Rendering Local: The Politics of Differential Knowledge in Carbon Offset Governance

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Environmental governance relies on the translation of socioecological knowledge across disciplines and cultural–political boundaries. Comparatively few studies have, however, examined how such expert knowledge is translated back into the local contexts where projects are implemented. This article explores these processes of translation for the case of forest-based carbon offsetting using a case study of the Trees for Global Benefits project in Uganda. Based on successive fieldwork in two project regions, it examines how climate change, carbon, and carbon trading are understood by project participants and what work these understandings perform as part of the governance of carbon offsets. The article identifies a distinctive "rendering local" of project logics and rationale, which occurs in part as a management strategy by the project organizers and is in part the outcome of participants' own articulations of offsetting concepts within the socioecological contexts in which they are embedded. Although these often unruly translations provide tensions and contradictions within the sociomaterial assemblage that constitutes the offset market, they also serve to facilitate project management. The dynamics identified here highlight the uneven geographies of environmental knowledge as instrumental to the governance of the offset market, therefore warranting closer attention by scholars studying carbon forestry and neoliberal environmentalism more generally. *Key Words: carbon forestry, carbon offsetting, environmental governance, knowledge politics, neoliberal nature.*

环境治理依赖于跨学科、跨文化和政治边界的社会生物学知识转化。但是，很少有研究探讨如何将这些专业知识转化到当地环境中的项目实施。本文以乌干达树木全球效益项目为例，探讨了森林碳补偿的转化过程。通过对这两个项目区域进行的连续实地工作，本文考察了项目参与者对气候变化、碳和碳交易的理解，及这些理解在碳补偿治理中的作用。本文找出了项目逻辑和基本原理独特的"地方解读"，这是项目组织者管理策略的一部分，也是参与者在其所在社会生态环境中自行表达的部分结果。尽管这些转化难以管理，在构成补偿市场的社会物质组合中会引发紧张和矛盾，但也有助于项目管理。本文发现的动态强调了环境知识的地理不均衡现象可以对补偿市场治理提供帮助，以确保碳林业以及更广义的新自由主义环保主义学者更密切的关注。 关键词: 碳林业，碳补偿，环境治理，知识政治，新自由主义自然。

La gobernanza ambiental descansa en la traducción del conocimiento socioecológico a través de las disciplinas y de las fronteras político–culturales. Comparativamente, sin embargo, pocos estudios han examinado cómo se adapta tal conocimiento de experticia a los contextos locales donde se están implementando proyectos. Este artículo explora estos procesos de traducción para el caso de la compensación de carbono con base en prácticas forestales, usando un estudio de caso del proyecto Árboles para Beneficio Global, en Uganda. A partir de sucesivos trabajos de campo en dos regiones del proyecto, el estudio examina cómo son interpretados el cambio climático, el carbono y el comercio del carbono por los participantes en el proyecto y qué función cumplen estos entendimientos como parte de la gobernanza de la compensación del carbono. El artículo identifica una singular "representación local" de la lógica y racionalidad del proyecto, la cual se da en parte como una estrategia de manejo por los organizadores del proyecto, parcialmente resultado de las propias articulaciones de los conceptos de compensación entre los participantes dentro de los contextos socioecológicos en los cuales se insertan. Aunque estas adaptaciones, a menudo revoltosas, generan tensiones y contradicciones dentro del ensamblaje sociomaterial que constituye el mercado de compensaciones, sirven también para facilitar el manejo del proyecto. Las dinámicas que aquí se identifican destacan el carácter instrumental de las geografías desiguales del conocimiento ambiental para la gobernanza del mercado de la compensación, justificando en consecuencia una mayor atención por los eruditos que estudian la estrategia forestal del carbono y, de manera más general, el ambientalismo neoliberal. *Palabras clave: compensación del carbono, gobernanza ambiental, naturaleza neoliberal, política del conocimiento, silvicultura del carbono.*

Carbon offsetting continues to be looked at by policymakers and businesses as an appealing instrument to help mitigate climate change. The logics and shortcomings of this strategy have been extensively discussed and criticized, particularly for the case of forest-based offsets (Böhm and Dabhi 2009; Lohmann 2011a; Hyams and Fawcett 2013; Mackey et al. 2013; Corbera and Martin 2015; Leach and Scoones 2015a). Although offsetting potentially generates new revenue streams and opportunities for poor communities in the Global South (Jindal, Swallow, and Kerr 2008; Thomas et al. 2010; Osborne and Shapiro-Garza 2018), it often comes with trade-offs, injustices, unintended consequences, or obstacles to implementation that tend to be insufficiently acknowledged by proponents (Muradian et al. 2013; Cavanagh and Benjaminsen 2014; Osborne 2015; Leach and Scoones 2015a; Corbera and Schroeder 2017; Edstedt and Carton 2018; Fischer and Hajdu 2018). Persistent concerns about the permanence and additionality of carbon offsets, moreover, raise questions about the environmental integrity of this particular mitigation approach (Galik and Jackson 2009; Erickson, Lazarus, and Spalding-Fecher 2014; Cames et al. 2016; Gren and Zeleke 2016).

