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Title

Failure to expand? Socio-technical practices and moral judgement in markets for biodiversity offsets

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Abstract

Markets have become an important form of governance in the neoliberal era. The ideology of markets as the most efficient form of organising economic activity has led to expansion of their usage, both in terms of what is governed by the market, but also in terms of the spaces in which the practices of a given market apply. However, there have been important challenges to market expansion, particularly on political and ethical grounds. This paper analyses how the socio-technical practices of market expansion can be affected by political contestation and individual moral judgements. This is analysed in the context of two markets for biodiversity offsets, in the United States and England. In both cases, regulators attempted to devise and standardise calculative mechanisms and socio-technical practices that promoted the use and expansion of the market. However, these socio-technical market practices have struggled to cross and negotiate uneven political and social spaces, being subject to moral judgements and political contestation. The paper demonstrates how the socio-technical practices of market expansion are affected by social entanglements, highlighting how this creates limits to the expansion of the market as a form of governance.

Keywords: Biodiversity offsets, market expansion, marketisation, governance, technological zones, moral economy, noxious markets

1. Expanding markets: Socio-technical practices and barriers

Neoliberal governance has been characterised by the expansion of markets, both in terms of what classes of objects are governed by the market and the geographical reach of markets. Market expansion requires that the socio-technical practices of the market – commodification, calculation and the metrology which underpins them – are applied to new and/or distant objects. However, it has been noted that market expansion is not always smooth, with marketisation coming across a number of barriers. This section reviews the socio-technical practices of expansion (section 1.1), using the Science and Technology Studies (STS)-inspired framework known as performativity of economics. The strengths and shortcomings of the framework are also addressed, especially in terms of assessing how the socio-technical practices of market expansion can be contested. In order to address those limitations, the paper introduces the framework of moral limits to markets, which provides insights into how market expansion can be contested (section 1.2).

1.1. Performing the market: The socio-technical practices of qualitative and quantitative expansion

The neoliberal era has been characterised by a ‘...dogmatic belief in the market as the best way to govern virtually all economic activities’ (Nelson 2003, p. 697), which has animated the use of markets to hitherto-unmarketed goods and services. The rationale for using markets as the preferred form of governance is guided by the implicit assumption that continued market expansion is not only possible, but also warranted and desirable. Markets are seen as reproducible and capable of delivering improved welfare across issues and spatial locations. One of the frameworks which analyses the origins of markets is the STS-inspired literature on the *performativity of economics* (Callon 1998a, 1998b, 1999, Callon and Muniesa 2005,

Garcia-Perpet 2007, MacKenzie 2007, 2008, MacKenzie *et al.* 2007, Muniesa and Callon 2007, Muniesa *et al.* 2007). The performativity of economics thesis sees markets as the products of economic agents' engagement with knowledge, models and technical tools produced by economic sciences, which they seek to emulate in practice. In this model, capitalist systems expand by extending the market into the non-market space, marketising existing externalities (Callon 1998a, Mitchell 2007).

The performativity of economics literature understands the concept of externality very similarly to economic sciences: Externalities consist of goods or services which are not governed by the market, and for which there is no price which accurately reflects their social value or cost (Coase 1960, Hanley *et al.* 2007). Callon's addition to this definition involves the insight that processes of marketizing a good or service ('framing') will inevitably result in the creation of new externalities, so complete framing is impossible (Callon 1998a). Overall, the concept that markets expand by bringing non-market goods into the fold of the market is based on a perceived dualism between market and non-market, prevalent in the performativity of economics literature, but not shared by other critical approaches (see below).

However, markets neither emerge nor expand of their own accord. According to the performativity of economics literature, market creation and expansion requires first that the actors involved engage with and perform the principles of market operations as described by economic sciences (Callon 1998b, 2007, Garcia-Perpet 2007, MacKenzie 2007). Second, they require that the models and tools of economics are deployed in the creation of calculative devices, which measure, quantify and frame the externality as a marketable commodity (Callon 1998a, Callon and Muniesa 2005, Muniesa *et al.* 2007, Miller 2008, Lohmann 2010).

In his study of the expansion of carbon markets, MacKenzie (2009a) demonstrated the creation of socio-technical practices to ‘make things the same’: First, different ‘things’ are made commensurable; and second, the processes and tools by which the resulting commodity is treated by the various actors involved is standardised. This extended socio-technical process of ‘making things the same’ maps onto the dynamics of market expansion across two dimensions: First, expansion in terms of the number of ‘things’ which are brought into the market; and second, expansion in terms of the space across which a given ‘things’ is governed by the market. This is achieved through the creation of calculative devices which produce commensurability between different (and possibly incommensurable) varieties of a given ‘thing’. The number of ‘things’ which are governed by the market grows by the addition of new goods, qualitatively different from those previously marketised. Consequently, we can describe this as a form of *qualitative expansion*.

For qualitative market expansion to take place, it is not enough that externalities are measured, assessed, quantified, and reduced to a format which allows agents to include them in their calculations. For the market to work on a stable manner, it is necessary to develop metrological regimes – sets of calculative devices, but also rules and practices, which create a predictable environment for economic actors (Callon 1998a). Metrological regimes are better understood as assemblages for governing economic life, aligning the various agents and stabilising the exchange (Miller and Rose 1990, Rose and Miller 1992, Miller and O’Leary 2007, Miller 2008). Metrological regimes are a key component of qualitative market expansion, underpinning how externalities are marketised.

The second form of market expansion consists of the extension of space wherein a given good or service is governed by the market. One example involves the marketisation of

reduction in carbon emissions. In 1990 only two countries used market mechanisms to price CO₂ emissions; by 2017, at least 42 national or supra-national¹ carbon pricing programmes were in operation, governing CO₂ emissions in a significant proportion of the globe (World Bank *et al.* 2016). As a result of this expansion, ‘things’ produced in one location can be offset against a reduction in the amount of the same ‘thing’ achieved elsewhere. In this case, the expansion of the market is *quantitative*: By extending the geographical reach of the market, a greater quantity of the same goods is marketised.

