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**To cite this article:** Ludovico Giacomo Conti (23 Sep 2024): Biodiversity Offsetting's Lingering Issue: Under-Compensation, Ethics, Policy & Environment, DOI: [10.1080/21550085.2024.2406174](https://doi.org/10.1080/21550085.2024.2406174)

**To link to this article:** <https://doi.org/10.1080/21550085.2024.2406174>



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Published online: 23 Sep 2024.



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# Biodiversity Offsetting's Lingering Issue: Under-Compensation

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## ABSTRACT

Biodiversity offsetting is a criticised conservation tool that compensates for harm to biodiversity with positive actions. This paper, framed within a compensatory theory framework, starts from a charitable interpretation principle to defend that biodiversity offsetting omits from the compensatory calculus people's attachment to a place: an element that cannot be fully compensated. Since compensation theory demands perfect and full compensation, biodiversity offsetting amounts to an ethically and politically questionable *under*-compensation. Consequently, the paper advocates for a shift to a radically protective justice understanding of biodiversity offsetting and for this tool not to be used to compensate for future damages.

## ARTICLE HISTORY

Received 9 October 2023  
Accepted 24 July 2024

## KEYWORDS

Biodiversity; offsetting;  
compensation; justice;  
natural disasters

## Introduction

Biodiversity, which 'represents the variety of life on Earth, including the full range of ecosystems, species, and genes' (Ledec et al., 2016, p. 1), is severely threatened. WWF's latest Living Planet Report provides one of the most accurate descriptions of the current biodiversity crisis. The report notes that over 'one million plants and animals are threatened with extinction. 1–2.5% of birds, mammals, amphibians, reptiles and fish have already gone extinct; population abundances and genetic diversity have decreased; and species are losing their climatically determined habitats' (WWF, 2022, p. 16). In the Anthropocene, human activities have increased the natural biodiversity extinction rate by 100 to 1'000 times (Rockström et al., 2009), resulting in 'an average 69% decline in monitored populations between 1970 and 2018' (WWF, 2022, p. 32). These levels are only comparable to previous mass extinctions (Barnosky et al., 2011; Dirzo et al., 2014).

In this grim scenario, efforts such as the UN Decade on Biodiversity have fallen short (WWF, 2022). Nevertheless, a specific conservation tool is on the rise: biodiversity offsetting (Madsen et al., 2010; Maron et al., 2012). Biodiversity offsetting is an umbrella term for a series of activities (Salzman & Ruhl, 2000), such as compensatory habitat creation (Morris et al., 2006), mitigation banks (Gibbons & Lindenmayer, 2007), conservation banking, habitat credit trading, or complementary remediation (Madsen et al., 2011). These offsets aim to '*compensate* for significant residual adverse biodiversity impacts

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arising from project development after appropriate prevention and mitigation measures have been taken<sup>1</sup> (Business and Biodiversity Offsets Programme [BBOP], 2009, p. 4) – primarily by focusing on ‘the conservation of species and ecosystems, in an area that is typically separate and distinct from the original project area’ (Ledec et al., 2016, p. 5). To this goal, biodiversity offsetting seeks to ‘achieve no net loss and preferably a net gain of biodiversity’ (BBOP, 2009, p. 4) to ‘effectively’ and ‘fully compensate for specified adverse residual impacts’ (Ledec et al., 2016, pp. 4, 7). As a result, biodiversity offsets are heralded as a valuable instrument (Bekessy et al., 2010; Gibbons & Lindenmayer, 2007; Reid, 2013) for encouraging businesses to internalise their negative environmental externalities into the decision-making process (Bull et al., 2013; UNEP, 2010). Moreover, they are praised for creating better and ‘improved ecological outcomes along with development’ (Bull et al., 2013, p. 1) than standard project planning, as they link the economy with conservation efforts.

Although this instrument has been conceived – and should be used – as the last step in the mitigation hierarchy, some have remarked how this practice is being used to speed up (Department for Environment, Food & Rural Affairs, 2013) and ‘greenwash planning applications’ (FERN, 2014b): to ‘biodiversitywash’ them (Conti & Seele, 2023). This perverse application has been condemned as a ‘regulated destruction’ (Kill, 2019), a ‘license to destroy’ (Monbiot, 2012), a form of ‘environmental indulgences’ (Goodin, 1994) or moral licensing (Burger et al., 2022).

Even when these contentions are set aside and the practice is assumed to be correctly implemented, some scholars highlight severe practical and ethical problems (Karlsson & Edvardsson Björnberg, 2021; Maron et al., 2012). Most practical objections have been counterargued and annulled by biodiversity offsetting supporters. And, when the raised charges cannot be fully addressed, proponents have argued that imperfect compensation is still better than no compensation (Karlsson & Karhunmaa, 2023). On the other hand, ethical objections have been contested by biodiversity offsetting supporters as being based on non-shared premises, such as the belief that nature has intrinsic value. Thus, there seems to be no definitive knockout argument against biodiversity offsetting yet.

Framed in a hypothetical, best-case scenario – viz., where biodiversity is assumed (i) to be the last step in the mitigation hierarchy, (ii) to provide full and perfect *ecological* compensation (namely, all ecological damages are compensated, and there are no net losses but even net gains), and (iii) all ethical and practical arguments against the practice can be somehow overcome – this paper explores whether there is something inherently wrong with this practice. This paper argues that biodiversity offsetting causes localised effects – contrary to other types of offsetting, such as the carbon one (Stockholm Environment Institute, 2011) – and omits from the compensation calculus fundamental *human*-related aspects such as the historical, social, emotional, and cultural values that people attach to biodiversity (FERN, 2014a). These place attachments are impossible to be *fully* compensated for, as highlighted in similar debates (Adger et al., 2011; Griffiths et al., 2019; Page & Heyward, 2017). Therefore, since compensation theory requires compensation to be full and exact, this paper contends that biodiversity offsetting results in an unfair and unjust *under*-compensation.