These concerns and criticisms in part pertain to offsetting's character as a market instrument. The repackaging of (promised) emission reductions as something that can be bought and sold on the market is predicated on specific assumptions, values, and expert knowledges about climate change mitigation that are deemed universal and straightforward but turn out to be anything but (Leach and Scoones 2015b; Twyman, Smith, and Arnall 2015). Scholars have long pointed out the constructed nature of such "ecosystem markets" and how they rely on processes of abstraction and commensuration that obscure crucial social and ecological differences (Castree 2003; Lansing 2011; Lohmann 2011b; Roth and Dressler 2012). Making ecosystems economically legible requires acts of translation that erase scientific uncertainties and seem incapable of capturing real-world complexities (Robertson 2006). This has wide-ranging implications for project implementation and puts environmental conservation in the service of specific economic and political interests (Lave, Doyle, and Robertson 2010; Fairhead, Leach, and Fraser 2012; Turnhout, Neves, and De Lijster 2014; Dempsey 2016; Lund et al. 2017; McElwee 2017).

Previous research shows the pitfalls of translating complex socioecological realities into technocratic and expert knowledge. It illuminates the social and political work that idealized environments (fail to) perform (Wittman and Caron 2009; Osborne 2011; Cavanagh and Benjaminsen 2014; Lyons and Westoby 2014; Asiyanbi 2016) and the inevitable challenges that arise in making reality comply with the abstractions that supposedly represent it (Milne and Adams 2012; Wang and Corson 2015; Carton and Andersson 2017; Nel 2017; Osborne and Shapiro-Garza 2018). It is not just the socioecologies of carbon offset projects that are subject to translation, however. In parallel with how forests are reduced to stands of carbon, pastures and croplands are reframed as "degraded" land, and communities are rendered into cost-optimizing ecosystem service providers, another form of translation is occurring: one by which expert notions like carbon, environmental degradation, and offsetting are themselves reframed to fit complex local realities and stakeholder interests. Translation, in other words, also runs from the abstract to the concrete, as the site-specific reframing of (global) technocratic knowledge to make it fit a variety of (local) contexts, allowing governance instruments such as carbon markets to be understood and articulated by a range of nonexpert actors.

This other form of translation is a necessarily incomplete and often flawed process, with concepts such as carbon or offsetting frequently losing much of their "original" meaning as they are articulated by nonexperts. A number of studies, for example, observe that targeted communities tend to have a poor grasp of the kind of transactions they are involved in or the rationale behind them (Corbera, Brown, and Adger 2007; Wittman and Caron 2009; Milne and Adams 2012; Shapiro-Garza 2013; Milne et al. 2019). Leach and Scoones's (2015a) edited volume on carbon forestry contains some illuminating examples of how local communities in different African contexts define carbon as "the mists you see above forests in the morning" (22) or as "charcoal air" (Kijazi 2015, 70), hinting at specific and potentially problematic understandings of where CO_2 emissions originate. Despite these anecdotal observations, geographers have so far attached relatively little importance to such (mis)translations of expert knowledge or how they inform our understanding of the logics and limitations of neoliberal environmental governance. Notable exceptions include Fisher

(2013), who engaged in some detail with the justice dimensions of community members' misunderstandings of forest interventions and highlighted their importance for assessing accountability and conditionality requirements in Payments for Ecosystem Services (PES) schemes (see also Fisher et al. 2018). Similarly, Otto (2018) discussed the confusions surrounding the nature of the carbon market in the Scolel'te project in Mexico and the distrust and suspicions these gave rise to when adverse market conditions caused payments to participants to dry up. His work underscores the potential ramifications that local misunderstandings of carbon offsetting have for the success of projects themselves and therewith hints at the significance of these translations to the political economy of the carbon offset market.

This article builds on this work to explore the broader dynamics and implications of communities' understandings of carbon offsetting. It focuses on a distinctively geographical logic in the translation of expert knowledge that, building on Li (2007) and others, I here describe as *rendering local* or *localization*, meaning the tendency to obscure, selectively ignore, or otherwise fail to articulate how global actors and dynamics are entangled in local environmental interventions. This rendering local proves to be a source of internal tension in the creation of tradeable offsets, giving rise to a number of inconsistencies and knowledge conflicts. Yet it also creates opportunities and benefits for both participants and project managers, highlighting how knowledge differentials and apparent failures of translation do not necessarily obstruct the functioning of carbon markets but can in fact facilitate it. This article thus extends discussions on the knowledge politics of neoliberal environmentalism into the spaces of carbon offset implementation, corroborating how expert knowledge is not simply imposed onto local contexts but necessarily interpreted and translated in context-specific, politicized, and fundamentally uneven ways. This ultimately underscores the bidirectional and dialectical character of knowledge translation, in which not only do economic abstractions serve to make socionatures legible within the prevailing logics of environmental governance but abstracted expert knowledge is in turn also rendered legible to, and by, the full range of actors involved in offsetting schemes, in the process giving abstract carbon a variegated "social life" of its own (cf. Goodman and Boyd 2011).