Quantitative market expansion requires that the metrological regimes operate seamlessly across space, assuring agreement in terms of the characteristics of the commodity. This involves standardising the operation of calculative devices across space, thus assuring that the commodity remains commensurable regardless of its physical location. This is achieved through the creation of ‘technological zones’, specific forms of space within which common standards have been established, in order to reduce the differences between technical practices and procedures (Barry 2006). Technological zones are fundamental to the expansion of the market across space; they constitute the spaces within which it is possible to speak of a single market (Barry and Slater 2002, Kama 2014).

The STS-based approach is often associated with ‘quasi-markets’ (Breslau 2013), designed to support policy objectives. Examples of markets analysed include fisheries stocks (Holm and Nielsen 2007), biodiversity (Pawliczek and Sullivan 2011, Apostolopoulou and Adams 2015a, Sullivan and Hannis 2015, Ferreira 2017, Ferreira and Ferreira 2018), reductions in sulphur emissions (Schmalensee *et al.* 1998) and reductions in carbon dioxide emissions (MacKenzie 2009b, 2009a). This indicates that the model is indicated to the study of

¹ This number includes the European Union Emissions Trading Scheme (EU-ETS), in which all 28 EU member states participate, plus Iceland, Norway, and Liechtenstein.

situations which involve experimenting with markets to achieve environmental objectives (Callon 2009), as it reflects how economic principles suffuse the institutional design (Breslau 2013). It also helps to illustrate how the material expression of those economic models is mediated by the political environment in which they exist (Ferreira and Ferreira 2018).

However, the model does not fully account for either the emergence or the expansion of markets. According to the ‘performativity of economics approach’ presented above, market expansion is a function of the expansion of socio-technical practices of calculation. This is based on the implicit assumption that calculations in the market can be isolated from perceived sources of bias, such as the political preferences or moral judgements of the calculative agencies. For purposes of operation in the market, individuals will, purportedly, operate under the bounded rationality of the strictly utility-maximising *Homo economicus*. In this view, calculations take place exclusively in the market, while other forms of governance use alternative methods of decision-making. This perspective is unsatisfactory: Governance routinely involves calculation in which social aspects play a role. This paper will now turn to the role played by political preferences and moral judgement in the processes of market expansion.

1.2. The uneven social spaces of market expansion: political and moral judgement

Despite the (implicit) expectation of market expansion, in practice the process is often contested. Markets are always the contingent outcome of the manner in which they are performed and reproduced (Berndt and Boeckler 2009, Hall 2012), which means their expansion depends on the political economy on which they operate (Nelson 2003).

Challenges to the idea of market expansion have been frequent and varied. In his study of 19th Century liberalism, Karl Polanyi noted the expansion of the market as a form of governance to what he described as fictitious commodities (labour, land and money), which are not produced for exchange (Polanyi 1944). Polanyi described this as a process of making society dependent on the economic system – what he termed the construction of a ‘market society’ – which would present challenges to human freedom, particularly in contexts of rapid technological development (Polanyi 1957a, 1957b, 1957c). Polanyi’s view was that governments’ role was to limit the marketisation of fictitious commodities, and hence market expansion (Polanyi 1944).

While Polanyi’s analysis focused on the interaction between market ideology and political control, the understanding the political economic context of markets cannot be divorced from questions of legitimacy and values. The legitimacy of forms of economic governance rests on their conforming to the values of the societies in which they operate (Sayer 2007). Markets require a narrow algorithmic vision of how to ascertain and calculate those values – for example, by using cost-benefit analysis (O’Neill 1993). This need for commensurability is entirely consistent with the performativity of economics perspective, which describes economic agents in markets acting as utility maximisers (Callon 1998b). The development of calculative agencies has the role of allowing this to take place, by assuring commensurability and hence exchange between comparable values. However, societies exhibit a plurality of values and preferences, which policy should strive to reproduce (Martinez-Alier *et al.* 1998, O’Neill and Spash 2000, O’Neill 2001). The assumption of commensurability in market exchange ignores the social meanings attached to acts of exchange, by ignoring the existing variety of moral preferences (O’Neill 1993). To focus on commensurability for the purposes of market exchange can have a negative impact on the legitimacy of markets.

Where social legitimacy is not achieved, the expansion of markets can become contested. Specifically, it has been suggested that there are ‘spheres’ of social life upon which the encroachment of markets is unwelcome and politically contested (Anderson 1995, Walzer 2010). This moral economy approach has argued for strong boundaries, separating the market and non-market spheres of life, and allowing social values to flourish outside the market. The objective of these boundaries is, ultimately, not only to present barriers to market governance, but to protect freedom, quality, and to block the exercise of certain forms of power (Rodrigues 2008).

Raising ethical objections to market expansion highlights that the issue of how far markets should be allowed to expand involves moral judgements. Ethicist Deborah Satz has argued that the marketisation of some goods can result in feelings of disapproval or repugnance (Satz 2010, Ferreira 2015). The reasons for a negative moral judgement vary: They can involve a dislike for the market promoting weak agency on the part of the individuals involved; the consequent promotion of vulnerability and inequality through marketisation; the possibility of extreme harm to individuals; and the possibility of extreme harm to society. While the causes of rejection of markets are varied, the moral judgement aspect of this opposition to marketisation is important: While Polanyi viewed some commodities as fictitious, in the sense that they were not originally meant for exchange in markets, both the idea of spheres of exchange and Satz’s model suggests that the legitimacy of market expansion is the result of normative preferences. This suggests that marketising certain goods can clash with moral judgements – made by individuals and groups, such as communities – for how said goods are governed and made available, which leads to contestation of market expansion.

