. Payment by results in international development: evidence from the first decade. Dev Policy Rev. 37(6):719–734. doi:10.1111/dpr.12405.

Correa J, van der Hoff R, Rajão R. 2019. Amazon Fund 10 years later: lessons from the world's largest REDD+ program. Forests. 10(3):272. doi:10.3390/f10030272.

Corson C. 2010. Shifting environmental governance in a neoliberal world: US AID for conservation. Antipode. 42(3):576–602. doi:10.1111/j.1467-8330.2010.00764.x.

CreditSuisse and McKinsey. (2016) Conservation finance from niche to mainstream: the building of an institutional asset class. Credit Suisse Group AG and McKinsey Center for Business and Environment.

Dempsey J, Suarez DC. 2016. Arrested development? The promises and paradoxes of "selling nature to save it". Annals of the American Association of Geographers. 106(3):653–671. doi:10.1080/24694452.2016.1140018.

Emerton L, Bishop J, Thomas L. 2006. Sustainable financing of protected areas: a global review of challenges and options. Gland, Switzerland: IUCN.

EuropeanCommission. 2012. Innovative use of financial instruments and approaches to enhance private sector finance of biodiversity. 070307/2010/581922/ETU/F1: 1-57. European Commission Directorate-General Environment. London.

Feger C, Pirard R. 2011. Assessing funding needs for biodiversity: critical issues. *Iddri, Policy Briefs*.

Figaj M. 2010. Who gets environmental aid? The characteristics of global environmental aid distribution. Environmental Economics and Policy Studies. 12(3):97–114. doi:10.1007/s10018-010-0165-6.

Fletcher R, Breitling J. 2012. Market mechanism or subsidy in disguise? Governing payment for environmental services in Costa Rica. Geoforum. 43(3):402–411. doi:10.1016/j.geoforum.2011.11.008.

Githiru M, King MW, Bauche P, Simon C, Boles J, Rindt C, Victurine R. 2015. Should biodiversity offsets help finance underfunded protected areas? Biological Conservation. 191:819–826. doi:10.1016/j.biocon.2015.07.033.

Gockel C, Gray L. 2011. Debt-for-nature swaps in action: two case studies in Peru. Ecology and Society. 16(3):2.

Goede M, Randalls S. 2009. Precaution, preemption: arts and technologies of the actionable future. Environment and Planning D: Society and Space. 27(5):859–878. doi:10.1068/d2608.

Gough D, Thomas J. 2012. Commonality and diversity in reviews. In: Gough D, Oliver S, Thomas J, editors. An introduction to systematic reviews. London: Sage. p. 35–65.

Gubbi S. 2010. Are conservation funds degrading wildlife habitats? Economic and Political Weekly. 45:22–25.

Guest G, MacQueen KM, Namey EE. 2011. Applied thematic analysis. Thousand Oaks, California: Sage.

Gutman P, Davidson S. October 2007. A review of innovative international financial mechanisms for biodiversity conservation with a special focus on the international financing of developing countries' protected areas. *WWF-MPO Washington DC*.

Hamrick K (2016) State of private investment in conservation 2016: a landscape assessment of an emerging market. Ecosystem Marketplace.

Harrigan J, Wang C. 2011. A new approach to the allocation of aid among developing countries: is the USA different from the rest? World Development. 39(8):1281–1293. doi:10.1016/j.worlddev.2010.12.011.

Hein L, Miller DC, de Groot R. 2013. Payments for ecosystem services and the financing of global biodiversity conservation. Current Opinion in Environmental Sustainability. 5(1):87–93. doi:10.1016/j.cosust.2012.12.004.

Hermoso V, Clavero M, Villero D, Brotons L. 2016 March. EU's conservation efforts need more strategic investment to meet continental commitments. Conservation Letters. 1–7.

Hickey V, Pimm SL. 2011. How the World Bank funds protected areas. Conservation Letters. 4(4):269–277. doi:10.1111/j.1755-263X.2011.00172.x.

Holloway I, Galvin K. 2016. Qualitative research in nursing and healthcare. New Jersey: John Wiley & Sons.

Holloway I, Todres L. 2003. The status of method: flexibility, consistency and coherence. Qualitative Research. 3(3):345–357. doi:10.1177/1468794103033004.

Holmes G, Scholfield K, Brockington D. 2012. A comparison of global conservation prioritization models with spatial spending patterns of conservation nongovernmental organizations. Conserv Biol. 26(4):602–609. doi:10.1111/j.1523-1739.2012.01879.x.