My argument proceeds by way of a case study of Trees for Global Benefits (TFGB), a community-based carbon sequestration project in western Uganda. The next section first contextualizes the article's focus within literature on the politics of knowledge translation, highlighting some important geographical dimensions to this debate. I then introduce the case and identify significant discrepancies between how carbon offsetting came to be understood by TFGB participants and the kind of carbon forestry knowledge that is being articulated by experts. In the Discussion, I draw out the tensions and opportunities that arise from these knowledge differentials and highlight the geographical dimensions through which these become articulated. The Conclusion summarizes the argument and calls for more critical attention to the politics of knowledge in carbon offset governance.

Knowledge Translations in the Making of Carbon Offsets

The translation of scientific knowledge into tools that policymakers and businesses can work with is a key mechanism through which complex socioecological realities are made legible and therewith governable. Market-based instruments such as carbon offsets are a prime example of this (Bäckstrand and Lövbrand 2006; MacKenzie 2009; Bumpus 2011; Stephan 2012), operating as they do through a sprawling assemblage of carbon dioxide equivalents, carbon credits, baselines, sustainability criteria, and accounting, monitoring, and verification methodologies that all rely on expert knowledge (Lohmann 2009; McElwee 2017). This technocratic toolbox is critical to the functioning of carbon markets and to upholding the discursive and economic value of offsets as a representation of real emission reductions (cf. Castree 2003; Robertson 2006).

It is also critical to the hegemonic position that carbon markets enjoy in climate policy, in that knowledge claims inevitably come imbued with values, interests, and power relations (Demeritt 2001; Jasanoff 2010; Mahony and Hulme 2018). In the process of translation, expert knowledge becomes oriented toward particular economic and political objectives (Lave 2012; Turnhout, Neves, and De Lijster 2014). It performs a dominant framing of environmental change and its solutions that silences alternative and opposing narratives, thereby to some

degree preempting the politics of deliberation (Swyngedouw 2011; Lövbrand et al. 2015). Given the current preoccupation in climate politics with cost-efficient, "flexible," and voluntary mitigation strategies (to which offsets are often key), knowledge translation thus becomes "a neoliberal and a hegemonic practice that actively (re)produces knowledge-power configurations" (Machen 2018, 495).

In other words, both the exchange value of carbon as a (pseudo-) commodity and the political legitimacy of market-based solutions is contingent on a successful process of translation; that is, on the construction of a unified and relatively homogenous understanding, among the different actors involved, of both the problems of environmental change and how best to address them. Insights from development studies suggest that this applies not just to the translation of knowledge across societal spheres—for example, from science into policy, economics, or business—but also to (subsequent) knowledge translations across political and cultural boundaries. Commenting on the ethnography of aid, Mosse (2005), for example, observed that any development project "requires the constant work of translation (of policy goals into practical interests; practical interests back into policy goals), which is the task of skilled brokers (managers, consultants, fieldworkers, community leaders …) who read the meaning of a project into the different institutional languages of its stakeholder supporters, constantly creating interest and making real" (9). A similar need can be observed in the implementation of carbon forestry. Dawson et al. (2018), for example, stressed the importance of what they termed "national interpretation processes" in REDD+[1] implementation, meaning the extensive policy work that goes into translating international norms and values around forest governance into diverse country settings. Milne et al. (2019), meanwhile, built on Latour in identifying knowledge translations as central to the enrollment of diverse actors in carbon forestry projects. This importantly includes local communities, who often perform active roles in carbon forestry as carbon stewards or offset producers and whose interests in and capacities for technocratic governance therefore to some extent need to be tailored to.

The uneven geographies and hegemonic political economic contexts in which these processes unfold in turn make such multiscalar knowledge translation tools into what, following Mosse (2005), one can call "disciplinary exercises in right thinking" (96). They become instruments in the recruitment of landscapes and livelihoods in the Global South to the objectives of neoliberal environmental governance—a now common theme in the environmentality literature (Leach and Scoones 2015a; Fletcher 2010, 2017). Social and economic power is here something that is exercised not only over project participants but also through them; that is, through the internalization of and appeal to ideas, practices, and material interests that serve to reproduce offsetting logics. Community practices that fail to relate to the modalities of international climate and forest governance are rendered invisible, actively marginalized, or both (Fairhead and Leach 1996; Fischer, Giertta, and Hajdu 2019), and the expression of such practices in terms compatible with dominant regimes is rewarded (Asiyanbi, Ogar, and Akintoye 2019). At the same time, the operation of social power through actors' everyday practices renders the object of translation somewhat fluid and politically unstable. This opens spaces for contestation and cooptation, enabling local actors to redefine and appropriate external discourses to suit their own interests and logics (Mosse 2005; Erb 2012; McElwee 2016). This can position community groups against but also in (partial) alliance with external, expert interests (Forsyth and Walker 2014). In this context, Sundberg (2006) speaks of transculturation, to denote the different ways in which local groups "elaborate, appropriate and contest the daily discourses and practices of conservation" (240–41). Her research, for example, highlights how communities in the Maya Biosphere Reserve of northern Guatemala used influential conservation discourses for political ends by "reinvent[ing] themselves as harmonious forest dwellers and conservation heroes" (Sundberg 1998, 91). Similarly, Cepek's (2011) ethnographic work with the Cofán people of the Ecuadorian Amazon shows how community members became engaged in a participatory conservation project for strategic political–economic reasons, staying fundamentally skeptical toward the project's overall objectives.