This review has identified the socio-technical practices by which markets expand – development of metrological regimes and institution of technological zones – as well as political and moral objections to that expansion. These competing tendencies – for and against market expansion – are likely to interact differently in different political-economic settings. The paper explores how socio-technical practices of market expansion are affected by moral judgement and political contestation. This is done in two specific case studies: The markets for biodiversity offsets in the US and UK.

2. Research context and approach

2.1. Biodiversity offsets

Biodiversity offsetting has been identified by both its promoters and policymakers as a possible mechanism to reduce the loss of biodiversity to development (ten Kate *et al.* 2004, TEEB 2008, BBOP 2012a). Biodiversity offsets are defined as ‘...conservation activities intended to compensate for the residual, unavoidable harm to biodiversity caused by development projects’ (ten Kate *et al.* 2004, p. 3), with the objective of achieving no net loss of biodiversity (ICMM 2005, ten Kate and Inbar 2008, Treweek *et al.* 2009). The industry reports widespread use of offsetting worldwide, with a variety of biodiversity offsetting mechanisms in operation: As of 2017, the Global Species Banking website lists 67 different biodiversity offsetting programmes, 22 of which in development, in 23 different countries worldwide (Ecosystem Marketplace 2017). The most recent estimates suggest that a total size of biodiversity offsets between US \$2.4-4.0 billion worldwide, with over 187,000 hectares of land reserved for offsetting (Madsen *et al.* 2011).

Of particular interest are biodiversity offsetting programmes, defined as ‘...any law or policy established, enhanced and/or preserved for the purpose of generating certified credits that

may be sold for compensatory mitigation for impacts to biodiversity' (Ecosystem Marketplace 2017). By allowing 'certified credits' to be systematically bought and sold, these programmes constitute markets for biodiversity offsets. In these markets, buyers (developers) acquire a given amount of a commodity (biodiversity 'credits') from sellers (such as landowners or dedicated providers) at an agreed price. The quantity of biodiversity credits bought is determined by the need to secure no net loss of biodiversity, meaning that it must be equivalent to the quantity of biodiversity lost to development, according to a given measurement.

Promoters of biodiversity offsetting suggest that these markets have the potential to expand to become important forms of governance of nature (ten Kate *et al.* 2004, Crowe and ten Kate 2010, PriceWaterhouseCooper LLC 2010, BBOP 2012a). An analysis of the collaboration between transnational companies, financial institutions, governments and non-governmental organisations (NGOs) in the Business and Biodiversity Offsets Programme (BBOP) suggests that the organisation has promoted standards which seek to achieve the commensurability and substitutability of species (BBOP 2009, 2012b, 2012a), promoting biodiversity offsetting as a conservation technology with global objectives (Sullivan and Hannis 2015).

The potential for expansion has also been noted by critics of offsetting. It has been suggested that markets for biodiversity offsets constitute examples of 'green-grabbing', designed to expand capitalist governance to the detriment of non-market forms conservation (Apostolopoulou and Adams 2015b). In an analysis of the USA-based Species Banking website, a clearing house for biodiversity offsets, Pawliczek and Sullivan note that these '[m]arket-based strategies are promoted as neoliberal governance solutions to environmental problems, from local to global scales' (2011, p. 435), again suggesting the potential for global expansion of markets for biodiversity offsets.

2.2. Cases and research approach

The paper analyses the attempts to expand two markets for biodiversity offsets, in the United States and in England. These two programmes were chosen to represent a mature market (US Species Banking, which has been in operation since circa 1992) and a nascent market (UK Biodiversity Offsets Pilots, which ran between 2012 and 2014). The two programmes present important contrasting points, as summarised in Table 1.

==TABLE 1==

While the premise of no net loss of biodiversity is promoted in both cases, the scope of compensation differs: In the Species Banking project the objective is to achieve no loss of individual endangered species, while the UK biodiversity offsets programme seeks to account for all habitat losses due to development. This creates differences in terms of the proxies for biodiversity used in each case, as well as in terms of the devices used frame biodiversity. It should also be noted that no net loss of biodiversity is not an unproblematic term. Rooted in the political project to marketise wetlands in the United States (Robertson 2000), it translates an economic and accounting understanding of the environment, not biological knowledge. No net loss of biodiversity indicates an aspiration, but conceals a failure to deliver in terms of conservation (Sullivan and Hannis 2015, Ferreira 2017). A second difference which led to these two programmes being chosen is the historical background associated with each programme. The US programme has been operating since 1992, with 139 biodiversity banks (providers of biodiversity credits) registered. In contrast, the English programme operated between 2012 and 2014, at a set of 6 experimental (pilot) areas (DEFRA 2012a). These differences in the length of time in operation have the potential to result in different practices

and organisations in the markets. In terms of regulation, both cases operate against the background of legislation requiring the protection of biodiversity (the Endangered Species Act of 1973 in the US, and the Section 106 of the Town and Country Act 1990 in the England). Both regulations enshrine the principle that development can be stopped if it results in significant damage to natural values. However, neither offsetting nor no net loss of biodiversity is specifically required in either regulatory framework. This effectively means that both markets face competition from non-market forms of providing compensation.

The research involved two stages. The first was document analysis of available information about biodiversity offset markets, including peer-reviewed academic materials, reports, grey literature and websites. This was followed by the collection of primary data, through 24 semi-structured interviews with stakeholders involved in these markets (policymakers, biodiversity offsetting promoters, offset providers, consultants, NGOs, corporate environmental and reputation managers and market intermediaries). Participants were selected for their roles in creating and shaping the markets in each case. Given that access to participants was at times difficult to secure, it was impossible to interview comparable stakeholders for both cases. This limitation was addressed by interviewing individuals with transnational experience of biodiversity offsetting, and by triangulating interview data with secondary data.