Huwyler F, Käppeli J, Serafimova K, Swanson E, Tobin J. 2014. Conservation finance: moving beyond donor funding toward an investor-driven approach. Credit Suisse, WWF, McKinsey & Company: Zurich (Switzerland).

Igoe J, Neves K, Brockington D. 2010. A spectacular eco-tour around the historic bloc: theorising the convergence of biodiversity conservation and capitalist expansion. Antipode. 42(3):486–512. doi:10.1111/j.1467-8330.2010.00761.x.

IUCN. 2012. Identifying and mobilizing resources for biodiversity conservation. Gland (Switzerland): IUCN Global Economics Programme.

James A, Gaston KJ, Balmford AC. 2001. Can we afford to conserve biodiversity? BioScience. 51(1):43–52. doi:10.1641/0006-3568(2001)051[0043:CWATCB]2.0.CO;2.

Johnson AE. 2009. Money matters: financial flows and priority setting around podocarpus National Park, Ecuador. Journal of Sustainable Forestry. 28(6–7):712–734. doi:10.1080/10549810902922359.

Klimpel T, Peiffer A, Mannigel E 2017. Private capital for nature conservation: could impact investments be a solution? In: Bonn & Radolfzell, editors. OroVerde the Tropical Forest Foundation and Global Nature Fund (GNF) International environment and nature foundation. Germany.

Klingebiel S 2012. Results-based aid (RBA): new aid approaches, limitations and the application to promote good governance. Discussion paper. Bonn: German Development Institute/Deutsches Institut f€ur Entwicklungspolitik (DIE).
Larson ER, Howell S, Kareiva P, Armsworth PR. 2016. Constraints of philanthropy on determining the distribution of biodiversity conservation funding. Conservation Biology. 30(1):206–215. doi:10.1111/cobi.12608.
Lin L, Sills E, Cheshire H. 2014. Targeting areas for reducing emissions from deforestation and forest degradation (REDD+) projects in Tanzania. Global Environmental Change. 24:277–286. doi:10.1016/j.gloenvcha.2013.12.003.
Little LR, Parslow J, Fay G, Grafton RQ, Smith ADM, Punt AE, Tuck GN. 2014. Environmental derivatives, risk analysis, and conservation management. Conservation Letters. 7(3):196–207. doi:10.1111/conl.12041.
Loft L. 2011. Market mechanisms for financing the reduction of emissions from deforestation and degradation in developing countries (REDD) - Learning from payments for ecosystem services schemes. International Journal of Biodiversity Science, Ecosystems Services and Management. 7:204–216. doi:10.1080/21513732.2011.645072.
Lung T, Meller L, AJA VT, Thuiller W, Cabeza M. 2014. Biodiversity funds and conservation needs in the EU under climate change. Conservation Letters. 7(4):390–400. doi:10.1111/conl.12096.
MacDonald KI. 2010. The Devil is in the (Bio)diversity: private Sector "Engagement" and the restructuring of biodiversity conservation. Antipode. 42(3):513–550. doi:10.1111/j.1467-8330.2010.00762.x.
MacDonald KI. 2018. Business, biodiversity and new 'fields' of conservation: the world conservation congress and the renegotiation of organisational order. In: Larsen PB, Brockington D, editors. The anthropology of conservation NGOs: rethinking the boundaries. Cham: Springer International Publishing; p. 71–119.
Mawdsley E. 2012. The changing geographies of foreign aid and development cooperation: contributions from gift theory. Transactions of the Institute of British Geographers. 37(2):256–272. doi:10.1111/j.1475-5661.2011.00467.x.
McFarland BJ. 2015. International finance for REDD+ within the context of conservation financing instruments. Journal of Sustainable Forestry. 34(6–7):534–546. doi:10.1080/10549811.2015.1017109.
Miller DC. 2014. Explaining global patterns of international aid for linked biodiversity conservation and development. World Development. 59:341–359. doi:10.1016/j.worlddev.2014.01.004.
Nowell LS, Norris JM, White DE, Moules NJ. 2017. Thematic analysis: Striving to meet the trustworthiness criteria. International Journal of Qualitative Methods. 16(1):1609406917733847. doi:10.1177/1609406917733847.
OECD. 2013. Scaling-up finance mechanisms for biodiversity. Paris:OECD Publishing.
OECD. 2020. A comprehensive overview of global biodiversity finance. Final report, April, 2020. Paris, France: OECD Publishing.
OECD & WEF. 2015. Blended Finance Vol. 1: A primer for development finance and philanthropic funders. Geneva: World Economic Forum.
Parker C, Cranford M, Oakes N, Leggett M. 2010. The little biodiversity finance book: A guide to proactive investment in natural capital (PINC). Oxford: Programme GC (ed).
Pattanayak SK, Wunder S, Ferraro PJ 2010. Show me the money: do payments supply environmental services in developing countries? *Review of Environmental Economics and Policy*: req006.
Paul E. 2015. Performance-based aid: why it will probably not meet its promises. Development Policy Review. 33(3):313–323.
Pearson M, Johnson M, Ellison R. 2010. Review of major results based aid (RBA) and results based financing (RBF) schemes. Final report March 2010. London: DfID Human Development Resource Centre.
Pereira J. 2017. Blended finance: what it is, how it works and how it is used. Brussels, Belgium: Eurodad.
Pilgrim JD, Bennun L. 2014. Will biodiversity offsets save or sink protected areas? Conservation Letters. 7(5):423–424. doi:10.1111/conl.12145.