Assuming this conclusion to be sound, its consequences are far-reaching. Firstly, if full and whole compensation is unattainable, then we ought to do everything we can to avoid the insurgence of the damage in the first place; this requires a radical shift from corrective

to protective justice. Secondly, the practice's deficiency becomes unacceptable when compensating for future damages because we would *knowingly* and *intentionally* provide insufficient compensation for anticipated damages: a worrying precedent for future compensations.

To defend this argument, the paper is structured into three sections. *Section I* outlines the current debate around biodiversity offsetting and identifies the lack of a knockout argument or one that develops on premises shared by those supporting the practice (namely, anthropocentric ones). In addition, it establishes the theoretical framing and provides a short, necessary introduction to the main tenets of compensation theory.

*Section II* constitutes the core argument. Through an analogy, it demonstrates that – even if, as claimed by its supporters, biodiversity offsetting were to provide full and perfect ecological compensation (i.e. no net loss is incurred, but net gains are even generated), it would still omit from the compensation calculus the social, cultural, and/or religious values that people may attach to the biodiversity of a place – what in the legal terms could be referred to as ‘subjective premium’ (Merrill, 1986, p. 83). Referring to the compensation theoretical framework presented earlier and drawing on Page and Heyward's (2017) reasoning on compensation for climate change, the irreplaceability of these features (FERN, 2014b) is highlighted. It is argued that these aspects can only be compensated through ends-displacing compensation – which, however, has been demonstrated to be a weaker form of compensation than its counterpart means replacement (Goodin, 1989). Consequently, biodiversity offsetting is deemed to amount to an *under*-compensation since those affected by irreplaceable loss are not restored to the status *ex ante* the damage.

Anticipating the criticism that the argument relies solely on a property-rights perspective, in *Section III*, borrowing the rationale from the debate around compensation in cases of natural disasters or removals, it is proposed that the impossibility of fully compensating for one's attachment to a place and its biodiversity elements also extends to people who do not have a property right on that natural element.

Finally, assuming the rationale is correct, the paper explores the two fundamental consequences of this insufficient compensation tool.

## Section I

### *State of the Art and the Missing Argument*

Biodiversity offsetting seeks to ‘*compensate* for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken’<sup>2</sup> (BBOP, 2009, p. 4) – mostly by focusing on ‘the conservation of species and ecosystems, in an area that is typically separate and distinct from the original project area’ (Ledec et al., 2016, p. 5). Such compensation is carried out through a series of activities (Salzman & Ruhl, 2000), such as compensatory habitat creation (Morris et al., 2006), mitigation banks (Gibbons & Lindenmayer, 2007), conservation banking, habitat credit trading, or complementary remediation (Madsen et al., 2011). These practices aim to ‘achieve no net loss and preferably a net gain of biodiversity’ (BBOP, 2009, p. 4) to ‘effectively’ and ‘fully compensate for specified adverse residual impacts’ (Ledec et al., 2016, pp. 4, 7). As such, biodiversity offsetting is heralded as a valuable instrument

(Bekessy et al., 2010; Gibbons & Lindenmayer, 2007; Reid, 2013) that encourages businesses to internalise their negative environmental externalities into decision-making processes (Bull et al., 2013; UNEP, 2010) and creates better and ‘improved ecological outcomes along with development’ (Bull et al., 2013, p. 1) than standard projects.

However, although this instrument has been conceived – and should be used – as the last step in the mitigation hierarchy (Ledec et al., 2016), offsetting is often used to speed up (Department for Environment, Food & Rural Affairs, 2013) and ‘greenwash planning applications’ (FERN, 2014b, p. 7), namely to ‘biodiversitywash’ them (Conti & Seele, 2023, p. 22). Hence, it appears that ‘the compensation component of mitigation has become nearly the sole focus of mitigation policy development’ (Hough & Robertson, 2009). Such a perverse application has been condemned as a ‘regulated destruction’ (Kill, 2019) or even a ‘license to destroy’ (Monbiot, 2012).

Setting aside these contentions and assuming that biodiversity offsetting is correctly used as a last resort, some scholars highlight some serious practical and ethical problems (M. Karlsson & Edvardsson Björnberg, 2021; Maron et al., 2012). Biodiversity offsetting’s major practical issues are its measurability and uncertainty (Gonçalves et al., 2015; Maron et al., 2012). In fact, it is difficult to ‘argue ecological equivalence between biodiversity components that differ in type, location, time, or ecological context’ (Bull et al., 2013, p. 4), and establishing such ‘equivalence’ (Reid, 2013, p. 220) becomes even more difficult if out-of-kind equivalences, i.e. ‘trading between different ecosystem types’ (Ives & Bekessy, 2015), are considered (Salzman & Ruhl, 2000). Moreover, the uncertainty of its effectiveness is also contested: the losses are certain, while the gains are not (Maron et al., 2012). This contention further increases in those scenarios where ecosystems are heavily modified (Hilderbrand et al., 2005) or when offsetting involves the restoration of communities (Wilkins et al., 2003).

Nevertheless, many counterarguments have been mounted to debunk these criticisms. To solve the measurability issue, some scholars have suggested developing more accurate metrics as well as better designing programs (Bekessy et al., 2010), while to address the uncertainty of results and gains of offsetting, the standard solution is multipliers (Bruggeman et al., 2005), i.e. a coefficient that modifies the 1:1 damages-gains ratio to a 1:( $x > 1$ ) one to account for possible inadequacy in calculations. In economic terms, multipliers can be conceived as the application of ‘a discount rate to calculate net present value’ (Bekessy et al., 2010). As such, concerning the practical issues, there seems not to be any definitive knockout argument against biodiversity offsetting.