Relevant individuals were identified from lists of participants in conferences and workshops on biodiversity offsetting, reports and websites with information on the topic. Interviews took place between 2012 and 2014. Table 2 lists the participants, the cases they were involved in and their roles.

==TABLE 2==

3. The Species Banking programme in the United States

3.1. Emergence and principles

The development of a biodiversity offsetting market in the United States first emerged from the need to address obstacles to development derived from environmental regulation. After approval of the Endangered Species Act (ESA) of 1973, planners and resource agencies became legally required to reject development projects likely to impact endangered species. The Act created a legal framework for planning that gave strong preference for conservation over economic development. However, implementation proved to have unintended consequences. Confronted with the prospect that development might be stopped by the discovery of listed species in their property, landowners began to selectively eradicate them, further endangering listed species (Bayon *et al.* 2008). This led planners to conclude that the balance between conservation and development had shifted excessively towards the former. One mechanism which promised to redress this imbalance consisted of allowing developers to compensate for species losses by acquiring certified species ‘credits’ from biodiversity ‘banks’ (Fox and Nino-Murcia 2005, Bayon *et al.* 2008). Unofficial practice in offsetting biodiversity losses eventually led to the Species Banking programme being established in the early 1990s, in the Central Valley of California. The Species Banking market provides offset for losses of endangered species. This specificity allows entrepreneurs to invest in land areas (species banks) in which endangered species are protected, thus producing credits for sale.

The programme first emerged in the absence of federal guidance, from the initiative of the local field offices of the United States Fish and Wildlife Service (USFWS), in coordination with public and private stakeholders (Mead 2008). Local agencies regulators cooperated with developers to allow offsetting of biodiversity losses. This effectively allowed them to comply

with the various environmental regulations while allowing development to take place. Arguably, planners and the remaining stakeholders could have attempted to change the regulations which required that development was stopped outright in case endangered species were affected. However, it is likely that such activities would be seen as attempts to reduce environmental protection, resulting in political contestation. The use of a market mechanism promised to help rebalance conservation and development (Gardner 2011) in a less controversial fashion.

Despite the first habitat bank being established in October 1992, federal guidance for the use of conservation banks would not appear before May 2003 (USFWS 2003). This guidance led to a renewed interest in the potential uses of the market to govern biodiversity, and put it on a path to expand its reach.

3.2. Expanding the market

The USFWS's Guidance for the Establishment, Use, and Operation of Conservation Banks sought to '...articulate generally applicable mitigation standards and principles and to explain how they are to be accomplished in the special context of conservation banks' (2003, p. 1). In its attempt to standardise and harmonise the operation of conservation banks, the regulator noted that '...it is important that the essential components and operational criteria of conservation banks are *standardized to ensure national consistency* (2003, p. 1, emphasis added). This articulation suggested that the regulator expected that the Species Banking market was likely to expand to cover all the US territory, as noted by the stated objective to assure 'national consistency'.

The mechanism by which this national consistency was sought was the standardisation of the calculative devices by which offsets are calculated. In its guidance, the regulator established a measure – designated *credit* – as the currency for exchange in offsetting:

Credits are the quantification of a species' or habitat's conservation values within a bank. The conservation values secured by a bank are converted into a fixed number of credits that may be bought, sold, or traded for the purposes of offsetting the impacts of private, State, local, or Federal activities. (...) The method of calculating bank credits should be the same as calculating match project impact debits. (USFWS 2003, p. 9)

The objective of the credit is to make biodiversity lost and biodiversity gained elsewhere commensurable. By specifying that credits in different locations are calculated using the same method, the federal regulator is seeking to standardise the calculative practices across the country (as noted above). This suggests an attempt at establishing a technological zone for the operation of conservation banks, as the entire United States territory would apply the same procedures to determine what constitutes an appropriate offset. This would constitute a process of quantitative expansion, by extending the space covered by a single offsets market. Due to its roots on the EFA, which protects endangered species, the Species Banking market is less likely to see qualitative expansion: New species can only be offset when they become endangered.

The regulator's attempts to constitute a technological zone were supported by the mitigation banks industry, as described by a mitigation banker:

There should be equivalent standards for all forms of mitigation. (...) That's all we are asking for, equivalence of standards. If you have that, you don't have all these other pressures, you don't run the risk of attempting to cut corners and buy or promote something because some non-profit is drawing on our nature.

(Interviewee D)

Since its creation, the Species Banking market has suffered competition from alternative forms of compensation, including one-off offsets (provided by the developer on a case-by-case basis) and *in-lieu* fees (payments into environmental funds) (Madsen *et al.* 2010). In the case of one-off offsets, no exchange takes place, while in the case of *in-lieu* fees there is no attempt at strong commensurability (O'Neill 1993, Martinez-Alier *et al.* 1998) between losses and the fee. This suggests these compensatory mechanisms are not attempting to perform as markets – they are non-market forms of compensation for biodiversity losses. Species Banking, on the other hand, is explicitly based on the concept of economic exchange, to allow landowners to capitalise non-market values, and uses explicit economic models in its operation (Ferreira and Ferreira 2018). This suggests Species Banking operates closer to the idea of a market.

Competition from the non-market forms of compensation (one-off offsets and *in-lieu* fees) has historically been one of the greatest challenges faced by mitigation bankers in the Species Banking programme, as noted by all the US-based stakeholders interviewed: Mitigation banks tend to have higher overheads and upkeep costs than alternative mechanisms, making them less competitive. Competition from the alternative forms of compensation, offered for example by non-profit organisations, has hindered the expansion of the Species Banking programme (Ferreira and Ferreira 2018).