Pirard R, Lapeyre R. 2014. Classifying market-based instruments for ecosystem services: A guide to the literature jungle. Ecosystem Services. 9:106–114. doi:10.1016/j.ecoser.2014.06.005.
Roe D. 2013. Has biodiversity fallen off the development agenda? A case study of the UK department for international development. ORYX. 47(1):113–121. doi:10.1017/S0030605312000543.
Romero MJ. 2013. A dangerous blend? The EU's agenda to 'blend'public development finance with private finance. Brussels, Belgium: Eurodad.
Romero MJ. 2016. Development finance takes 'Private Turn': implications and challenges ahead. Development. 59(1–2):59–65. doi:10.1057/s41301-017-0074-0.
Romero MJ, Van de Poel J. 2014. Private finance for development unravelled. Brussels, Belgium: Eurodad.
Rosendal GK, Schei PJ. 2014. How may REDD+ affect the practical, legal and institutional framework for 'Payment for ecosystem services' in Costa Rica? Ecosystem Services. 9:75–82. doi:10.1016/j.ecoser.2014.04.009.
Stadler J. 2011. Financial mechanisms for nature conservation - The international level. Natur und Landschaft. 86:166–168.
TEEB. 2013. Natural capital at risk: the top 100 externalities of business. The Economics of Ecosystems and Biodiversity Programme: London.
Turnhout E, Neves K, De Lijster E. 2014. 'Measurementality' in biodiversity governance: knowledge, transparency, and the intergovernmental science-policy platform on biodiversity and ecosystem services (ipbes). Environment and Planning A. 46(3):581–597. doi:10.1068/a4629.
Van der Hoff R, Rajão R, Leroy P. 2018. Clashing interpretations of REDD+ "results" in the Amazon Fund. Climatic Change. 150(3–4):433–445. doi:10.1007/s10584-018-2288-x.
Waldron A, Mooers AO, Miller DC, Nibbelink N, Redding D, Kuhn TS, Roberts JT, Gittleman JL. Targeting global conservation funding to limit immediate biodiversity declines. Proceedings of the National Academy of Sciences of the United States of America. 110:12144–12148.
Wang XH, Berman E. 2014. Financing conservation: some empirical evidence from Florida local governments. Journal of Environmental Planning and Management. 57(5):733–750. doi:10.1080/09640568.2013.767781.
Wendland KJ, Honzák M, Portela R, Vitale B, Rubinoff S, Randrianarisoa J. 2010. Targeting and implementing payments for ecosystem services: opportunities for bundling biodiversity conservation with carbon and water services in Madagascar. Ecological Economics. 69(11):2093–2107. doi:10.1016/j.ecolecon.2009.01.002.
Whitelaw PA, King BEM, Tolkach D. 2014. Protected areas, conservation and tourism - financing the sustainable dream. Journal of Sustainable Tourism. 22(4):584–603. doi:10.1080/09669582.2013.873445.
Woods N. 2008. Whose aid? Whose influence? China, emerging donors and the silent revolution in development assistance. International Affairs. 84(6):1205–1221. doi:10.1111/j.1468-2346.2008.00765.x.
Wunder, S., 2005. Payments for Environmental Services: Some Nuts and Bolts. Occasional Paper No. 42. Center for International Forestry Research, Nairobi, Kenya
Zentelis R, Lindenmayer D. 2015. Bombing for biodiversity-enhancing conservation values of military training areas. Conservation Letters. 8(4):299–305. doi:10.1111/conl.12155.