Concerning the ethicality of biodiversity offsetting, the literature is relatively confined, but five main lines of argument against biodiversity offsetting have been identified by M. Karlsson and Edvardsson Björnberg (2021). The first argument defends that nature has an intrinsic value and that offsetting’s conception of nature as a means and not an end in itself violates said value (Spash, 2015). Such a non-anthropocentric argument is a weighty one. Still, scholars like Caney (2010) or Minter and Gerber (2013) have proposed ways to make sense of the intrinsic value of nature and its commodification, defending that its monetisation could be the only way of safeguarding it; accordingly, it could be thought to be (at least partially) debunked. Moreover, if one were to endorse an anthropocentric value system for which only humans can be ascribed intrinsic value, there would be an initial disagreement on the premises – before even getting to the core of the argument. The second ‘deontological non-anthropocentric’ (Karlsson & Edvardsson Björnberg, 2021)

line of reasoning contests the initial assumption of fungibility of ecological entities (Salzman & Ruhl, 2000), holding that the losses endured by nature cannot ontologically be compensated (Karlsson & Edvardsson Björnberg, 2021). However, offsetting is not 'not necessarily to trade off one unit of nature for its twin elsewhere' (M. Karlsson & Edvardsson Björnberg, 2021, p. 581) and, as noted by Morris et al. (2006), biodiversity offsetting can be conceived as striving to make up the lost environmental elements as far as possible. The third argument argues that we know too little about the complexity of nature to make adequate trades (Ives & Bekessy, 2015). Such an epistemic argument is counterattacked by asserting that such lacking knowledge can be bypassed through practical tools such as multipliers (BBOP, 2009). As such, the epistemic issue also runs short. The fourth rationale, at the 'porous boundary between deontological and virtue ethics' (M. Karlsson & Edvardsson Björnberg, 2021, p. 582) maintains that offsetting might transform into a form of 'environmental indulgences' (Goodin, 1994) where, because of offsetting's arithmetical logic where damages can be compensated by benefits, individuals might believe that there is no wrongness in harming nature as long as one engages in a compensation scheme (Ives & Bekessy, 2015; Reid, 2013): a form of moral licensing, i.e. the idea that by doing something some good deed, one is remitted from unethical, immoral, or problematic behavior (Burger et al., 2022). As such, offsetting's commodification of nature could impede the 'develop[ment of] virtuous, caring, nonanthropocentric dispositions' (M. Karlsson & Edvardsson Björnberg, 2021, p. 582). Opponents allege the opposite: the obligation to offset increases the consideration of the environment in the decision-making process. To settle this virtue ethics issue, further research has been deemed necessary (M. Karlsson & Edvardsson Björnberg, 2021). The fifth point focuses on the possible exacerbations of inequities generated by diverse geographical (Ives & Bekessy, 2015; Mandel et al., 2015; Salzman & Ruhl, 2000) and temporal (BenDor et al., 2008; Maron et al., 2016) winners and losers. Some propose tackling these inequities through various *ad hoc* financial and economic tools (BBOP, 2012; New Zealand Government, 2014; Rockström et al., 2009). Therefore, even among the ethical objections, there is a lack of a decisive argument against biodiversity offsetting.

To summarise, two main points emerge from this brief overview. First, counterarguments have been developed for each practical and ethical objection against biodiversity offsetting: through some mechanisms, such as multiple or more full-fledged metrics, multipliers, or more complex theoretical lines of argument, biodiversity offsetting advocates can still defend the efficacy and worthiness of the practice. Second, the most compelling ethical arguments (see the first two lines of reasoning) start from a non-anthropocentric perspective in a clear juxtaposition to the 'anthropocentric, instrumental and economic' (Spash, 2015, p. 550) one advocated by biodiversity offsetting supporters – and, as such, are not accepted by the latter.

Therefore, to provide a powerful argument less likely to be contested, I take on a charitable interpretation principle and assume what I believe to be the most favorable position for a supporter of biodiversity offsetting. To explain: (i) I adopt an anthropocentric perspective where nature has no inherent value but only an instrumental one (Spash, 2015, p. 550); (ii) I work in an ideal scenario where all the above-mentioned (practical and ethical) objections raised against biodiversity offsetting can, somehow, be silenced through some expedient or instrument; and (iii) I assume, in accordance with the World Bank's user guide to biodiversity offsetting, that biodiversity offsetting can

'effectively' and 'fully compensate for specified adverse residual impacts' (Ledec et al., 2016, pp. 4, 7). Framed within these premises, I aim to assess whether there is something inherently wrong with biodiversity offsetting.

### *The Theoretical Framework of Compensation*

To make my case against biodiversity offsetting, I build the argument within compensation theory, mostly relying on the seminal work 'Theories of Compensation' (Goodin, 1989) by Goodin, and by transposing to the biodiversity offsetting debate Page and Heyward's (2017) on compensation for climate change loss. This theoretical choice stems from the fact that biodiversity offsetting is, according to the standard definition (BBOP, 2009; FERN, 2014a; Ledec et al., 2016), a *compensatory* measure.

Compensation theories and tort law identify compensation as a backwards-looking concept (Palmer, 2010; Sheinman, 2003) and define it as the act of bringing the person who suffered a loss to the *status quo ante* the damage or the tort (Goodin, 1989). Such a restoration is to be carried out 'as swiftly as possible' (Page & Heyward, 2017, p. 7) with 'a full and perfect equivalent for that thing' (Monongahela Nav. Co. V. United States, 1893, p. 326) to 'make the plaintiff whole' (Goldberg, 2006, p. 435). Because of this, compensation works on a counterfactual assumption of how things could have worked out to assess the reparation owed (Roberts, 2006).