Expert knowledge is in this way not just transposed into different contexts but actively rearticulated in line with prevailing social, economic, and political dynamics. In other words, in the process of making real, the translation of knowledge across new settings and actors also actively creates difference. Applied to our case, this highlights an interesting

contradiction between (1) carbon offsets as (pseudo-) commodity, demanding the creation of equivalence through abstract, expert knowledge, and (2) offset creation as a material practice that derives its logic and appeal by way of locally specific articulations. Thus, although a common theme in the literature highlights failures of abstraction and knowledge translation as obstacles to neoliberal environmental governance (West 2005; Robertson 2006; Leach and Scoones 2015a; Otto 2018), such "failures" are in important ways also constitutive of it. The local adaptation of expert knowledge indicates a source of potential tension and conflict, but it is also foundational to making global environmental governance work in the first place. With the case study that I elaborate in the remainder of this article, I aim to show that these seemingly contradictory dynamics and the various ways in which they play out in practice are worth paying closer attention to. The dynamic I identify is not one of straightforward cooptation, resistance, or knowledge imposition but a heterogeneous constellation of tensions, contradictions, and alignments that, due to the uneven space in which it operates, nevertheless acquires a certain logic. Concretely, I suggest that the difficulties in translating carbon offset projects are in some ways used productively by project implementers as a tool of environmental governance. Much as environmental governance operates through the reworking of local livelihoods and landscapes, it also operates through the creation of distinctively local understandings of what instruments like carbon offsetting are fundamentally about.

The Trees for Global Benefits Project

Founded in western Uganda in 2003, TFGB is a PES project that promotes the planting of indigenous trees by and for smallholder farmers. TFGB operates according to the Plan Vivo methodology and derives most of its income from selling carbon offsets on the voluntary carbon market. As with other projects on this market, TFGB offsets are marketed not just for their climate mitigation potential but also for the socioeconomic benefits that the project claims to bring for participating farmers. Offset buyers can thus claim that they compensate for their own continued emissions while also contributing to sustainable development in rural Uganda. Concretely, interested companies buy offsets

(directly or via an intermediary) from a Ugandan organization called Ecotrust, which is managing TFGB. This funding is used to administer the project and to compensate the project participants. From its start in one pilot region, TFGB has expanded rapidly and now covers a number of districts in western Uganda and, more recently, the Mt. Elgon region in the east. More than 6,000 participants have officially joined (Ecotrust 2018), and the project is frequently hailed as a best practice example both within Uganda and internationally (SEED 2013). Despite this apparent success, TFGB has suffered from many of the same problems identified in other PES and offsetting projects. Previous studies have raised concerns with, for example, elite capture (Fisher 2013; Schreckenberg, Mwayafu, and Nyamutale 2013), motivation crowding (Fisher 2012), lack of accountability toward participants (Fisher 2013; Andersson and Carton 2017), and insufficient attention to socioecological complexities (Carton and Andersson 2017). Although these issues are not the main focus of this article, they clearly intersect with questions of knowledge translation and levels of understanding about the project among participants.

For farmers, participation in TFGB involves entering into individual twenty-five-year contracts with Ecotrust that stipulate how many trees to plant on what area and what technical specification (e.g., agroforestry or woodlot systems) to follow. Farmers in return receive a total of five payments, spread out over the first ten years of the contract and conditional on achieving specified planting objectives (Schreckenberg, Mwayafu, and Nyamutale 2013; for more details about the project's design, see Ecotrust 2016). The amount paid out is different for every farmer, due to the use of individual carbon prices and fluctuations in the dollar exchange rate, but is on the order of US$600/ha for the entire period (Fisher 2012). This is seen by Ecotrust as just an incentive payment and is not meant to cover the full opportunity costs of tree planting. Participants' main income in the project is expected to come from eventually harvesting their trees for timber and from secondary income-generating activities such as the sale of fruits, honey, or herbal medicine (Ecotrust 2016). Progress toward the planting objectives defined in the contract is tracked by regular monitoring visits. Management of the project is in the hands of Ecotrust staff, but the organization mostly operates out of Kampala and has minimal on-the-ground presence

in the different regions. In the day-to-day interaction between Ecotrust and project participants, a key role is played by local farmer coordinators, selected community members who are responsible for recruitment and who work on a largely voluntary basis.

The analysis presented here is based on fieldwork in two of the project regions. First, in 2014 and 2015, I carried out interviews with fifty-six TFGB participants and ten nonparticipants familiar with the project in three subcounties bordering Queen Elizabeth National Park (see also Carton and Andersson 2017). In 2019, I carried out an additional sixty-one interviews and a brief survey with participants in two districts neighboring Lake Albert. During this last fieldwork period, I also interviewed Ecotrust staff and various nongovernmental organizations working on environmental conservation and issues related to forestry and oil and gas extraction more specifically.