Several of the US-based interviewees referred to the establishment of a common standard of offsetting as the creation of a 'level playing field'. The concept of the level playing field, while referring to competition between market and non-market forms of compensation, also refers indirectly to the establishment of a technological zone covering all the United States territory. All forms of compensation could then converge into the market practice, since all agents would be required to use the calculative mechanisms of the market. In those circumstances, developers would likely be required acquire compensation from biodiversity

offsets providers, as this would follow the legal standards. In this circumstance, the establishment of the technological zone is a competitive strategy from the part of the promoters of Species Banking, who seek to promote the socio-technical practices of the market over non-market practices. By favouring standardisation of the practices of offsetting, the USFWS and the mitigation banking industry attempted to follow a quantitative market expansion strategy.

3.3. Barriers to expansion

Despite being the largest and most important biodiversity offsets programme in the world (Madsen et al., 2010), and despite the attempts to expand its usage, Species Banking remains a limited and comparatively small mechanism for compensating biodiversity losses in the United States. Its development and expansion has been uneven: The 139 mitigation banks registered in the speciesbanking.com website are distributed across only 13 US States, with the vast majority (112) located in California (Ecosystem Marketplace 2015). This disparate distribution has meant that there is no national programme of biodiversity offsetting to speak of, but rather several individual locations where the practice takes place.

Part of the reason for the difficulty in establishing a technological zone is associated with the individuals involved in overseeing its operation on the ground. Each field office of the USFWS has the autonomy to accept or reject different forms of mitigation, and often shows little interest in adopting the socio-technical market practices recommended at federal level (Fox and Nino-Murcia 2005). This was confirmed by a consultant working for an information-provider in the environmental markets sector:

Part of the problem in the US is that while banking is working, or is strong in some areas, in other areas, it hasn't been picked up – for a number of reasons, but certainly because the status quo is easier than learning a new thing. So, there

are a lot of regulators that even though they have heard of conservation banking, it's not on their priority to figure it out and start taking it. (Interviewee D)

While the suggestion that local regulators fail to give priority to offsetting because of the difficulty of learning new processes may be simplistic, the political dimension of the process of marketisation is nevertheless clear. Market expansion requires continued engagement with local political decision-makers and local regulators, which prevent the framing process to be successful. Biodiversity cannot be fully separated from the social and political spheres, a prerequisite of commodification. As a result, its governance continues to be subject to considerations other than the calculations produced by calculative devices. The federal efforts to standardise socio-technical practices and construct a technological zone can and have been resisted at the local level.

In an attempt to address this issue, the offsetting industry has lobbied the US-FWS for federal regulation supporting offsetting over competing forms of compensation. In the background to this is a similar campaign in the context of the wetlands mitigation banking programme (Gardner 2011). In that instance, the wetlands mitigation industry obtained a 'Final Rule' from the federal regulator (the Environmental Protection Agency), giving primacy to mitigation banking over non-market competitors (EPA 2008, Hough and Robertson 2008, Madsen 2013). However, the US-FWS has so far not given preference to the Species Banking market over alternative forms of compensation. Furthermore, it is unclear that a preference ruling would succeed in establishing a national market:

...even to that [potential preference ruling] there is resistance, cultural resistance some times within the agencies, because people are making money off the environment, and there are still a lot of folks in the agencies that feel that way.

(Interviewee H)

As the interviewee suggests, USFWS field officers continue to give preference to non-market forms of offsetting. Marketisation is opposed because of a moral stance against the concept of profiting from the environment. For the individuals mentioned by the interviewer, Species Banking is a noxious market, trading in a commodity (endangered species) which should not be subject to market governance. These individuals have the agency to oppose the market, by continuing to accept (and maybe support) alternative, non-market forms of compensation for biodiversity losses.

In addition, even where the marketisation of endangered species is accepted, the creation of a technological zone for the Species Banking has so far proved impossible. Despite the guidance issued by the US-FWS, there is currently a wide multiplicity of socio-technical practices of calculation in use. This was described by a consultant working for an information provider:

Each region has sort of its guideline for how you credit both credits that have been created, as well as impacts, although certain regions do the same methods and standards. There are 38 different regulatory regions in the US, and potentially you would have 38 regimes [of calculation]. (Interviewee D)

The degree of variety of calculative devices is the result of decision-making at each of the regulatory regions. It is appropriate to note that the United States biodiversity offsetting programmes has been in place for several decades; perhaps as a result of this, mechanisms for calculating biodiversity losses have been instituted over time (a form of path dependency), and attempts to converge procedures and devices have consequently met with only limited success. In practice, this makes it difficult to relate current practice in each location to practice elsewhere.

The picture presented by the Species Banking programme reflects difficulties of reproducing the market across a unified technological zone. Competition from non-market forms of compensating for biodiversity impacts has limited the use of the market. Despite attempts to legislate for the use of offsetting, or failing that, of its standards, it has so far been impossible to establish a nation-wide market wherein biodiversity offsets are the *de facto* form of governance. Opposition of local regulators to the attempts by federal regulators and the biodiversity offsets industry on moral grounds has also hindered the expansion of the market. In achieving this, local decision-makers have been assisted by the complexity of qualifying biodiversity and making it calculable, even in a situation where the definition of biodiversity (as endangered species) makes it comparatively simple to make calculable.

While these results cannot be ascribed to path-dependency in the governance of the Species Banking programme alone, the fact that this is the largest offsetting experiment in the world and one of the longest running cannot be ignored. This paper addresses this issue by presenting a second case study, with a much shorter length of operation – the biodiversity offsets pilots programme in England.

