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Ir-REDD-ucible: Addressing the Policy Persistence of Nature-Based Offsetting

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Abstract

Despite a flurry of critical scholarship and bad press on reputable media outlets, nature-based 'solutions' to the climate crisis do not appear to be losing credibility within climate mitigation agendas. In fact, carbon markets are still growing, with carbon forestry as one of their most substantial drivers. While a disconnect between academia and policy comes as no surprise, a close look at almost two decades of academic and grey literature reveals several flaws and helps to explain why critical takes on carbon offsetting may have failed to make a dent in the carbon trading paradigm. Informed by insights from geography, political ecology, and critical development studies, this paper aims to tackle these challenges by interrogating the existing literature and proposing a research agenda for more insightful knowledge production and dissemination.

Keywords

carbon offsetting, nature-based solutions, REDD+, policy persistence, extractivism

Introduction

This paper addresses carbon offsetting, and nature-based offsets specifically, by interrogating the existing critical literature on the topic. If scientific literature has already demonstrated the flaws of nature-based offsetting (Haya et al. 2023), compounded by media coverage (Lakhani 2023) and grassroots activism (WRM 2023), why are nature-based

'solutions' growing, albeit with ebbs and tides? If nature-based offsetting (henceforth "NBO"[1]) is biogeochemically ineffective and socially harmful, then steering mitigation efforts away from this false solution is urgently necessary. This paper argues that NBO has so far proved 'irreducible' (i.e. unscathed in the face of criticism) – among other reasons – because academic research has failed to: 1) convey its arguments in an accessible and actionable form; 2) develop a coherent conceptualisation of the carbon commodity; 3) uncover the neocolonial value appropriation through unequal exchange so as to question the desirability of the offsetting paradigm beyond individual projects' shortcomings; 4) effectively tackle the class dimension of the carbon industry and expose the enrolment of *comprador* elites that allow for the carbon business to flourish; and 5) engage with indigenous and other marginalized groups' voices and practices.

While there is no shortage of critical – or at least sceptical – scientific literature on carbon markets and NBO, schemes such as REDD+ (Reduced Emissions from Deforestation and Degradation) keep expanding[2]. Scholars across disciplines have addressed policy persistence despite all odds in environmental policy: Büscher (2014) shows how purported success becomes a discursive commodity in itself, whereas Asiyanbi and Lund (2020) contend that the persistence of REDD+ can be understood in that it "aligns with the dominant neoliberal approach to environmental governance […] as a spatio-temporal fix" (p. 382), depending on the manufacture of success stories that are made to travel elsewhere (Svarstad and Benjaminsen 2017). Picking up these threads, Santos and Correia (2022) show that "persistence and stability of [REDD+] is based on discourse and a process that purport shared governance with forest-dependent peoples" (p. 125). More recently, influential political ecologist Robert Fletcher has argued that "conservation's undead forward lurching is particularly evident with respect to [REDD+]" (Fletcher 2023, p. 148). Fletcher resorts to psychoanalysis to account for neoliberal conservation's "failing forward" and identifies its essence in an "economy of expectations" (Borup et al. 2006)[3]. In this sense, 'die-hard' environmental policies align with Peck's (2010) "zombie liberalism", outliving its cerebral demise.

These accounts provide a wealth of explanations as to why institutional practitioners refuse to come to terms with capitalism's unsustainability. While empirically investigating the science-policy interface is beyond the scope of this paper, acknowledging that institutional and market governance seldom acts in unison with critical social science should not exempt scholars from questioning their own work. Indeed, surrendering to the fact that policies persist despite critical scholarship is tantamount to proclaiming the complete futility of scholarly work. From a more constructive perspective, policy persistence can instead be interpreted as the product of an array of factors that include flawed academic critiques, their failure to penetrate policy spheres and public opinion, as well as their failure to co-produce knowledge with affected communities and inform their decisions. The objective of this paper is not to add to the host of analyses and case studies as much as to identify avenues of research to be supplemented or inaugurated.

[1] For clarifications on 'nature-based offsetting' formulation, please refer to the methodology section.
[2] See section 3.
[3] For a recent example, see BeZero's (2024) prospect of a "$100bn [market] for planet and people".

The paper is structured as follows: after a methodological section, and before delving into NBO scholarship, section 3 addresses the terminological ambiguity that dominates the field, illustrating attempts made to popularise the existing criticism. Section 4 discusses the main gaps in the literature, identifying four largely overlooked lines of investigation. Finally, a potential research agenda is outlined in Section 5.

Methodology

This paper endeavours to explain the policy persistence of NBO through a narrative literature review of scientific literature within the loosely defined fields of geography, political ecology, sustainability studies, and development studies. While mainly intended for critical scholars, given the review method applied the paper may be of interest to policymakers, journalists, and practitioners alike. Narrative reviews offer an "exploratory evaluation of the literature or a subset of literature in a particular area" (Sovacool et al. 2018). While they take on a less comprehensive approach than systematic reviews and are, therefore, less replicable, narrative reviews allow for a more in-depth qualitative analysis. To mitigate the risk of researcher bias, the sample includes existing reviews (such as Chhatre et al. 2012, Bayrak and Marafa 2016, Milne et al. 2019).

The review is based on an analysis of over 60 papers and doctoral dissertations published between 2010 and 2023. Given the rapidly changing nature of carbon markets, it was decided to restrict the search to relatively recent papers. The cutoff year was chosen based on two considerations: 2010 was the year after the "Copenhagen disaster" (Dimitrov 2010), when negotiation breakdown led parties to a deep overhaul of climate ambitions, and was the year of COP16, which marked an important milestone for REDD+ with the introduction of the "Cancun safeguards" (Haya et al., 2023).