Trees for Local Benefits: The Rendering Local of Carbon Forestry

The way in which farmers are recruited into TFGB gives a first indication of the knowledge translations that occur in this project. Generally, initial information about the project is spread by word of mouth and through the recruiting efforts of the local farmer coordinators. Once sufficient people have expressed interest, the coordinator calls prospective participants to an information meeting where TFGB is introduced and where farmers are given the opportunity to sign up. Information about the rationale and operational details of the project are conveyed at this first meeting and at subsequent semiregular get-togethers to which all participants of a specific subcounty or village are invited. These meetings are led by the local farmer coordinator alone or with regional Ecotrust staff. They also provide the forum through which Ecotrust offers participants skill training on topics such as forest management and the establishment of apiaries and other small businesses. During these meetings, considerable efforts are made to accentuate those aspects of the project that Ecotrust deems most directly relevant and most likely to be understood by (prospective) participants. The economic benefits of participation are an important part of this, as are the local environmental and livelihood benefits of tree planting. According to the organization, these are comprised of, among other things, easy access to firewood, the diversification of farmer incomes, improved soil fertility, the provision of shade, and the ability of trees to "bring rain."

To help clarify the logics of tree planting, recruitment meetings and training sessions also involve education on climate change. Taking into account the complexity of the subject and the fact that project participants have often only had limited formal schooling, climate change is commonly explained by building on the knowledge that farmers already possess. Ecotrust staff thus described how they explain climate change outcomes by invoking recent extreme weather events and long-term changes that farmers have observed in local precipitation patterns and growing seasons. Similarly, the drivers of climate change are made tangible by referring to examples of greenhouse gas emissions that participants can relate to, such as from firewood and charcoal burning, motorbike and car traffic, and exhaust fumes from nearby industries (a sugar processing factory in Hoima was a popular example).

Comparatively less attention is given to the logics of carbon offsetting or the workings of the carbon market more generally. This reflects a general conviction within Ecotrust that carbon and carbon offsetting are abstract concepts that carry little meaning for smallholders. According to the organization, farmers readily understand the processes of photosynthesis and sequestration, but "it is the concept of why anyone would want to pay for it that sounds far-fetched. … To them [by] who[m] and how carbon is sold is an academic question that is difficult to relate to" (personal communication, Ecotrust director, 27 April 2016). As a consequence, the exact dynamics of offsetting are regarded as only marginally interesting to participants. In fact, Ecotrust explicitly argues that mitigation as such is a project objective that is of primary relevance for carbon offset buyers, whereas TFGB farmers are deemed to be interested mostly in adaptation and the practical project details; that is, "how the tree planting helps [the farmer] deal with prolonged droughts and improve productivity, and what is required of him/her to access [project] financing" (personal communication, Ecotrust director, 27 April 2016). Carbon offsetting is in this way translated by Ecotrust as two somewhat separate logics, connected only by a unidirectional flow of funding from buyer to offset producer.

To get a sense of how these translations relate to participants' own understandings of the project, I carried out a small survey and follow-up interviews with a sample of sixty-one farmers in 2019. In the survey, I asked participants about their own experiences with and knowledge of climate change, whereas the interview focused on more in-depth knowledge of the project. The results (Table 1) show that the vast majority of respondents (85 percent) felt that the climate in their region has become drier and hotter or that the rains have become more unpredictable during their lifetime. Almost unanimously, this was attributed primarily to a reduction in forest cover. Respondents argued that population growth, agricultural expansion, and the proliferation of sugarcane plantations have led to widespread deforestation, which in turn affected cloud formation and local precipitation patterns. More infrequently mentioned drivers were the degradation of wetlands and other water bodies and, as I elaborate later, the ongoing oil and gas exploration activities in the Lake Albert region. Of the few respondents who instead argued that the climate had become cooler or that rainfall had increased in their area, all argued that this was because of the trees that they (and other people) had planted as part of the TFGB project.

Most notable in this is that none of the respondents linked their observations of changes in the climate to more distant or dispersed drivers, such as

Table 1. Trees for Global Benefits participant perceptions of climate change

	Responses (N = 61)	Percentage
Observed changes in climate		
Reduced rainfall and/or hotter, more prolonged droughts, more unreliable seasons	51	85
Increased rainfall and/or cooler	5	8
Unspecified change	3	5
No change	2	3
Reasons for observed changes in climate (multiple possible)		
Deforestation	53	88
Increased forest cover	6	10
Degradation of wetlands and other water bodies	6	10
Oil and gas exploration around Lake Albert	4	7
Don't know	2	3

global increases in greenhouse gas emissions. Indeed, the survey overwhelmingly shows that TFGB farmers' understandings of observed climate change are grounded in their experiences of how their local surroundings have changed as a whole. This is despite many of these respondents later, in the interview, demonstrating that they understood that emissions play some kind of role as a driver of climate change and that this was in one way or another related to why they were being paid to grow trees. One interviewee, for example, first said that the climate had been changing in his area because of extensive deforestation and then, in explaining what he had learned from the Ecotrust training sessions, argued that "the ozone layer[2] is destroyed by industries … that is why the world is so hot." Asked whether he thus thought that this had also affected the climate in his region, he was adamant that changes in his region are due to deforestation (interview, Julius, 8 February 2019).[3] Participants, in other words, do not necessarily connect what they are being told about climate change and emissions in TFGB training sessions with the changes that they have been experiencing themselves.