Concerning the question of how to compensate, it is first necessary to specify that compensation is different from restitution: the former aims at counterbalancing a loss endured by providing *not* the 'object itself, but rather the provision of *something else* altogether' (Goodin, 1989, p. 59), while the latter entails returning something to its proper owner and is 'essentially a system of corrective justice' (Sheinman, 2003, p. 21). Accordingly, restitution is a subcategory of compensation (Satz, 2012). The literature proposes two ways to compensate: means replacement and ends-displacing (Goodin, 1989; Page & Heyward, 2017). The first is the common understanding of compensation, viz., a like-for-like replacement that aims to provide '*equivalent* means for pursuing the *same ends*'<sup>3</sup> (Goodin, 1989, p. 60) one had before the tort occurred. Contrastingly, ends-displacing compensation is a '*substitution* of one sort of pleasure for another'<sup>4</sup> (Goodin, 1989, p. 61) and emerges when the tort involves the impossibility of replacing the means as there is no close substitute. Because of this, the person is helped to pursue *different* ends that need to leave her 'subjectively as well off as [she] would have been, had [she] not suffered the loss at all' (Goodin, 1989, p. 60).

As both instruments underline, an important feature of compensation lies in its exactness: the plaintiff has to be made 'whole' (Goldberg, 2006). This is fundamental since *over-* or *under-*compensation is distributionally unfair (Lee, 2013) since one would receive respectively more and less of what one is entitled. Moreover, under-compensation could also be deemed unjust because refusing to properly compensate is a perpetration of and even the production of '*further* harm, beyond the original harm – that is, the further harm consisting of the victim's continuing suffering' Since causing harm is morally wrong and legally forbidden, the act of not fully compensating – and thus continuing or increasing such harm – is wrong and 'violates the victim's right not to be harmed' (Kagan, 1988, p. 299).

## Section II

### *Biodiversity Offsetting as Ends-Displacement Compensation: An Analogy*

To show how biodiversity offsetting, even if assumed to provide a perfect ecological compensation (i.e. there is no net loss or there even are net gains (Ledec et al., 2016)), still produces an unfair and unjust under-compensation, I propose to reason by analogy. I first present a general hypothetical case (*scenario one*) and its consequences; then, I describe a biodiversity offsetting scenario (*scenario two*). Finally, after underlining the features similar to the hypothetical case, I transpose the conclusions of the former to the latter.

**Scenario one:** *Alice is hosting a cocktail party and, while chitchatting, her tech-geek, clumsy best friend Ben trips and spills his staining pomegranate juice on Alice's beautiful Van Gogh. Unfortunately, even after a quick clean-up, Alice's art consultant informs her that the canvas is ruined irreparably. Ben – causally responsible for Alice's damage and ashamed of the destruction caused – proposes to compensate for the loss of her precious Van Gogh.*

How can Ben compensate Alice? We can quickly grasp that there is an *a priori* impossibility for restitution since the canvas was not stolen and then given back – but was irreparably damaged. Unfortunately, a means replacement compensation would not work either as it cannot fully bring Alice back to the status *ex ante* the damage. To explain why, let us think of an extreme case:

**Addendum scenario one:** *Ben, who is a tech geek, has developed the most advanced robot on the planet capable of painting an exact replica of the ruined Van Gogh. Thanks to its precision, the colours, the ageing, and every brush stroke match the original one in a way that would be impossible to tell the fake canvas apart from the original.*

Would the replica amount to compensation for the damage caused? Most likely not. It is conceivable that Alice would appreciate the gesture, but she would not feel compensated as the replica would remain a *replica*, i.e. a fake (Goodin, 1989). Her refusal to accept it as compensation stems from the fact that there is *no* close substitute for the original Van Gogh. This is because, even if the replica were to look precisely the same, it would not be the *original* one: it would not have the *same* history; it would *not* have been painted by Van Gogh in the late nineteenth century; it would *not* have been previously owned by some specific art collectors; it would *not* have been presented at a particular art exhibition. The two paintings may look alike, but what would still differentiate the original from the fake is that the *original* Van Gogh is valued 'on account of [its] history' (Goodin, 1989, p. 65): its originality – which is a feature that cannot be incorporated into any like-for-like compensation that makes use of a facsimile.

Since there is no close substitute to compensate for the loss, the *only* solution available is ends-displacing compensation. According to this strategy, for example, Ben could buy Alice an all-paid cruise in the Caribbean. As one can intuitively understand, such compensation runs into some issues. To display: if one were to analyse it from a purely economic perspective, the sum would be derisory compared to the work of art's value; as such, it could only amount to a *symbolic* compensation aimed at providing 'solace' (Cane & Goudkamp, 2018, pp. 474–476). This under-compensation entails that this compensation is weaker than its counterpart means replacement. To explain: means replacement brings the person *precisely* to the status *ex ante* the tort occurred (Goodin, 1989), as it provides only

*alternatives* to achieve the *same* goal there was before the tort occurred (Page & Heyward, 2017); on the other hand, ends displacement compensation *cannot* bring the person back to that status *ex ante* and, as such, it requires the person who suffered the tort to *shift* her ends altogether as there is no alternative that can be provided.

Nevertheless, one could argue that the cruise amounts to an under-compensation and solace just because its value is not comparable to the canvas's. Therefore, compensating Alice with something equal to the fair market value of the work of art should solve the issue. However, such a rationale does not consider that 'fair market value' is 'the price at which the property would exchange hands between a willing buyer and a willing seller, neither being under compulsion to buy or to sell and both having reasonable knowledge of relevant fact' (*United States V. Cartwright*, 1973, p. 551). In simpler words, it represents the amount of money for which Alice *would* have sold and forgone the irreplaceable canvas. Does this solve the issue, then? I argue that it does not since, in Alice's example, what is missing is exactly the 'willingness' and the absence of 'compulsion' parameters. In fact, Alice was *forced* to part with the Van Gogh since it was *no longer viable*: she was forced to shift her ends, namely, enjoying a beautiful painting in her living room, to something else, e.g. enjoying the amenities of the cruise (Goodin, 1989). As such, even if it were possible to provide compensation of equivalent value, it would be *forced* upon the subject.