Publications were retrieved through Scopus searches (keywords included "nature-based offsetting", "nature-based solutions", "REDD"). The initial pool of over 25,000 papers was streamlined by searching for publications with at least two of the keywords and by applying the following criteria: first, since the analytical lens is placed on carbon, papers on biodiversity offsetting were not considered. Second, literature on NBO focusing on biological indicators (such as Streck 2021), as well as technical papers from the geosciences and distant disciplines within social sciences (e.g. law), were not taken into consideration either. Third, publications adopting a descriptive approach or uncritically reporting on the technicalities of NBO were excluded (it is worth stressing that the aim here is not to assess the outcomes of NBO, but rather to interrogate existing criticisms). Fourth, given the critical development studies approach, papers had to cover projects implemented in the Global South. The final sample of approximately 30 papers was then expanded through backward snowballing. Although the search was not deliberately limited to the English-language literature, nearly all papers discussed are in English. This points to a need to decolonise academic production that resonates with some of the reflections further down in the paper.

While the focus on REDD(+) was not a deliberate inclusion criterion, nearly all papers address it least in part, due to both its widespread implementation and controversial aspects. The decision to use the term nature-based offsetting has a threefold rationale: first, to question the framing of offsetting as a 'solution'. Second, to analyse nature-based projects that might not be part of the REDD+ scheme. Third, should the REDD+ scheme eventually yield under the weight of scientific and media criticism, new NBO schemes might take its

place (see Friess 2023). This does not mean that the arguments made here would become irrelevant.

Popularising Criticism

One overarching reason for the lack of clarity on carbon markets lies in the sheer terminological ambiguity that surrounds them (Gillenwater 2012). Concepts like offsets, allowances, capture, storage, sequestration, and removal are by now well established, and so does NBO-related vocabulary, including jurisdictional, compliance, voluntary, non-market-based and so on (Nel 2017). Yet they do not mean the same to everyone[4]. Indeed, "making things the same" (MacKenzie 2009) from diverse material circumstances is the elemental precondition for carbon trading (Gutiérrez 2011). To add to the confusion, scholars and practitioners regularly coin new euphemisms : "We are not a carbon broker, we call ourselves a nature climate solutions company" (personal communication with a carbon market professional 2022).

Undoubtedly, terminological obscurity is an asset to those who are skilled at navigating the haze of carbon markets. However, if carbon offsetting is ever to deliver, terminological, procedural, and regulatory homogenisation is long overdue. Some have tried to work around this terminological bog and adopted a figurative approach to popularise the debate: metaphors. While metaphors are not the matter scientific publications are typically made of, it would be unwise to downplay their enabling potential (Demeritt 1994). Metaphors can conjure up new imaginaries and shape the way we conceive of social and natural phenomena. Indeed, "one form in which discourses […] can gain authority is as metaphors" (Barnes and Duncan 1992:9). Although 'gaining authority' may be a double-edged sword, if carbon offsetting is to be subjected to stricter scrutiny, then it must be made relatable beyond the fog of technical jargon.

Metaphors "persuade by saying that things that we thought were outside our ken […] are really a lot like other things that we know very well" (ibid:11). In this sense, one of the most fitting metaphors used to critically refer to carbon credits is that of Papal indulgences, popularised by George Monbiot and widely taken up in the grey literature (Anderson et al. 2017): "Just as in the 15th and 16th centuries you could […] kill and lie without fear of eternal damnation, today you can live exactly as you please as long as you give your ducats to one of the companies selling [offsets]" (Monbiot 2006). As was the case with indulgences, intermediaries may sometimes be in good faith, yet there is no way to ensure that the promised objective will be achieved. Similarly, referring to the empty admissions of guilt common in the green growth discourse (Lucas 2023), Joan Martínez-Alier uses the term ejaculations, short aspirational prayers from the Christian religious tradition whose mere utterance cleanses the conscience of 'sinners' allowing them to carry on with business as usual.

Another way to portray carbon markets is to think of them as Ponzi schemes[5]. Indeed, carbon practitioners tend to draw an idyllic win-win picture of the industry and to make

[4] A useful source in this regard is Ecosystem Marketplace's yearly report on voluntary carbon markets (see Donofrio et al. 2021). For an overview of the functioning of REDD+, see also Nature (2022).
[5] A form of fraud that lures investors by promising quick returns from purportedly legitimate business activities.

promises based on unrealistic calculations: just like finding enough downstream 'takers' for everyone to become a millionaire is impossible, planting and preserving vegetation to offset all global GHG emissions (37.4 billion tonnes in 2023) would lead to a rapid exhaustion of the available space on Earth's landmass. This storyline, which speaks to the 'performance' of carbon markets (Asiyanbi and Lund 2020), helps epistemic communities (Büscher 2014) build a self-referential space in which each other's narrative is reinforced. Another poignant 'criminal' metaphor was popularised by Kenyan ecologist Mordecai Ogada: "the movement of large sums of money without any goods or services in exchange is money laundering […]. The brokers who receive the money are the same people who audit this intangible carbon" (Ogada 2021).

Foster et al. (2009) evoke the mythological King Midas referring to mainstream economics, which "seeks to transmute ecological values into economic ones" (p. 1088), whereas Reyes (2011) associates the image of "zombie carbon" to "sectoral" carbon markets, envisioned at COP16 as a way to revive ailing carbon markets. The same metaphor is applied by Fletcher (2023), who speaks of "REDD+'s zombie-like trajectory" (p. 148).

By using some of the above catchphrases, and especially by exposing the flawed nature of carbon accounting practices, respected media (Greenfield 2023, Fischer and Knuth 2023) and activist publications (Lang 2023) have dealt a blow to the offsetting paradigm. Following a wave of bad press spearheaded by 'The Guardian', in 2023 the market volume dropped by 56% (Procton 2024). The British media outlet went down in the industry's history as being the main culprit, so much so that, in June 2024, offsetting practitioners held a webinar titled "The Guardian Effect" (Nordahl 2024). This 'spectre' haunting the industry, however, was not fully matched by market figures[6] and was met with disgruntled rebuttals (Verra 2023a) that, while hardly scientific in nature, were instrumental in fending off a total collapse.