4. The biodiversity offset pilots programme in England

4.1. Emergence and principles

In the aftermath of the 2010 UK General Election, the new Coalition Government pledged to pilot biodiversity offsetting. Conservation and land-use planning in England is underpinned by the 2012 National Planning Policy Framework, which establishes that unavoidable damages to biodiversity arising from development can be compensated (Great Britain and Department for Communities and Local Government 2012). The document establishes a mitigation hierarchy, in which biodiversity offsetting should be used only as a last (Sullivan

and Hannis 2015). Compensation for biodiversity loss itself is covered by Section 106 of the Town and Country Planning Act 1990, through which developers and local authorities in England can negotiate compensation agreements. However, the results of these arrangements have been criticised for their lack of efficacy in delivering appropriate levels of conservation (Latimer and Hill 2007). These criticisms were highlighted in a number of policy papers, which suggested that biodiversity offsets could offer an alternative approach (Trewick *et al.* 2009, DEFRA 2010, 2011a, 2011b, Lawton *et al.* 2010). In 2012 the Department for Environment, Food & Rural Affairs (DEFRA) announced that 6 pilot biodiversity offset projects would be commissioned to test the approach (DEFRA 2012a). The 6 pilots, known as the Biodiversity Offsets Pilots, operated between July 2012 and the end of 2014.

In addition to addressing concerns related to biodiversity conservation, the programme was also part of a political project to reform the England's planning regime (Ferreira 2017). The Secretary of State Owen Paterson – a noted proponent of biodiversity offsetting – noted in the introduction of the Pilots to Parliament that biodiversity offsets would be used to 'help the planning system deliver more for the environment and the economy', helping to address the fact that 'some planning decisions take too long and the outcome can be too uncertain, which can hinder development' (Paterson 2013). The same point was made by the DEFRA-sponsored Ecosystem Markets Task Force (EMTF), which elected biodiversity offsets as the ecosystems market most likely to deliver economic growth for the UK (EMTF 2013). These two positions demonstrate how, besides promoting conservation, the programme was designed as a mechanism for promoting economic growth.

4.2. Expanding the market

In order to deliver on the political project to reform planning in England, the Biodiversity Offset Pilots would need to govern over an extensive variety of types of existing biodiversity.

This had an impact on the commodity chosen. The Pilots were designed to provide compensation for habitat losses (DEFRA 2011c), which meant that the programme needed to cover a broad range of situations, and assure commensurability not only across different locations, but also across different ecological contexts (Ferreira 2017). The political decision to create a market which could offset a myriad of biodiversity habitat types created noticeable problems in terms of developing a functioning set of calculative devices. Biodiversity does not lend itself to simple measurement and qualification, as it is a complex construct, covering aspects going from the micro-cellular to the ecosystem level (Whittaker *et al.* 2001, Burgin 2008, Devictor 2015). In addition, there were no readily available devices which could be used to make biodiversity calculable. Conscious of these difficulties, DEFRA suggested an experimental tool for calculating biodiversity values, designated *metric*, to be used by the pilot experiments:

Metrics are surrogates, or combinations of measurements, that together provide an assessment of the biodiversity value of a particular area. The metric allows the biodiversity impact of a development to be quantified so that the offset requirement, and the value of the compensatory action, can be clearly defined. Metrics are transferable between sites and habitats, allowing an impact on one habitat type to be offset with conservation action elsewhere, or involving a different habitat type and/or quality of habitat. (DEFRA 2012b, p. 2)

DEFRA's proposed calculative device is based on the *No Net Loss and Loss- Gain Calculations in Biodiversity Offsets* resource paper developed by the Business and Biodiversity Offsets Programme (BBOP 2012b). BBOP is a transnational organisation, the members of which are mostly large corporations and international environmental NGOs, dedicated to advocating the use of biodiversity offsets worldwide (BBOP 2009). The metric operated by compiling relatively simple indicators from two different sites (the impact and

offset site)², to produce a single score. The process of producing a single score reduced the multivariate aspects of biodiversity to a series of digits which could subsequently be input to a spreadsheet, and weighed according to the importance attributed to each. Complex ecosystems were reduced to, and represented by, a unit value. This is the other powerful governance role of single accounting scores: To make activities and processes that may otherwise have little in common comparable (Miller 2008). In doing so, the metric makes different biodiversities (in different spaces, with different characteristics, values, uses and histories) commensurable. This indicates a process of qualitative market expansion, as hitherto-unmarketed aspects of biodiversity are marketised.

Second, through the action of the metric, the meaning of biodiversity was changed. Rather than a localised set of unique goods, services and values, biodiversity becomes transferable ‘credits’ and ‘debts’, such that impacts in one site can be offset elsewhere, by another habitat type or quality. The metric was promoted as an attempt to develop a standard, acceptable accounting procedure for estimating biodiversity value. In that role, it was also a mechanism of quantitative market expansion, standardising a metrological regime that can make biodiversity commensurable across spaces. The metric was effectively a platform for developing a technological zone, with shared rules of exchange and socio-technical processes of calculation. In promoting this approach, DEFRA was demonstrating its preference for expanding the market for biodiversity offsets.

² The two indicators used are ‘habitat type’, which scores a given habitat in three categories, according to its local distinctiveness (rare or supporting species rarely found elsewhere in the area), and its condition. In its proposed technical paper, DEFRA asserted that ‘[t]here is currently no standard habitat condition assessment tool, although various methods are used for specific purposes.’ (DEFRA 2012b, p. 6).