But let me leave aside the absence of these two debilitating points and assume for the sake of argument that, somehow, they could be bypassed. Could some sort of compensation based on the fair market value provide a full and perfect compensation for what has been lost? I defend that it cannot because the fair market value does not consider that one can attach more value to the item than its market value because of 'sentimental attachments, or the special suitability of the property for [one's] particular (perhaps idiosyncratic) needs' (*Coniston Corp. V. Village Of Hoffman Estates*, 1988, p. 464). To explain: even if the Van Gogh's market value is 10 million dollars, Alice might value it more since she attaches to it a 'subjective premium' (Merrill, 1986, p. 83), i.e. a 'personal' value (*Coniston Corp. V. Village Of Hoffman Estates*, 1988, p. 464) not billable and not transferable that is not considered by the market value (Lee, 2013). As such, even if Alice were to be compensated with some sort of ends-displacing compensation of the value of 10 million dollars (namely, the fair market value), 'the fair-market-value formula ... [would] provide no recovery for the subjective value that [Alice] attach[es] to [her] property' (Merrill & Smith, 2012, p. 1254). In Alice's perspective, the compensation would amount to an *under-compensation* as it would 'not internalise all of the cost of the taking' (Lee, 2013, p. 601).

To sum up, in cases where something irreplaceable is damaged (in this case, the canvas), reparation is *de facto* impossible. Means replacement compensation cannot provide the necessary full and exact compensation either, as it cannot recreate the uniqueness that makes the damaged entity valuable. Accordingly, the sole solution that remains at disposal is the *deficient* ends-displacing compensation – which can only be symbolic. This is because if one tries to bring it up to match the value for which the person would have foregone it, the compensation would still be forced, and if one employs the fair market formula, one would omit the subjective premium of that the damaged person ascribes to its property.

Having established these points, I transpose such conclusions to a biodiversity offsetting case. Per a charitable interpretation principle, I propose the simplest offsetting case consisting only of a single tree compensation. This is first to strengthen the similarity with the Van Gogh's case (one painting, one tree) and, second, to silence the ontological or epistemological criticisms about the impossibility of perfectly offsetting complex systems such as forests. By working with few variables – and bracketing the possible features that could be used against the practice of biodiversity offsetting – I aim at providing the most favorable setup for biodiversity offsetting advocates and the most challenging one for its adversaries.

**Scenario two:** *Imagine that Dona is the owner of the Wollsthorpe Manor – the estate famous for having, among its various trees, the apple tree under which Sir Isaac Newton had the intuition and formulated the gravitational theory. Let us assume that this apple tree was to be cut down to make space to park the equipment used to build a nearby road. Charlie, the contractor and owner of the equipment, tries to avoid cutting the tree, but, in the end, no other solution is found. Regretful of the action, Charlie proposes compensating Dona for the damage to the ecosystem and the place's biodiversity he caused.*

Let me follow the previous reasoning and apply the compensation theory mentioned above. As in the first scenario, any restitution would be impossible since the apple tree was not unrightfully taken and then given back; if that were to be the case, it would be called 'biodiversity restitution', not offsetting. Therefore, the question of how to fully and perfectly compensate Dona moves to assess whether means-replacement could work. To avoid possible ontological dissimilarity and geographical displacement objections, let me introduce another element (This second scenario mimics Ben's proposal to make his robot paint a perfect replica of the Van Gogh).

**Addendum to scenario two:** *Several scions were taken from the original Newton's apple tree; therefore, there are several clones of the tree. One of these is in the Cambridge Botanical Garden. Let us assume that Charlie manages to buy the Botanical Garden's scion and proposes to compensate Dona by planting the clone after the duration of the works – exactly in the same spot as the original one.*

Would this be a full and perfect compensation? Most likely not. In fact, Dona, who is a mathematician and a fond fan of Sir Isaac Newton, will not attach the same value to the clone as she did to the original one. This is because the clone, despite being a genetic copy of the original tree, will not have its *same* history: it will not be *the* tree under which Sir Isaac had his intuition but a mere facsimile – exactly like the replica of the Van Gogh will not be an original Van Gogh. For this reason, compensating Dona with the clone does not consider the history that it is linked to the tree. Hence, because of this omission, a means replacement compensation would remain *imperfect* and would not bring the injured party back to the status *ex ante* the damage occurred.

Having established that – as for the first scenario – means replacement is insufficient, the only compensation available remains ends-displacing compensation. Charlie could compensate Dona for the tree's loss with something else that would make her as well off as before, e.g. the cruise in the Caribbeans offered to Alice. Unfortunately, as in the previous case, the same issues of coercion and insufficiency of the fair market formula would soon arise since Dona, like Alice, was not given the chance not to have her tree

fallen, nor would any compensation account for the subjective premium she placed on that peculiar tree.

But for the sake of argument, let me leave aside the fair market and the coercion issues and assume that they can somehow be bypassed. In this hypothetical setup, let me assess whether Dona can be made as well off as before the tort occurred, namely whether she can be made ‘whole again’ (Page & Heyward, 2017, p. 6). Following Goodin (1989) and Page and Heyward (2017), I argue that she could not. The reason is the following: if we were to graphically represent the accident, using an economic terminology, we could say that Dona was on a given indifference curve  $i$ , but the tree cutting placed on a lower indifference curve  $i^*$ . Since the goal of compensation is to make the plaintiff whole again, Dona – through some sort of ends-displacement compensation – should be brought back to  $i$ . Assuming this was possible, would Dona be as well off as before? No, since she would be as well off as before (same indifference curve) – but she would be ‘differently off’ (Goodin, 1989, p. 60). In fact, the initial point  $P$  on the indifference curve  $i$  where Dona was, *no longer exists* as the tree’s fungibility and existence have been made unavailable by its cutting.