This section has explored the effectiveness of different modes of knowledge production and dissemination. It has ventured along a road insufficiently travelled and shown how media and activism may be better positioned to have an impact on policymaking and popular sentiment. Nevertheless, if climate change is also a matter of communication (Supran and Oreskes 2017), then academia must find ways to engage the public in a constructive spirit. The pun in this paper's heading offers a small contribution to an arsenal of rhetorical figures to be potentially associated with NBO.

Where Academic Criticism is Lacking

This section introduces the critical literature on NBO, with four sub-sections taking it on from a specific angle. While surely not an all-encompassing account[7], it singles out different if interconnected shortcomings that, if addressed, would give academic criticism 'more teeth'.

[6] Despite the credibility crisis, VCM retirements in 2023 exceeded 2022 levels (Garside 2024) and the market value (723 million USD) was greater than the annual value for any year from 2009 to 2020 (Procton 2024). NBO remains among the methods with the highest credit issuance (Sylvera 2023). As more and more countries plan jurisdictional schemes (e.g. Marawanyika and Sguazzin 2023), including with the backing of the World Bank (2023) and large NGOs (Thomson 2023), this trend is unlikely to be reversed soon.

[7] See for example Gay-Antaki (2016) on the lack of gender perspectives on carbon markets.

A possible initial distinction to be made is between papers dealing with "jurisdictional" carbon forestry projects (where jurisdiction typically refers to a country or a State), sometimes linked to so-called "compliance" or "regulatory" schemes, and papers focusing on individual projects funded through voluntary carbon markets (VCM, see Garcia et al. 2021). While the boundaries between the two are somewhat blurred, this is no trivial distinction, as credits generated through jurisdictional projects are typically (co-)developed by local authorities, may flow into nationally determined contributions or be exchanged through bilateral agreements, and might be eligible for a UN-vetted market (Angelsen 2017) should the long-debated Article 6 of the Paris Agreement become operational[8]. These credits are more likely to fetch a price premium (Gourlay 2024). Conversely, project-based credits are typically sold to private entities for the purposes of companies' net-zero claims, imply feebler institutional scrutiny and are therefore more prone to additionality and leakage issues (Irawan et al. 2019, Bayrak and Marafa 2016). Bearing witness to the co-evolution of voluntary and compliance credits, in some countries projects developed under an 'umbrella' jurisdictional scheme in preparation for Article 6 trading are, in fact, purely VCM-based (one example being Colombia, see Dufrasne 2021).

The majority of the publications analysed focus – explicitly or implicitly – on jurisdictional projects (Santos and Correia 2022, Rodríguez-de-Francisco et al. 2021, Guerra and Moutinho 2020, Asiyanbi et al. 2017). This appears to contradict the claim that "there is much less experience with, and knowledge about, the implementation of jurisdictional REDD+" (Irawan et al. 2019:1), although this quote probably reflects the fact that jurisdictional projects are often theorised and rarely implemented. While none of the papers hinges on a direct comparison, some of them more or less explicitly tell compliance and voluntary projects apart (Larson et al. 2013, Laing et al. 2016, Bayrak and Marafa 2016, Krause and Nielsen 2019, and Wunder et al. 2020). Lastly, some authors situate their research within voluntary carbon markets (Gebara 2013, Mahanty et al. 2015, Benjaminsen and Kaarhus 2018, Garcia et al. 2021, Huff 2021, Manda and Mukanda 2023, Huxham et al. 2023). Milne et al. (2019), who combine ethnographic work with a literature review, clarify that "much of the evidence […] has come from site-level, voluntary market schemes" (p. 93).

Strikingly, numerous papers are unclear as to what happens to the credits issued. In some cases, the institutional setting is intelligible from contextual information (Bruna 2022, Angelsen 2017, Work 2017, Poudyal et al. 2016, Brockhaus and Di Gregorio 2014, Larson et al. 2013, Beymer-Farris and Bassett 2012, Lemaitre 2011, Shankland and Hasenclever 2011), but in others it is completely left to guesswork (Loaiza et al. 2016, Awono et al. 2014). Sometimes, contradictory information is provided: in a study of subject-making through REDD+ in Indonesia, Setyowati (2020) denotes a strong involvement of sub-national authorities while also mentioning a carbon broker and the Voluntary Carbon Standard's

[8] As an agreement was reached on Article 6 at COP29, this prospect looks less unlikely. However, NBO will remain contested: according to some (Mulder 2024), REDD+ is incompatible with Article 6, while others make a case for it to fall within emission reductions..

validation process, possibly hinting at a market-based pilot project for Indonesia's compliance scheme[9].

What is Carbon?

The debate on the 'essence' of CO_2 on carbon markets, emerged in the early 2000s along with the "new carbon economy" (Corbera and Brown 2010), cuts across several disciplines, from STS to geography and beyond. Today, a certain degree of unclarity persists on what scholars talk about when they evoke the offset commodity. At stake here is not (only) the legal standing of carbon or the social construction of carbon markets (Callon 2009) but as offsets' status from a political economy perspective.

An analysis of this sub-field reveals a stronger interest in the theorisation of carbon markets in the first few years after their inception, which suggests that scholars have later tended to take them for granted. Goodman and Boyd (2010) describe the "carbon-ification" of the social and political sphere, yet they fail to define the socionatural arrangement they – rightly – claim has taken over so many aspects of our life. Drawing on Bakker's (2004) "cooperative commodities", Bumpus (2011) discusses the problematic commodification of carbon. His otherwise compelling theorisation comes up against its limits when confronted with nature-based offsets (see below).