How do we make sense of this difference between participants' understandings of climate change and how they explain the rationale for the TFGB project? One of the reasons for the disconnect appears to be that climate change itself is understood by at least some of the participants as a mostly local phenomenon, composed of localized causes, effects, or both. The climatic changes that are motivating offset buyers is in this understanding not necessarily connected to those experienced by the participants themselves. One of the farmer coordinators, for example, in explaining how he teaches his farmers about climate change, argued that proximity to emission sources to a large degree determines how a specific region is affected by climate change. He noted that farmers in his region would be affected by neighboring industries but that they are affected only marginally—if at all—by industrial activities in the Global North: "[The emissions] in your country will affect you more, but what is in my country will affect me more" (interview, Rachid, 7 February 2019). Similarly, it was not uncommon for interviewees to argue that tree planting would help offset or neutralize nearby emissions (elaborated later) or that greenhouse gas emissions had only led to warming in the Global North, because they originated from industrial activities in those areas. As one participant put it, "The weather there [in industrialized

countries] is not easy, they have no trees and it is completely dry, and that is why they want carbon. … Here in Uganda it is cool" (interview, Gerard, 7 February 2019).

These articulations of climate change also help shed light on participants' understandings of the TFGB project and the dynamics of offsetting more generally. Reflecting the limited efforts by Ecotrust to try and elaborate the details on this, interviewees often acknowledged that they do not know exactly where the money was coming from for their payments, what motivates the funders, or in what way these people are themselves benefiting from the project. A number of interviewees argued that funders are compelled to fund tree planting in Uganda due to a lack of available land or unfavorable growing conditions in their own countries. Others conceived of the project as just another development project and believed that the only interest of funders is to support poor farmers and help increase forest cover in their area for altruistic reasons. Some participants conceptualized the "carbon" that buyers were interested in as any other commodity that would be physically extracted from their trees at some point and exported abroad and wondered how exactly this would happen. More often, though, carbon sequestration and tree planting were connected by participants to the production of an immaterial good, commonly believed to be "fresh" or "cool" air. Interestingly, this notion gives meaning to carbon in a way that also reinforces the local uses of tree growing. A third of the farmers interviewed during 2019 explicitly associated the need for carbon sequestration or the creation of "fresh air" with the direct health effects of emissions, thus seemingly conflating climate change and air pollution. Carbon, in other words, is here translated as something that has a direct use value to the project participants themselves, suggesting that nothing of apparent scarcity is being traded away and that all conceivable benefits of the project remain with the farmers. It is unsurprising in this context that the incentive payments that participants receive are commonly seen as free money, which not only led to disbelief but initially also to mistrust and fears that the contracts actually contained a claim to farmers' land or the trees themselves (interview, Ecotrust official, 4 February 2019). The incredulity at the economic logics of the project was expressed by one of the farmer coordinators, when asked to narrate how the project was originally introduced to their community:

They told us [we would be] selling air, which was also queer [laughs heartily] … that you will grow a tree … and then you will only sell air … it became queer [laughs heartily]. How can you grow a tree [laughs] and then you sell air [laughs], and you are paid [laughs]? (Interview, Leonalda, 23 January 2015)

Taken together, these accounts and understandings speak to a multifaceted and complex process of translation operating in TFGB. On the one hand, Ecotrust is making deliberate efforts to translate what it believes are abstract and not fully farmer-relevant concepts and dynamics into terms that are legible to its (prospective) participants. This includes explaining climate change through primarily local examples but also a conscious underplaying of the mitigation dimensions of the project, while highlighting the economic and environmental benefits to participants themselves. At the same time, the preceding examples show how various forms of translation are occurring through the project participants; that is, the project is being reinterpreted through associations that people make with preexisting knowledge, experiences, and expectations and in an effort to relate abstract and novel ideas to local socioeconomic and environmental contexts (cf. Twyman, Smith, and Arnall 2015). The local farmer coordinators appear to play an important role here, in that they both help translate the information that comes from Ecotrust and reproduce common misunderstandings and confusions among the farmers with whom they interact.

The overall, combined, and partly intended effect of this is what I call the "rendering local" of the TFGB project. As the preceding examples demonstrate, this is not an innocent process, leading to misunderstandings and seemingly significant omissions. The larger question, then, is what work the rendering local of this project performs.