4.3. Barriers to expansion

Despite the effort to develop a metrological regime and promote a technological zone, the process of expanding the market for biodiversity offsets in England resulted in significant contestation during the operation of the Pilots. This was due to ongoing concerns about the potential environmental impacts of biodiversity offsets. Activists remarked that offsetting has the potential to secure the approval of planning applications that would have otherwise been rejected – a possibility described by critics of offsetting as a ‘license to trash’ (Birdwatch 2013, Carrington 2013, Howarth 2013, McGrath 2013, Clough 2014). As the use of the expression ‘license to trash’ became widespread in the media, it became apparent that the political dimensions of biodiversity had not been entirely subordinated to the operation of the metric. This was reflected in the reluctance to see the market for biodiversity offsets expand. This was noted by a planning officer in one of the areas where the Offset Pilots were taking place:

Our steering group is very keen that the offset provision is done within the [local authority] area, smaller than the county. They want it to try to be as close to the development as they can. (...) One of the reasons for that is local people are often concerned about the wildlife in their area, and if they see an area they know is quite good for wildlife being lost, it is important they also see the local benefits of the offsets. I think tying it geographically to where the damage is being done is crucial. That will be needed to take local people and communities to support the project. (Interviewee M)

The ‘local’ aspect of biodiversity has both geographical and political dimensions. Not only is biodiversity attached to a ‘local’ habitat, it also inhabits a ‘local’ political territory.

Confirming this view, another planning officer working in a second pilot biodiversity offset area displayed similar views:

[Biodiversity offsetting] has got to be within the district, definitely. (...) We are very localised, parochial on those things. The elected members probably wouldn't accept [offsetting] further afield than the district itself. (Interviewee N)

Both officers suggested that local political agents (the *steering group* or the *elected members*), would not 'accept' or 'support' a wide spatial expansion of the market. This raises questions in terms of the legitimacy of a quantitative market expansion: Affected individuals are likely to contest and oppose market practices which displace the impacts of development over biodiversity. Such an expanded market would be noxious, for its potential to result in extreme damages to nature in a given area. This perspective contrasts with the stated intention to expand the market: While DEFRA stated in its *Principles* document that biodiversity offsets should be managed by local authorities and follow local conservation priorities (DEFRA 2011c), it never defined service areas³ within which offsets could be used, as is common in other programmes (Treweek *et al.* 2009). This contributed to fuelling suspicion among some opponents that an eventual England-wide biodiversity offsetting market would allow buyers to acquire offsets far from the impact area, resulting in displacement of damages and effective loss of biodiversity. As noted by the scientific coordinator of a large environmental NGO in the UK,

I find it very hard to picture how a system would work effectively in terms of biodiversity outcomes. (...) I can see how it might work in terms of local decision-

³ Service areas are a feature of the Species Banking programme, as well as the related Wetlands Mitigation Banking programme. They consist of geographically-bounded areas within each impacts can be compensated from a given mitigation bank (Bonnie and Wilcove 2008, Treweek *et al.* 2009). The objective is to localise the compensation for biodiversity lost.

making, if you just let each local authority do its own thing; I don't think that would work for developers, and I think the market would become highly fragmented. There would be no clear market, to be absolutely honest, because all my experience with developers is, they don't just work in one small local authority area, or very few of them do, but work across multiple local authority areas, and it might be one region of the country, or the big developers clearly work across the whole country. The one thing they are most interested in is a level playing field. If they don't get that, you might find them gravitating towards the area where the offset system, such as it is, is weakest. (Interviewee P)

The interviewee's rationale for being reluctant to support biodiversity offsetting is directly related to the problem of market expansion. A market which remained localised would be fragmented, and of limited use to developers. As no service areas were not defined, the interviewee envisaged a situation where developers effectively cause displacement of biodiversity damages by targeting areas which 'the weakest' policies. Such 'shopping around' for less stringent applications of the principles of biodiversity offsetting is only possible if commensurability between biodiversities in various locations is assured. This would require the creation of a stable technological zone across the country, in which sellers would compete for buyers. The same interviewee also explained that opinions about offsetting in their NGO ranged from positive and interested '...to the highly sceptical, highly cynical, who think it's just another way of developers being allowed to get away with damaging sites and not really paying the true costs', as noted by the same interviewee. The latter position effectively sees offsetting as a 'license to trash'.

The Biodiversity Offsets Pilot projects were not successful in reducing the political contestation against biodiversity offsetting. The reasons for this are associated with the potential expansion of the market. By creating objects which could circulate and have the potential to contribute to displace damages to biodiversity, the metric effectively produced a new contestable object – the biodiversity offset. The reasons for contestation are firmly rooted in a moral objection to market expansion. All actors interviewed for this research agreed with the principle of no net loss of biodiversity, and with the usefulness of making developers pay for their impacts. However, participants questioned the practical feasibility of ever achieving no net loss of biodiversity, as well as the possibility of detaching the location of impacts and offsets. The concept of biodiversity offsets as a ‘license to trash’ translates how market expansion can be noxious (Satz 2010): It encapsulates how expanding the market can result in extreme damages to the environment (and consequently to individuals and society). There is a concern with the transfer of power from society to developers and corporations. The expansion of markets for biodiversity offsets has the potential to weaken the planning process, allowing companies to effectively bypass restrictions by providing compensation elsewhere. This is perceived a unacceptable driver of inequality and vulnerability (Monbiot 2012, Howarth 2013, Ferreira 2017).

The six pilot projects were completed in 2014 and proceeded to report to DEFRA. The final evaluation concluded that the Pilots were partially successfully in testing the metric and governance regimes but found that a nationwide programme would require regulation requiring offsetting to be used. An evaluation of the Pilots (Collingwood Environmental Planning and IEEP 2014) showed that concerns remained in terms of the added costs that offsetting might add to development. In addition, the expected streamlining of the planning process was not achieved, as offsetting added new processes and requirements. The resulting system was both more complex and costlier than existing planning applications. Furthermore,

while the use of the metric was seen as positive development, which added transparency and predictability to the process of negotiating compensation, the calculative device was not applied consistently. Several of the pilots reported agreeing to reduce the costs to developers after negotiation, as well as other developers not choosing not to use biodiversity offsetting. Local authorities also maintained a strong preference for offset sites close to impact, preferably within the same local authority. However, *‘[s]earching for and preparing appropriate offset sites entailed costs which developers were reticent to meet – these costs were sensitive to the exchange rules (which determine which habitats can replace certain habitats) and how far offset sites could be from the impact site’* (Collingwood Environmental Planning and IEEP 2014, p. 5). Developers’ preferences for wider technological zones, which would allow market expansion and possibly reduce costs are in opposition to the preferences of local authorities’, for whom uncontrolled market expansion would result in unacceptable biodiversity losses at local level. In addition, in response to an EU consultation on no net loss of biodiversity, DEFRA highlighted some of the difficulties of establishing a nationwide offsetting programme, including ‘who would operate the metric and how would consistency be ensured’, and how to define ‘restrictions on where an offset could be located’ (DEFRA 2014).