From a Marxian perspective, scholars have debated whether offsets may be ascribed to the category of commodities or to that of derivatives[10], or "meta-commodities" (Holmes 2010). This is no negligible distinction: if the latter is true, carbon credits may be likened to fictitious capital (Harvey 2006), a notion that may lead down a slippery slope. Huff (2021) situates blue carbon within the economy of repair. While her connection between the Marxian commodity fetish and Polanyian fictitious commodities is questionable (Polanyi clarified that "the fetish character of the value of commodities […] has nothing in common with the fictitious commodities", see Polanyi, 1957 [1944]), she rightly claims that producing offsets "involves fundamentally different technologies and techniques than conventional ways of extracting economic value from nature" (p. 2219) and points to a dual (conventionally extractive and virtual) pathway of accumulation. Not losing sight of the physical dimension of offsets is crucial as "value relations in carbon markets are intimately connected to the appropriation of nature" (Bryant 2017:5) in fossil industries, of which carbon trading is the flipside yet an integral part. From a somewhat accumulation-agnostic standpoint, Bryant diagnoses a 'dysfunctional' accumulation of capital through carbon markets, as states have failed to institute strong markets by "overallocating allowances and insufficiently limiting international offset credits" (ibid:11).

To the author's knowledge, the concept of "economy of repair" in relation to sustainability was coined by Fairhead et al. (2012), who posited that the "damage inflicted by economic growth […] creates the basis for the new growth economy of repair" (p.242). Leonardi (2017) goes a step further by affirming that "carbon markets, in order to be offered

[9] Arguably, no carbon project can be exhaustively untangled in a single paper. Not coincidentally, some of the most comprehensive studies can be found in PhD dissertations (Gifford 2018) and papers stemming from PhD dissertations (Chomba et al. 2016).

[10] Perhaps not coincidentally, one of the 'fathers' of carbon markets, Richard Sandor, is recognised as the 'father' of financial derivatives (see Cameron, 2007).

as their own remedy, must always fail *to a certain extent*" (p. 79, italics in the original). This is part of what he defines "carbon trading dogma", which, consistent with Borup et al.'s (2016) and Fletcher's (2023) framing as "economy of expectations", entails the "belief that climate change, although a market failure, can be viably solved only by further marketization" (Leonardi 2017:62). In synthesis, then, what keeps carbon markets floating is not only the fantasy of future success, but also their built-in deficiencies that guarantee future demand for carbon reductions.

Leonardi further elaborates on previous scholarship to identify carbon commodities' use value in information, which is indistinguishable from their exchange value. Conversely, Lansing (2011) discusses the discursive construction of carbon value. His otherwise informative analysis is unconvincing on two aspects: first, he argues that "a carbon offset's use value is not found in its qualitative characteristics, but […] in the quantitative representations of its spaces", yet his account of the arbitrary selection of fallow fields in Costa Rica seems to indicate precisely that certain fields were selected due to their temporary use, i.e. their qualitative features, over quantitative considerations. In fact, the quantification of carbon sinks in relation to their social use is an inevitable step common to all offsets (Gutiérrez 2011). Second, Lansing's argument that it is through additionality calculations that "the *salto mortale* of exchange can be completed" (p. 746) clashes with Karatani's (2003) observation – cited shortly before – according to whom "A certain thing—no matter how much labor time is required to make it—has no value if not sold" (p. 8). In other words, no matter how much labour is invested to demonstrate an offset's use value – its value will be realised only when it is sold.

The carbon offsetting landscape becomes particularly blurred when considering nature-based solutions like REDD+. In this case, the "carbon that would have been emitted if it had not been displaced by the project activity" (Bumpus 2011:616) is not an imaginary unit of carbon that would have been emitted from a hypothetical fossil fuel, but rather a unit that can be physically traced to a specific landscape (Lansing 2012) and measured with increasing precision. This representational *and* physical act of separation is what Castree (2003) defines "individuation", and points to the fact that not all carbon commodities are the same.

Another gap that stands out is that while many scholars and even politicians (see Ministerio de Relaciones Exteriores 2021) have framed carbon markets as "carbon colonialism" (Parsons 2023, Bumpus and Liverman 2010, Bachram 2004), few explicitly frame them as extractivism (exceptions include Brightman 2019, Nicholson 2021, Bruna 2022). The implications of this conceptual misstep can be far-reaching: only by recognising carbon as a commodity that is 'extracted' and 'exported' is it possible to conceive the full scale of "accumulation by decarbonisation" (Bumpus and Liverman 2008) and its neocolonial undertones, as the decarbonisation underpinning the reproduction of the hegemonic socio-economic model at a time of climate crisis is heavily 'subsidised' by carbon offsetting schemes.

This is rendered obvious by the carbon frenzy of the last 20 years, coming in the footsteps of previous extractive waves. As happened multiple times in the past, wealthy countries are suddenly interested in working with countries deemed rich in a certain 'thing' – particular ecosystems, in this case. In this respect, Leonardi's definition of carbon commodities as a "second order abstraction" (p. 75), as well as Cavanagh and Benjaminsen's (2014) and Huff's (2021) insistence on their *virtual* essence can be problematic: in fact, nature-based credits present an unneglectable material dimension which, in many respects, is not

unlike that of more tangible resources. Although there is no transference of property of the actual CO_2, nor of the biological unit it relates to, a link exists between the offset commodity and both its biological 'precursor' (a tree, a portion of peatland, etc.) and its effects on the ground, including the long-term physical effort required to 'extract' it (conservation) and the territorial 'disciplining' processes (forest access and use) it entails. Along these lines, Milne (2012) postulates that what is being transacted is "behaviour change", while Carton and Andersson (2017) refer to the "[real] subsumption of carbon sequestration" (p. 833). Consistently, Frewer (2021) emphasises the labour involved in offset production (see also Bryant 2017). To his argument that most of the labour "occurs in the offices of NGOs and government departments, […] carbon brokers, verifiers and advertisers" (p. 2), one could object that offsets also harvest the millennial conservation labour of forest communities and claim their future conservation labour. Paraphrasing Frederick Engels, one could argue that through offset production past labour is being squandered[11].