The Work That (Unruly) Translations Perform

To substantiate the wider significance of the dynamics previously identified, it is useful to draw on an extended example. Let us therefore consider the Bunyoro region, one of the areas where TFGB activities are concentrated. Located on the shores of Lake Albert, the region was recently shown to hold 1.4 billion barrels of recoverable oil reserves, which the Ugandan government is fully intent on extracting. Exploratory drilling has been ongoing for a

number of years, and construction of a 3,000-ha industrial park in Hoima district, which will house an oil refinery, the country's second international airport, and petrochemical and agrochemical industries, among other enterprises, is underway. Expectations of a veritable "oil boom" have led to significant land speculation in the area and set in motion an influx of fortune seekers from other parts of the country. TFGB participants, too, are generally hopeful that oil will bring development, primarily in terms of better infrastructure, employment opportunities, and improved access to markets. There is equally a worry, however, that oil development will lead to land grabbing, forced relocation, conflicts over compensation payments, and contested land rights, all of which have already occurred in some parts of the region.

Participants are also concerned about the effects that oil development might have on their immediate environment. Apart from concerns about oil spills from the various pipelines that will traverse some farmers' lands, one of the most common and widespread worries is that oil and gas production in the area will come to have direct negative impacts on the local climate. Most interviewees articulated some variation of this idea, arguing, for example, that "petroleum extraction will cause desertification" (interview, Sulaiman, 28 January 2019) or that "oil and gas is associated with dry conditions, where oil is, there is reduced rain" (interview, Lucia, 26 January 2019). A few interviewees even argued that exploratory oil activities had already affected weather patterns (Table 1). The reasoning here is that there is a direct causal connection between the extraction of oil in a specific area and adverse climatic conditions that occur there. Some people substantiated this by making parallels to other oil-producing regions, notably South Sudan, Libya, or Saudi Arabia.

The planting of trees is widely seen as a way to mitigate these adverse effects. Indeed, it was not uncommon for interviewees to first argue that oil extraction would lead to drought in their region and then to comment that they were generally very positive about the prospects of oil development. Confronted with this apparent contradiction, these people would often observe that tree growing would offset the negative climate effects of neighboring oil developments. Oil and gas extraction is, in this reading, a problem only to the extent that there are no trees around. One person thus said that people are

"doing all they can by planting trees, so that they will not have desertification" (interview, Moses, 28 January 2019). Another remarked that "with Ecotrust and the government, [we] will embark on tree planting, and that will cap the effects [of oil development]" (interview, Isaac, 26 January 2019). A third noted that even though she knew that oil and gas could cause the area to dry, she felt that the "carbon [from the trees she planted] will be protecting us" (interview, David, 29 January 2019).

Much like with their understandings of the TFGB project more generally, interviewees did not necessarily link these ideas of tree planting and local climate change to any kind of emissions. Some people, for example, observed that oil and gas would cause the region to dry because of the heat involved in extraction activities, or through some other unspecified process, and that trees would offset this effect directly by "attracting rain." For others, however, the information on greenhouse gases and fossil fuel emissions they received from Ecotrust appeared to provide an explanation for the assumed relationship between drought and nearby oil extraction. These participants thus constructed a direct connection between the trees that they are growing and the sequestration of climate-affecting emissions from local oil and gas development. As one participant put it, "Oil activities, during the drilling and so forth, release some gasses to the atmosphere, which produce more heat … so we plant some trees to absorb those carbons" (interview, Rose, 5 February 2019). In other words, as far as participants were concerned, the TFGB project became partly about the mitigation of local oil and gas development, rather than (or in addition to) the sequestration of unidentified emissions from the Global North. Even some of the local farmer coordinators appeared to hold this view, with one, for example, observing that "with the oil there are a lot of very heavy machines [which] will also attack the ozone layer … so before they begin drilling, we tell our farmers to plant very many trees" (interview, Ismail, 31 January 2019).

It should be noted here that the "oil leads to local climate change" narrative is not exclusive to TFGB participants. It was repeated to me by some non-governmental organization workers, even though they did not necessarily know what to make of it. Although it is difficult to know exactly where the idea originates, a number of interviewees traced it to

information they had received from local radio channels, from other community members, and from a (now defunct) regional development organization that had come to their village some years back. Two farmer coordinators argued that CNOOC, the Chinese oil company operating the Kingfisher project in the south of Lake Albert, had recently organized a meeting in their village where they advocated for tree planting as a way to mitigate some of the environmental effects of oil development. Ecotrust itself appears to have played a role in this translation as well, mostly by its use in farmer meetings on local oil and gas exploration as a way to illustrate the drivers of climate change (interview, Ecotrust official, 1 February 2019). The important takeaway from this complex knowledge assemblage is that extant circumstances and developments external to carbon offsetting projects can have far-reaching impacts on how the logics of those projects are interpreted by local communities. The rendering local of TFGB is in this sense the logical outcome of the encounter between abstracted expert knowledge with the socioecological specificity that resides at the local scale.