As such, Dona could be brought back to the same indifference curve but never to the same point she was before the tort occurred: she is left non-identically situated even though [she is] as well off as [she was] all things considered since [she has] been forced into adopting a new set of valued ends and not merely a new, or repaired, set of means to these objectives (Page & Heyward, 2017, p. 15). Accordingly, she cannot be *fully* made whole again. This underlines how, in specific cases where a loss that is permanent and makes the loss item unavailable (Page & Heyward, 2017) (and needs to be differentiated from damage, which is reversible (Kreft et al., 2012)) is entailed, ends-displacement can only enable the ‘agent to “get back on their feet”’ (Page & Heyward, 2017, p. 15) but cannot be a *full* compensation: it can only amount to an under-compensation.

In conclusion, since there are no morally relevant differences between the first scenario and the second (what changes is merely the damaged item), the conclusion reached in the canvas case should carry over to the biodiversity offsetting case. If this is the case, biodiversity offsetting – even if it provides full and perfect ecological compensation (i.e. there is no net loss, but there even are net gains) – *cannot* compensate for the subjective premium and values attached by one person to biodiversity. Because of this omission, biodiversity offsetting amounts to an unfair and unjust *under*-compensation.

### Section III

Because analogies always work on similar – but not exact – cases, I assume there might be some objections to what I have argued so far.

First, it could be pointed out to me that the analogy between the Van Gogh’s replica and the scion does not hold: the scion is *de facto* a genetic copy of Newton’s tree and, as such, is linked to the original tree, while, Van Gogh replica is not, it is a new entity that mimics the original one. However, such an argumentation runs short as it does not consider that a clone is still an ontologically secondary entity: simply put, since it cannot occupy the same temporal and spatial coordinates, it remains – regardless of its accuracy – a *copy*, a duplicate of something, and not the entity itself. Therefore, although the original

and the clone have the same genetic material, the scion is comparable to the canvas as both are copies and lack the originality of the entity they duplicate.

Second, it could be pointed out that biodiversity is the ‘variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems’ (Secretariat of the Convention on Biological Diversity, 2011). Hence, biodiversity is a *characteristic* of an ecological system, not a ‘thing’. Therefore, compensating for the loss of biodiversity differs from compensating for the loss of a painting, which is an entity and not a characteristic. However, this disanalogy contention does not consider that what is lost in the damage of the Van Gogh canvas is not only the canvas *per se* but also the originality of the work (i.e. a characteristic), which is what makes the canvas so valuable and which cannot be transferred to an exact copy (otherwise a means replacement compensation should be acceptable). Likewise, in biodiversity offsetting, there is not only the loss of a given biodiversity but also its uniqueness (Conti & Seele, 2024).

This point relates to a third possible contention, namely the fact that one might have no meaningful relation to a specific entity (e.g. Dona’s tree) but have it for a given composition or kind of system (e.g. a specific forest’s biodiversity); this might be due to the provisioning, regulating, cultural, or supporting services that biodiversity provides (Millenium Ecosystem Assessment, 2005). Nevertheless, what I defended so far would still hold: what would be lost in the offsetting of a forest’s biodiversity (omitting all practical difficulties of recreating such a feature and assuming that it could somehow be achieved) is the *originality* of that biodiversity. The offset might recreate the same biodiversity level, but this would be (like the replica or the scion) a copy, a replica, of the initial biodiversity that cannot be *that* biodiversity: even if it were to recreate the forest with clones of what was in it before (thus recreating the same biodiversity as before he damage), it would necessarily lack the feature of originality – exactly how the single scion lacks originality and represents a copy of the initial entity of which it is a clone (Conti & Seele, 2024). As such, one would most likely feel not *fully* compensated for the loss of a specific forest’s biodiversity if one were to be offered a copy of it. Although this might seem far-fetched, this deficiency plays an important role if cultural, spiritual, or religious services of biodiversity are considered. To display: within the Hinduist belief system, ‘natural objects such as rivers, trees, stones and animals can manifest the sacred as forms of divinity worthy of devotion and conservation’ (Irvine et al., 2019, p. 221); as a result, people might have strong connections with certain *specific* natural elements (Haberman, 2018). This link with biodiversity and specific natural elements is not confined to Hinduism but is present in many other spiritual belief systems (Irvine et al., 2019): for example, some scholars defend that in the Christian belief system, biodiversity creates sacred feelings and a connection to the Holy Trinity (Boff, 1997). Because of these spiritual, religious, and cultural attachments, substituting natural elements or their features with copies or offsets would be highly problematic, if not impossible, as the spiritual, religious or cultural value attached to that *specific* element would be lost and could not be transferred to the copy. *In concreto*, two examples might help to understand people’s place-specific attachment and their unwillingness to forgo them: the first is the obstruction by the Standing

Rock Sioux tribe (a native American tribe) to the construction of the Dakota Access pipeline, whose path was to cross what they considered sacred land; the second, is the Native Hawaiians' protest against the construction of a new telescope on the dormant volcano of Mauna Kea as Native Hawaiians consider it a culturally significant and sacred site (Dyke & Kea, 2019; Kahanamoku et al., 2020; Murray, 2019). If their place-specific spiritual, cultural or religious link with biodiversity and nature could be compensated for, it would have sufficed to offer the natives compensatory sites in different locations. But this would have, most likely, not been accepted (Burton et al., 2017) because, to them, *that* land and *that* volcano are sacred, i.e. they have a cultural, spiritual, and religious attachment to *those* places – and not to some other piece of land (Griffiths et al., 2020). Such uniqueness is hardly replaceable.

Third, it could be retorted that Dona's ascription of value to the tree based on its history is something extravagant. However, this contention would not consider that many historical landmarks or natural wonders are valued for their history (Goodin, 1989).