Surely, the populations inhabiting these areas do not see much of a difference between carbon extractivism and past extractive ventures. Leggett and Lovell (2011) refer the telling question of a Papua New Guinean landowner involved in a REDD+ project: "What kind of pipes or other things do we need to collect the carbon?" (p. 11). Governments, too, appear to consider carbon a resource beyond its fictitious 'life' in global circuits of capital as they move to claim control of carbon stocks ("carbon tenure") as strategic sovereign assets even in areas where land tenure is formally devolved to Indigenous communities (Carbon Brief 2022). Within climate policies, as Ulloa (2013) notes, territories are simultaneously visible, in that they are within the purview of carbon markets, and invisible, in that indigenous realities are flattened.

The CO_2 traded on carbon markets might be the immaterial representation of an "economy of appearances" (Tsing 2000), yet credit issuance involves artefacts including various documents (Nel 2017) and relies on acts of performative materiality (Lansing 2012, Bracking 2015). Even more significantly, carbon is 'given' materiality in the eyes of the communities involved: both Leggett and Lovell (2011) and Setyowati (2020) report that Indonesian villagers believe they are "selling the wind" (ibid:466). As is the case with other forms of extractivism, some areas are naturally better endowed with the sought-after resource – in this case, the socio-natural environments conceived of as forests. Forested regions with a relatively low population density are thus construed as 'rich in carbon (offsets)' based on pre-existing material conditions. Paraphrasing Zimmermann's (1993) "resources are not: they become" and Karl Marx, we could say: "Men [sic] make their own resources, but they do not make them just as they please; they do not make them under circumstances chosen by themselves, but under circumstances directly encountered, given and transmitted from the past".

Countries with a low opportunity cost for people to adapt their behaviours to the UN-sanctioned climate regime are the ideal target for carbon extractivism. This very logic underpins the Clean Development Mechanism, which allows Global North actors to achieve emission reductions where it is cheapest. According to Gutiérrez (2011), the "market in emission reductions can only be conceived in the context of uneven development" (p. 654).

[11] Engels maintained that workers burning coal, wood, etc. are squanderers of "past solar heat" (Engels 1882).

That emission reductions are cheapest in the Global South, however, is by no means a 'natural' fact. As Amin (1976) – among others – has shown, historically-produced differences in the cost of labour are a foundational element of unequal exchange. Building on Frewer (2021) and others, then, it could be argued that it is these three constitutive elements (forests, low population density, and low opportunity cost), in addition to project-design documents, that 'make' the offset commodity.

In conclusion, Bridge's (2009) observation that resources are made when they "simultaneously 'fit' existing socio-technical arrangements and solve certain problems" (p. 1220) remains the most enlightening. Carbon, like many other natural resources, was there long before humans, yet only over the last two decades has humanity found a problem to which carbon is the solution. The solution – *bien entendu* – devised by the hegemonic capitalist forces for the colonisation of a new 'outside'.

Where is the Market?

"Like other global commodities, the trade of forest carbon rests upon transactions that involve a range of actors and institutions […] extending from a specific locality to international buyers" (Mahanty et al. 2015:177). In light of observations such as this, and given that carbon markets reached a global value of over 900 billion USD in 2022 (Verma and Chestney 2023), with voluntary carbon markets attracting 1.3 billion USD (South Pole 2023), it would be fair to expect a thorough analysis of the carbon commodity chain in the literature, moving from localised projects up to global value chains. Mahanty et al., (2015) and Milne and Mahanty (2019) venture into the carbon commodity chain, although their accounts say more about the bureaucratic production of carbon than they do about global value chains. Mahanty et al. (2015) recognise that "[i]nformation limitations and uncertainties associated with [carbon markets] make it difficult to undertake detailed quantitative analysis" (p. 178). Overall, in the academic literature the carbon commodity chain is shrouded in a mist that is only partly explained by the confusion discussed above.

As mentioned, a vast majority of studies are not straightforward about institutional setups, contextual features, and supply chain linkages: most focus on jurisdictional REDD+, whereas only a fraction explicitly focuses on VCM projects. This is particularly surprising given that most NBO funding so far went to (and most credits were issued by) non-jurisdictional projects due – among other things – to scarce finance available for jurisdictional schemes (Nature 2022, Miah and Aturo 2021), and that REDD+ remains among the most popular offsetting methodologies (Donofrio et al. 2021). Some studies highlight the problem of delayed or foregone payments, often resulting from funding not trickling down to project developers. This issue, however, is mostly mentioned in passing (Wunder et al. 2020, Milne et al. 2019, Pye et al. 2017, Gay-Antaki 2016, Lederer 2012).

This generalised unclarity can be partly attributed to the fact that "REDD+ opens a complex governance space involving international, national and local institutions" (Hunsberger et al. 2017:6). An intricate maze that not every study ventures into, all the more as industry stakeholders tend to morph faster than research can keep track of (see Verra 2023b). Indeed, since the VCS registry developed the JNR Framework to help "entities with forest-related emission reduction activities to integrate their efforts into governmental climate goals" (Verra n.d.), the distinction between 'independent' projects and projects 'nested' into compliance schemes may be rather blurred (Wunder et al. 2020). Such an inviting laxity for profiteers may

be one of the reasons why "REDD+ projects have produced the biggest share of credits in the VCM, representing 74%" (Nature 2022:14)[12]. Moreover, NBO funding channels are often unclear at the project planning stage and opaque during implementation (Wunder et al. 2020, Bayrak and Marafa 2016), which makes it prohibitive for researchers to paint a robust picture. Also, the geography literature tends to focus on country-level and global climate governance, rather than taking on the 'grounded' view of political ecology (Milne et al. 2019). Meanwhile, studies assessing a project's impact on land use and livelihoods often leave markets unattended: "Scholarship on REDD+ appears to assume some kind of a market" (Chhatre et al. 2012:657).