The issues noted above – a belief that biodiversity offsetting will not deliver the promised outcomes, the possibility that it might entrench existing inequalities, and fear that it might displace nature to the detriment of some areas – have created an opposition to biodiversity offsetting in England. Overall, it would appear that, as of 2018, the project of qualitative and quantitative market expansion has failed. These developments are taking place at a moment of flux, uncertainty – and a degree of policy paralysis – in the UK political economy, resulting from the 2016 vote to leave the European Union (‘Brexit’). Risk analysis for environmental protection across the various possible future UK-European Union

relationships suggests high risks arising from the relaxation of environmental protection and enforcement (Burns *et al.* 2018). At the same time, a think-tank founded by the former Environment Secretary and biodiversity offsetting proponent, Owen Paterson, continues to promote a national offsetting scheme, highlighting how it would ‘...provide opportunities for landowners, and certainty for developers and the environment’ (Paterson 2017, p. 10). However, at local authority level, the proposed metric has continued to be used after the end of the pilots, where a ‘...hybrid governance regime, which protects the role of local authorities as the preeminent agents in deciding between conservation or development, but operates under the principles and calculative devices of offsetting, appears to be taking hold. (Ferreira 2017, p. 1583). The evidence suggests that a market for biodiversity offsets in England may still emerge and expand, particularly given that the contestation during the Pilots was mostly led by planners and some environmental NGOs, with the policy being mostly unknown by local communities.

5. Conclusions: Behind market expansion, legitimacy

This paper has analysed the processes involved in the expansion of two markets for biodiversity offsets, Species Banking and Biodiversity Offsets Pilots. In both cases, political projects to expand the market to cover the entire territory of the respective nations have been limited by entanglements with society. Attempts to develop metrological regimes and institute technological zones have opened the process to contestation and re-politicisation. At the time of writing, the Species Banking market remains highly fragmented, with localised pockets of activity but no national coverage, while the Biodiversity Offsets Pilots programme was never followed up by a national market. There is currently no biodiversity offsetting programme in operation in England, although there are examples of voluntary one-off

offsetting schemes, and the metric continues to be used widely as a method for quantifying impacts (Ferreira 2017).

Critics of markets as a form of governance in the neoliberal age have asserted the assumption that markets can expand, driven by the alliance between capital and government, which leads to a roll-back of regulation and a roll-out of policies conducive to capital accumulation (Igoe and Brockington 2007, Castree 2008, Büscher *et al.* 2012). While these drivers and processes can be seen at work, their success is by no means guaranteed. Contrary to the assertions of economists, markets are neither a ‘natural’ form of exchange, nor are they necessarily robust institutions. On the contrary, they require felicitous conditions to mesh successfully (Hébert 2014) with the reality they are meant to govern: Ideas about how markets should operate, knowledge, calculative devices and agents all need to come together. But even where these conditions are met (to a greater or lesser extent), processes of market expansion are still vulnerable to moral and ethical judgement on the part of actors affected by them.

In both cases, the results sought by the promoters of biodiversity offsetting are inextricably linked to the political project to expand the market. Biodiversity offsets markets can only serve as mechanisms to avoid limits to development if they expand to allow for exchange to include more of nature, both qualitatively and quantitatively. However, herein lies their weakness: Socio-technical practices must cross and negotiate uneven social and political spaces, where competing calculative agencies operate and alternative governance mechanisms function. An important part of this results from material facts associated with biodiversity itself: On the one hand, it is a complex construct, which makes the work of calculative devices difficult (Ferreira 2017). But on the other hand, biodiversity is characterised by strong connections to its physical and socio-political environment. Local decision-makers involved in offsetting are given the agency and political power to contest the expansion of the market and maintain local control over conservation of biodiversity. In the

cases studied, market expansion was contested and failed because was perceived to have extreme negative impacts over the environment (including society and individuals), or because it could result in growing inequality and transfers of power to wealthy developers. The language of ‘profiteering’ and ‘license to trash’ illustrates how the market expansion remains vulnerable to the moral judgement.

Since the publication of Michel Callon’s *The Laws of the Markets* (Callon 1998c), the concept that markets are the result of the performativity of economics has been widely accepted and developed. Since then, the concept has also been criticised for (apparently) de-politicising marketisation (Holm 2007), and has arguably been re-politicised through research which showed the role and importance of politics to how economics is performed (Mitchell 2005, 2007, 2010, Miller and O’Leary 2007, Miller 2008, Lohmann 2009, 2010, MacKenzie 2009b, 2009a). However, the ethical and moral aspects of market expansion remain under-explored. Even as economics experiments to bring new aspects of life into the market, or to expand the spatial reach of market practices multiply, evidence is mounting that some of those experiments are unsuccessful. As this paper as shown, at least some of those failures can be attributed to moral and ethical judgements of the actors involved. This suggests an important research agenda, around the legitimacy of governance by the market, as well as the mechanisms by which the moral economy can impact on the socio-technical practices of the market. As shown by this paper, such research should focus explicitly in uses of markets for the governance of nature, a field in which persistent gaps in knowledge remain, especially in terms of the preferences of citizens who are not affiliated to political or environmental institutions.

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