Fourth, someone could concede that the argument is sound but point out that the case proposed is idiosyncratic and applies only to landmarks such as Newton's apple tree or other natural wonders – but not to 'ordinary' trees. As such, it could be argued that no subjective premium would be added and that the fair market value would thus provide full and exact compensation. However, I beg to differ – at least partially. In fact, one could easily imagine that the ordinary tree in Dona's garden is the one she used to play on as a kid and where her grandad built her a small tree house. Because of these memories, she has a personal attachment to it, and precisely as before, compensating her with a clone of it would not make her as well off had the tree not been cut down: the memories and their value would remain unaccounted in the compensation calculus, or if they were they could only be compensated through the weaker ends-displacing compensation. As such, the under-compensation of biodiversity offsetting caused by the omission of the subjective premium is not limited to historical landmarks or natural wonders but may – hypothetically – extend to *all* environmental features to which someone can attach some sort of personal attachment.

However, if this is the case, it might be further retorted to me that extreme cases of people, groups of people, or populations having never been to or never lived in a certain place but asserting to have a certain emotional attachment to it and, because of it, demanding to be compensated for their loss, could soon arise. To avoid such an issue, establishing some sort of threshold becomes necessary. In other words, what is to be decided is: first, the level over which one person or a population have sufficiently strong personal links to a specific environment or ecosystem that a forced modification of it would create an irreparable loss and, therefore, an under-compensation; second, what proportion of ecosystems – if there is one – is reasonably assigned subjective value by at least one human community; third, in case of modifications, what constitutes a *sufficient* alteration of the originality of the ecosystem that requires compensation. I believe in having presented a strong case that the subjective premium should be considered to provide full and perfect compensation. Still, I acknowledge the difficulty of where to set these thresholds since, if they are set too low, everything might be deemed worthy of compensation and compensation is owed to everyone. At the same time, if set too high, damages to one's or to a population's emotional, cultural, spiritual, and religious

attachments are not properly compensated, a situation that would constitute a clear injustice. In both cases, further research is needed.

Fifth, I could also be retorted that the idea of people assigning values other than instrumental ones is far-fetched and, in any case, they should not be accounted for in offsetting. But this last point runs short since, first, it has been demonstrated how people ascribe to biodiversity many values, among which cultural and spiritual ones (Schultz et al., 2005), and, second, the issue of how to quantify these values to properly incorporate them in the calculus has already been identified by the literature (Maron et al., 2016).

Finally, it might be retorted that I framed the issue in terms of property: Alice was the *owner* of the Van Gogh, and Ben infringed her right to property by ruining the canvas. Likewise, Dona was the tree *owner*, and because of this, Charlie had a duty to compensate her for this loss. The question is, therefore, whether someone other than the owner should be compensated for his or her loss of the memories attached to someone else's natural element. Let me conceptualise this case in a third scenario.

**Scenario three:** *Prof. Elliot teaches at the nearby Cambridge mathematics department and has a strong attachment to Newton's tree because she wrote her award-winning doctoral thesis under it.*

Does the professor have some indirect claim on the tree because of its importance to her – even if she is not the owner? It is obvious that the problem becomes much more complex and nuanced if the property framework is removed. I suggest that a possible solution can be borrowed from the ethical debate around compensation in case of natural disasters (Brake, 2019; de Shalit, 2011) or population removals (Ochoa Espejo, 2016; Stilz, 2013). To this goal, we must approach the issue from a different perspective: *self-identity*.

Studies in psychology and sociology (Falk, 2004; Gieryn, 2000) underline how place is fundamental in everyone's life and identity (Falk et al., 2006). It enables or even defines 'industry and occupations, foodways, architecture and building, lifestyle, and aesthetics' (Brake, 2019, p. 181) – an importance that is even greater in Indigenous communities (Stilz, 2013) where 'culture [and way of living are] inseparable from the conditions of their physical surroundings' (Tsosie', 2007, p. 1672).

Due to our 'identity as being "rooted in place"' (Falk et al., 2006, p. 117), in the case of a natural disaster, the displacement of a person might prevent her from continuing to pursue her 'located life-plans' (Stilz, 2013, p. 334) that are dependent on features of a certain locality (Tsosie', 2007). Such impediment corrodes the person's crucial functionings (de Shalit, 2011) and may cause severe consequences to self-identity (Tsosie', 2007), such as a sense of 'upheaval' and 'uprooting' (Stilz, 2013, p. 339), that, when addressing the ethical issues of the cost of displacement, create an impossibility of properly compensating (de Shalit, 2011). This is because no like-for-like compensation is possible (there are no substitutes for them), nor is any ends-replacing compensation (because there is no commensurability for one's self-identity nor interchangeability among functionings): 'place-based and cultural values' (Maron et al., 2016) as well as 'the loss of a place and its psychosocial and cultural elements' [. . .] can arguably never be compensated' (Adger et al., 2011, p. 16). Therefore, considering that there is no possibility to fully compensate nor rectify this displacement and the damages caused by it, there should be an 'obligation to do all we can to prevent it' (de Shalit, 2011, p. 311).

I suggest that this established framework and its conclusions could be transposed into the biodiversity offsetting debate to provide a first step toward addressing the under-compensation issue. In fact, the displaced person has *no* property right over her place (to be understood in *latu senso*), exactly like Prof. Elliot has *no* property right over Sir Isaac Newton's tree. Nevertheless, in case of displacement, this person is morally entitled to some sort of compensation because of the loss of the cultural, social, economic, and religious attachments to her place; likewise, Prof. Elliot could be entitled to some sort of compensation for the loss of the sentimental attachment to the apple tree. Unfortunately, since compensating for the loss of one's cultural, social, economic, and religious attachments to one's place would be impossible to carry out due to the irreplaceable nature of the lost item (i.e. there is no substitute for one's 'sense of place' (Falk et al., 2006, p. 117)), a duty to prevent such a loss applies. If this is the case, since there are no morally relevant differences, prof. Elliot should be granted the same compensation on the same grounds that it is provided to the displaced person since cutting the tree would seriously undermine a part of her identity – as it represents an important socio-cultural item of her place.

Therefore, if we agree that the displaced person is to be compensated – despite having no ownership over her place – because the loss of her place undermines her self-identity, the same should apply to the person who has some sense of attachment to her place (while still not being the owner) and sees her place taken away from her.