As a result, carbon projects appear either as 'black boxes' in carbon market-wide studies or, conversely, as if taking place in a vacuum. The evanescence of these connections "enables a self-referential space where members of epistemic communities cite and reinforce each other's interpretation" (Büscher 2014:87). In other words, the more chain connections are lost, the easier it is to sell empty 'success'. I therefore argue that this strand of literature could benefit from cross-breeding with global production networks approaches (Coe et al. 2008). Such a contamination could help debunk spurious success stories by allowing scholars to draw quantitative conclusions: how is value distributed among the different actors? What portion of climate finance goes towards the enhancement of local communities, and what portion is injected into global circuits of capital? How often are financial commitments not met? As Moros et al. (2020) observe, academics endorsing a critical discourse says more about their acquaintance with conceptual debates than it does about the existence of 'hard' evidence. Building up such evidence could be the key to turning an ethical problem into a quantifiable economic problem – arguably an effective way to gain clout in policymaking.

On a qualitative level, GPN insights could help explain how carbon capital 'lands' in rural contexts. What local actors act as intermediaries at the points of friction of global capitalism (Tsing 2005) and how is the "articulation" (Hall 1980) between different social formations (global capital and forest livelihoods) configured? The work of Global South intellectuals like Amin (1976), Marini (1972), and Quijano (2007), who attribute a critical role to colonised elites as links between colonialism and coloniality, especially in Latin America, may serve as a base for reflection in this direction.

Relatedly, Latin America would be a relevant place to start digging into another largely ignored question: what is the weight of illegal actors and corruption on carbon commodity chains? Official reports revealing that carbon developers pay their way into guerrilla-controlled territories by bribing – i.e. funding – armed groups (Defensoría del Pueblo 2024) are beginning to bring to light a phenomenon scholars should soon grapple with. In the literature, even very informative works on the political economy of offsetting fall into economistic reductionism. Consider the debate between Angelsen et al. (2017) and Fletcher et al. (2017): the bone of contention is essentially what 'price is right' for REDD+ to compensate the opportunity cost (and – Flecther argues – something more) of rational stakeholders. More often than scholars recognise, deforestation is driven by factors that reach beyond the economic calculus and even beyond the control of landowners, including territorial disputes (Botero 2024) and entrenched 'cultural' extractive habits (Collins 2024).

[12] Estimates vary (see also Allied Offsets 2022), but all sources agree on the prevalence of forestry credits in the VCM.

Ignoring these circumstances makes for cleaner but less realistic theorisations on the social feasibility of NBO.

Where is Class Analysis?

The mystification of carbon credits valorisation has another grave consequence: the existing literature offers limited insights into situated power relations and class analysis of environmental distribution conflicts.

While many papers do address issues of territorialisation, power relations, and trickling down of conservation incentives (Milne et al. 2019, Corbera et al. 2011), they display a tendency to jump back to higher political scales immediately. Amin (1976), among others, drew attention to the critical role played by *comprador* elites as chain links between global capital and its localised manifestations. If political ecology is about "[tracking] winners and losers" amid social–environmental change (Robbins 2012), then research should attempt to tease out those who win *as well as* those who lose, often generically lumped together as 'disadvantaged' groups. Moreover, a historical analysis of socio-environmental processes is often left out, which means that communities appear as if ontologically 'disadvantaged', with no agency of their own. As Haalboom and Natcher (2012) note, "the label "vulnerable" is often generated by those who are more or less unfamiliar with the complexities of local culture [which] may ultimately hinder their efforts to gain greater autonomy" (p. 319). In other words, a granular *political* ecology of NBO is missing.

There are, of course, a number of exceptions: some papers (Pasgaard and Chea 2013, Awono et al. 2014, Chomba et al. 2016, Poudyal et al. 2016, Milne et al. 2019) look at the intersection of REDD+, community involvement, and the reproduction of inequalities, whereas Leggett and Lovell (2011) denounce the elite capture of financial income from a project in Papua New Guinea, although Huxham et al. (2023) warn against a blanket application of this notion. A key remark by Leggett and Lovell (2011) is that "for some forest-dependent peoples, shifting cultivation is not so much 'what they do', as 'who they are" (p. 7), which reveals a 'double' alienation from both their means of production and their means of social reproduction. This underscores ontological divergences that are not contemplated within the "decarbonisation consensus" (Bringel and Svampa 2023), as "the underlying logic of REDD is Western contract-based exchange: when payments are made to support forest protection […], a service is being purchased" (Shankland and Hasenclever 2011:86).

Most studies agree that, beyond formal involvement in carbon forestry, substantial participation must be ensured (Santos and Correia 2022, Nantongo et al. 2019). Secure land tenure (Wunder et al. 2020, Pelletier et al. 2016, Sunderlin et al. 2009) and community forest management (Fischer et al. 2023) are widely recognised as the basis for successful conservation, yet State-sanctioned tenure does not necessarily ensure environmental or social outcomes. Chhatre et al. (2012) as well as Pasgaard and Chea (2013) bring attention to tenure as "the ability […] to appropriate resources" and to benefit from them (a "bundle of powers", see Ribot and Peluso 2003). In fact, land tenure may come as a mixed blessing: as it typically requires enforceable land titling, NBO has been known to fuel land grabs (Leach et al. 2012, Osborne 2013). The same can be said for forest governance: while it can be conductive to equitable carbon forestry (Larson and Petkova 2011), it can also favour (re-)centralisation (Milne et al. 2019, Phelps et al. 2010). Scholars have emphasised how access to land and local associations is essential. Unfortunately, however, poor households or women-headed

households are often excluded, which means that relying too much on formal political and legal arrangements can actually entrench inequalities.

All of the above advises against a sweeping approach to policy research aimed at prescribing how NBO should be designed. Departing from the infatuation for 'upscaling' and 'modelling' (Asiyanbi and Massarella 2020), it may be wise to drop one-size-fits-all approaches together with the idea of a global carbon market, prioritising what McDermott et al. (2013) define "contextual equity" instead. At any rate, the roots of this limited depth of analysis lie deeper, namely in the normalisation of the status quo of formerly colonised polities. Nearly none of the papers thoroughly attend to the colonial heritage of the relevant region, nor explain why offsetting projects are implemented there and not somewhere else. This brings me to my last argument.

Where is Decolonial Theory (and Practice)?

The most conspicuous deficiency in the offsetting-critical literature is a decolonial approach to knowledge production. Colonialism as a historical phenomenon is hinted at in some papers (Airey and Krause 2017), others address its enduring impact on contemporary forest processes (Mukono 2024, Nel 2017, Asiyanbi et al. 2017), but compelling decolonial theory *and practice* are sorely lacking.

In this paper, decolonisation is addressed by engaging (uncomfortably, as a scholar from the Global North) with Tuck and Yang's (2012) call to consider it as "a distinct project from other civil and human rights-based social justice projects [which] cannot easily be grafted onto pre-existing discourses/frameworks, even if they are critical" (p. 3). Decolonisation, then, is an unsettling historical process that must take seriously struggles over tangible resources, wealth, and privilege, as well as the 'undisciplining' of the racialised subjects of colonial governance (Collins 2024). More specifically – and more modestly – this section reflects upon decolonial scholarship, intended as an approach to academic research that is less deferent to modernist, Eurocentric, and market-centred narratives, embraces plural worldviews, promotes practice-based knowledge production, and endeavours to turn research subjects into research actors.

The papers examined generally do not interrogate rural perspectives on carbon offsetting. Where the views of forest dwellers emerge, they tend to be either in the background or grouped together as an undifferentiated 'community'. Most of the political ecology literature does at least digress on livelihood impacts (Jagger et al. 2010), culture-blind policies (Benjaminsen and Kaarhus 2018), and exclusionary practices (Asiyanbi et al. 2017), but very few studies investigate what directly involved community members think about the logic by which they are called upon to 'fix' the atmosphere. For much engagement with donors, project developers, and policymakers, much less is with the so-called "project-affected people" (or "asterisk people", following Tuck and Yang, 2012) their agency sometimes limited to a logframe (Mustalahti and Rakotonarivo 2014). Notable exceptions are Shankland and Hasenclever (2011), which addresses the ontological divide between market-based approaches and the 'socioculturalist' ideology, as well as Awono et al. (2014), Airey and Krause (2017), Milne and Mahanty's (2019), and especially Andoke Andoke et al. (2023), based – among other things – on the personal experience of two indigenous co-authors. Most notably, Collins (2024) shows how a purportedly apolitical process like REDD+ lands on layers of colonial history ("colonial residue") and how forests that once provided shelter from

colonisers now "are again providing refuge, but this time explicitly to the wider international community" (p. 11). To tackle this, she suggests supporting the 'undisciplining' process of the racialised subjects of colonial governance. Along these lines, Schroeder and González (2019) seek to "contrast Western and indigenous ontologies of territoriality" (p. 198), although their claim that indigenous knowledge should be "scaled up" for the purposes of forest governance is as dubious as it is vague.

The very fact that the social effects of carbon forestry are conventionally called *co*-benefits or *additional* benefits is problematic, as it implies that the only indispensable benefit consists in emissions mitigation (in other words, serving the purposes of Global North clients). A majority of papers delve into a top-down view of policy design (Sunderlin et al. 2009), but little effort is devoted to questioning the very logic behind NBO; when it is, it is mostly due to project-level (in)effectiveness, not as a matter of global socio-environmental justice. Consequently, even less attention is devoted to indigenous alternatives to carbon forest management. As a result, social scientists run the risk of being inadvertently complicit in the perpetuation of colonial imbalances (see De Leeuw and Hunt 2018).

Scholars and activists increasingly point out that, if decolonisation remains merely a theory – or at most a social justice discourse – it has little to offer to change the material conditions of people's lives. If decolonisation is anything at all, it must be, above all, a practice (Tuck and Yang, 2012). Similar thoughts emanate from Latin America, most notably in the work of Rivera Cusicanqui: in Ch'ixinakax utxiwa (2012), she stresses the centrality of decolonial practice, as opposed to the "logocentric and nominalist version of decolonization" (p. 102) that propagates from the ivory towers of academia.

Bayrak and Marafa (2016) refer of "two schools of thoughts on REDD+ and livelihoods: The "pro-poor" school and the "do-no-harm" school" (p. 8). As to why a community should let its own territory be used by external actors developing a project in the name of a scheme devised in the air-conditioned rooms of climate negotiations – provided that no harm is caused! – no justification is provided. Indigenous communities – goes the climate regime motto – are part of the solution. The solution to someone else's problem, that is. I hence argue that, besides focusing on exposing the flaws of individual projects, scholars should take a step back and do more to question the very desirability of the offsetting paradigm.

Following not only decolonial theory, but also the declared rationale of the UN Clean Development Mechanism, NBO has a reason to exist only if it promotes the empowerment of affected communities (where empowerment is understood as "the organized efforts of marginalized groups to transform patterns of resource allocation", see Utting 1994:256). Any 'neutral' intervention, upheld merely through conventional informed consent, will perpetuate epistemic injustice and unequal exchange while it exploits carbon sinks to allow for further capital expansion. Going beyond the UN's stated ambitions, a number of requirements could be integrated in decolonial carbon forestry: these could include both symbolic measures for historical redress (for example renaming locations with indigenous names) and concrete measures such as the reorganisation of tenure relations and land restitutions (Chomba et al. 2016), as well as regulatory safeguards ensuring that most of the value generated stays in the community.

On the other hand, the essentialisation of Indigenous people as forest stewards poses serious risks. Besides the thorny issue of who qualifies as Indigenous, Indigenous groups are

not monoliths and, like any social group, are subject to internal struggles. Indigenous people have historically been skilled forest stewards when carbon had a value, but not a price. The long-term effects of commodified carbon on forest communities are uncharted land.