Moreover, if the suggested analogy holds, then the conclusion reached in the case of the ethical debate around compensation after natural disasters should also carry over to the compensation discussion for biodiversity offsetting: since we cannot fully compensate for the fundamental loss of one's attachment to one's place, 'then decision-making must proceed on the basis of rights, precaution or other principles' (Adger et al., 2011, p. 14). Based on the analogy, I reckon we could transpose de Shalit's (2011) normative implication that we ought to do everything we can to *prevent* the loss of one's sense of place. Such a principle aligns with courts' decisions to issue injunctions in cases where there is the possibility of creating irreplaceable damages.

## Conclusions

Starting from a charitable interpretation principle, in *Section I*, I adopted the most favorable perspective for a biodiversity offsetting proponent and assumed (i) an anthropocentric perspective where nature has no intrinsic value but only an instrumental one (Spash, 2015); (ii) that all the accusations raised insofar against biodiversity offsetting could, through some sort of mechanism or tool, be overcome (M. Karlsson & Edvardsson Björnberg, 2021); and (iii) that biodiversity offsetting can provide full and perfect ecological compensation as biodiversity offsetting claims to provide no net loss (NNL) or even positive benefits (Ledec et al., 2016).

In *Section II*, I demonstrated through an analogy that the compensation fair market formula omits from the calculus the 'subjective premium' (Merrill, 1986, p. 83) that persons might ascribe to their place. Thanks to the Van Gogh and the clone examples, I defended that such attachment cannot be compensated through a means replacing compensation. As such, I established that only an ends-displacing compensation is applicable. However, because of its forced character, the irreplaceability of the lost item, the shortcomings of the fair market formula, and the fact that the plaintiff could be well

off as before but *differently off*, ends-displacing compensation cannot bring the plaintiff back to the status *ex ante* the damage (Goodin, 1989), nor make it whole (Goldberg, 2006). Based on this, I concluded that biodiversity offsetting amounts to an unfair (Lee, 2013) and unjust (Kagan, 1988) *under-compensation*. Such a conclusion aligns with Page and Heyward's (2017) point on the difficulty of compensating for the loss of certain value-laden elements because of climate change events; my example is not far from the issue of compensating for the loss of an ancestral burial site proposed by the two scholars.

Aware that the framing proposed could be accused of being too narrowly focused on the notion of property, in *Section III*, I showed how the same conclusion could be reached even if property rights were excluded – by highlighting the tight link between place and self-identity. To do so, I borrowed the line of reasoning proposed by scholars addressing the ethical issue of compensating for the displacement of people after natural disasters (Brake, 2019; de Shalit, 2011). They suggest that displaced people, in the event of a natural disaster or because of climate change, lose not only material goods but also their attachment to their place (Tsosie', 2007); such a loss is irreplaceable because of its importance at a self-identity level and because it has no close substitutes. Hence, they advocate for a duty to do everything possible to avoid this loss. I suggest that the same rationale applies in the case of a person who suffers the effects of a biodiversity offsetting program: as for the displaced person, she has no ownership of her place (to be understood *latu senso*), but since she has a similar attachment to her place (granted that the offset would take away such place), she should be entitled to compensation for her loss. However, exactly for the same reasons as the displaced person, full and perfect compensation is unachievable since there is no equivalent means replacement nor any ends-displacing compensation that would not amount to an under-compensation. Assuming that my second analogy holds, I concluded – aligning with the courts' practice of issuing injunctions (Goodin, 1989) – that there might be a duty to do everything possible to avoid irreplaceable losses.

In conclusion, my line of reasoning highlights a paradoxical situation: even if full and perfect ecological compensation could somehow be achieved (no net loss is incurred, but even net gains are obtained), biodiversity offsetting would *still* amount to under-compensation. This is because, in the process of offsetting, people's attachments to places (historical, social, cultural, religious, spiritual) would be lost; these are features that cannot be *fully* compensated (the closest compensation would leave the person as well off as before but still differently off). If this point is accepted, granted that under-compensation perpetuates and even produces '*further harm, beyond the original harm – that is, the further harm consisting of the victim's continuing suffering*' (Kagan, 1988, p. 299) – then two major far-reaching consequences arise.

First, a change of understanding of biodiversity offsetting from *corrective* to *protective* justice (Sheinman, 2003) is necessary. This entails applying a *radical* precautionary principle according to which we ought to do everything we can to *prevent* the loss of one's attachment to one's place (Adger et al., 2011; de Shalit, 2011). Such a protective theoretical approach would permit '*rather than looking backwards with disappointment at past wrongful interactions and seeking their correction [which cannot be achieved], [to] look forward with apprehension at future wrongful interactions in order to prevent them*' (Sheinman, 2003, pp. 36–37). In other words, it would permit avoiding, in the first place, the creation of irreparable damages and any subsequent claim of under-compensation

altogether. I understand that such a proposal might seem radical, but it is the same conclusion reached by other scholars in the similar ethical debate around natural disasters and displacement issues (Brake, 2019; de Shalit, 2011); what I have argued in this paper is just its extension in the domain of biodiversity offsetting.

Second, biodiversity offsetting should not be used to compensate for *future* environmental damages. This is because using it in a forward-looking manner would entail *knowingly* and *intentionally* providing insufficient compensation for damages that will be suffered: a choice that may create a worrying precedent. However, it should also be noted that the issue of under-compensation does not fade away if biodiversity is applied as a backwards-looking compensation mechanism. Nevertheless, in this case, biodiversity offsetting could be partially justified by highlighting that imperfect compensation is still better than no compensation at all. This backwards-looking use calls for careful and cautious deployment of biodiversity offsetting and for further ethical research.

## Notes

1. Italics added.
2. Italics added.
3. First italics added.
4. Italics added.

## Disclosure Statement

No potential conflict of interest was reported by the author(s).

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