This section has dived into the NBO literature and has pinpointed four interlinked domains that have been left partly unattended in the literature: the conceptualisation of carbon, an articulation of carbon markets and commodity chains, an analysis of power and class dynamics within those chains, and decolonial scholarship. The conclusions will draw together these threads and formulate suggestions for future research.

Conclusions

In this paper, I have addressed the content and flaws of critical literature on carbon offsetting. I started by discussing the ambiguity and potential of terminology, and showing how journalism and activism did have an impact. I have then addressed the main gaps in the literature by distinguishing four major shortcomings. Ultimately, with all their woes, forest carbon schemes appear to be unyielding (or 'irREDDucible'). This points to the need for further critical engagement, especially focusing on when NBO actually *works* by its standards, in order to uncover what may be wrong with offsetting schemes at their roots. In what follows, I set out the items of an ambitious yet not unrealistic research agenda.

Researchers have started to scratch the surface, but several shortfalls remain in terms of geographical coverage (NBO in Latin America – except for Brazil and increasingly Peru – is relatively understudied, despite South America issuing the highest number of REDD+ credits in 2022, see Sylvera 2023) as well as from a theoretical and practice-oriented perspective. This paper has attempted to strengthen the case, if not against NBO altogether (the boldest move in this direction was Bolivia's request for a moratorium on Article 6.4 markets, see Gibson, 2023), at least for a precautionary principle inducing an assessment of the interscalar dynamics of policy implementation. This paper does not go so far as to argue in favour of abrupt discontinuation of NBO schemes, owing not to a belief in their effectiveness but to the concern that shutting down existing projects might have unintended consequences for the ecosystems involved and the livelihoods depending on them (Jones 2024). Indeed, that offsets are worthless does not mean that a project is worthless under all rubrics. Scholars have shown that communities often rely on REDD+ for funding streams (Mukono 2024) and possibly tenure clarification (Milne et al. 2019), which substantiates the environmental risk that "if the payments stop, the mangroves will be cut down in a day" (Huff 2021, p 2218). In light of this, NBO schemes could be refashioned as 'climate contributions', which would take away the carbon accounting component and make them more akin to PES. This is the road being paved by the European Union (Council of the EU 2024) and, despite the use of REDD or similar acronyms, is also the way major international partnership has been functioning (Angelsen et al. 2017). Social scientists, then, could take it upon themselves to investigate if and how REDD+ projects could transition to PES without harming those dependent upon REDD+ funding. This would also eliminate the need to guarantee permanence: any payment towards ecosystem conservation would have an impact *however long* that ecosystem may last, just like art restoration, and would not revert mitigation efforts as no emissions would have been released in exchange.

Besides clarifying beneficiaries on paper, ensuring the actual money flow has proven challenging, as news stories uncovering fraudulent schemes and climate denialism temper

the demand for credits. As conservation in the Global South is more or less directly dependent on funding flows from the Global North, in some cases the failure of carbon forestry comes down to former colonisers (not) honouring their historical and ecological debt. Critical research, then, cannot remain blind to commodity chains and to the many actors – formal or informal, legal or otherwise – that partake in carbon credit production networks. Elaborating a political ecology of funding agencies and project developers propped up with quantitative findings could help understand how and why climate funding flows are throttled.

This paper has also sought to show that, even if carbon forestry were to work on a project-level, it remains a neocolonial, capitalist solution to a problem caused by colonialism and capitalism. Hence, even if one were to trust conservation projects to succeed and carbon finance to target the 'right' beneficiaries, the overall structure of domination of humans and nature would remain intact. In this vein, academic research could aim at the intersection of alternative forms of land tenure, subsistence livelihoods, and carbon forestry to envision pathways for truly empowering carbon forestry: for instance, since the process of carbon commodification requires specific institutional and technical scaffolding (i.e. technology), a case could be made for technology transfer to Indigenous communities, which would make external developers and brokers redundant and favour "autocentric development" (Amin 1976).

Most studies addressing the opportunity cost of avoided forest uses do not do it through the lens of unequal exchange: a carbon trading perspective interspersed with insights from global commodity chains could illuminate the imbalances new forms of dependency inherent to carbon trading and help identify key g-local junctions of value appropriation. Very few studies have attempted to provide quantitative data along the carbon value chain, from payouts to partner communities to the final credit retail price (see Lock 2021); even fewer have managed to pierce into the secrecy of carbon brokerage, even though the whole scheme supposedly takes place under the aegis of the UN. Making these connections would elucidate potential extractive dynamics, global neocolonial patterns, and class contestations.

Moreover, as Milne et al. (2019) note, there is a need for more "ethnographic research that provides nuanced and independent accounts of REDD+ on the ground" (p. 85). Innovative studies could attempt to co-design research with local communities, adopt radical field methods (such as countermapping, see Peluso 1995) and, more generally, genuinely engage with local populations and scholars, thus combining qualitative and quantitative data to draw a comprehensive picture of NBO. This would at least partly defuse the risk of reiteration of colonial patterns through academic research.

Finally, this paper has stressed the importance of conceiving both research and decolonisation not only as theoretical activities, but also as a practice. Researchers would do good to lend an ear to the many scholars (especially from the Global South) who argue against a siloed approach between research and activism. As privileged producers and interpreters of knowledge, scholars cannot be deaf to the calls for more incisive public and political engagement. In this spirit, and given the at least partial success of investigative journalism and environmental activism in unmasking false climate solutions, alternative channels for dissemination and action could be considered.

To conclude, academics and non-academics alike are being constantly reminded, by images of natural disasters and armed conflict, that slow-paced theorisation might soon prove ill-suited for a global conjuncture that demands action. Might we not envision a scholarly community driven by a higher sense of urgency?

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