Evidently, the idea that participants' tree planting efforts serve to compensate for local emissions conflicts with the narratives of TFGB's offset buyers. The entire idea of both PES projects and offsets is that the payments provided by the funders function as the immediate incentive for tree planting. It is this that allows buyers to claim ownership of the carbon in TFGB trees and therefore to account for them as part of their own emission budgets. Farmers are not supposed to come up with their own reasons for tree planting or to discursively claim the sequestered carbon as offsetting an entirely different set of activities. Doing so jeopardizes the alleged additionality of the project and therefore the validity of the offsetting claims that buyers are making. To the extent that participants understand project funding as a form of development aid, this flags a substantial yet hidden disagreement on who can claim the climate benefits of these trees. In other words, the unruly translations of carbon offsetting that occur here create a contradiction within the project and a potential threat to its economic logic—even though it remains an unarticulated and so far inconsequential one.

At the same time, the discursive tension that emerges from these translations also aids the project,

by making oil and gas activities in the region one more reason for farmers to sign up. In one subcounty, for example, near where the industrial park is being constructed, a majority of interviewed participants argued that the motivation of people in the community to grow trees had increased due to concerns over the impending impacts of oil development. The local farmer coordinator spontaneously confirmed this: "Another thing why [people] decide to join now … is because of the oil and gas emissions that are likely to come from near [to where people live], so that the trees can be able to absorb at least those fumes" (interview, Johnbaptist, 26 January 2019). Interviews demonstrate a number of other instances where specifically localized understandings about the project play into the interests of Ecotrust. Although by far the most significant reasons participants give for joining are material ones—mostly timber, firewood, and the payments—people clearly also pin their hope on tree planting as a way to mitigate or offset a wide range of local environmental changes, not all of them equally realistic. Examples include the previously mentioned "fresh air" that trees create (meant either as a form of microclimate regulation around homesteads or a way to reduce air pollution) but also the idea that tree planting would help "stabilize the seasons," "return the weather back to normal," or help to "attract rain."

Rendering Local as a Tool of Governance

Geographers have long highlighted the relational character of carbon markets and the often contradictory dynamics that emerge from this. Carbon markets are made up of what Knox-Hayes (2013) described as a "socio-materiality," an entity "constituted by the social actors and processes that build the markets" (126). Their internal logic and therefore the value of traded carbon credits fundamentally depend on a "relational ordering between the spaces of carbon storage, the carbon dioxide emitter, and the atmosphere itself" (Lansing 2011, 747). Indeed, the whole point of the technocratic machinery behind the creation, certification, and monitoring of offset claims is to continuously perform a sense of coherence within this relational ordering; that is, to enact the stability of the market's sociomaterial assemblage (Lansing 2012; Nel 2017). Given the central role that local communities

commonly play within carbon offsetting projects, their own understandings of and roles within this relational ordering seem of particular interest.

It is significant in this sense that many TFGB participants, through what is a highly contextual and multilayered process of knowledge translation, articulate an entirely different sociomateriality, one that fails to perform basic characteristics of the carbon market, such as the additionality of tree planting activities or the equivalence of spatially distinct emissions as part of a single environmental problem. For many readers it will seem evident that these alternative sociomaterialities provide erroneous readings of how climate change, carbon offsetting, or the TFGB project in particular operate. Tree planting does not simply compensate for the negative health or environmental impacts of oil exploitation, nor does it by itself ensure a return to previous precipitation patterns. Similarly, carbon offset buyers tend to be motivated by more than just altruism in their decision to support tree planting in the Global South. Yet it is not the extent to which such local articulations are "wrong" or the degree to which they reflect the knowledge produced by experts that is important here. Indeed, the apparent misunderstandings that participants hold make perfect sense within the contexts in which they occur. It is no surprise that smallholder farmers in rural Uganda are vastly disadvantaged when it comes to expressing the scientific complexities of climate change or the technocratic abstractions to do with the carbon offset market.

In fact, many of the examples given earlier are best characterized not as wrong but as inevitably partial. Participants' beliefs that tree planting will help to "bring rain," for example, are generally supported by science: Evapotranspiration from forests is widely recognized as an important factor in the regulation of regional temperature and precipitation patterns (Jia et al. 2019), if not necessarily on the microscale that many of the participants I talked to believe it to be occurring. It is not the fact that participants attribute local climate regulation effects to their trees that is remarkable but their identification of this as the main or even only driver of climate change. In other words, the translations that occur in TFGB are significant because they appear to prioritize or otherwise serve to benefit certain understandings over others. Indeed, we can discern a logic in the specific aspects of the project, of its rationale, or of the general drivers of climate change that tend

to be articulated and which ones are not. The empirical material shows that the combined translations by Ecotrust and by participating farmers themselves give rise to distinctly localized explanations of how and why TFGB operates—elaborating deforestation and reduced evapotranspiration as causes of climate change or local industrial activities as motivations for tree planting—ignoring or at least downplaying factors such as the uneven global drivers behind the changing climate or the equally global logics of mitigation that underpin the actions of carbon offset buyers.

This geographical component to the dynamics of knowledge translation spills over into the wider politics and governance of the project. For one, it creates skewed motivations and unrealistic expectations regarding the benefits of the project, as when participants assume a direct relation between their own tree plantation and the amelioration of climate or growing conditions or when the production of "good" or "clean air" becomes a project objective in itself, to which remediative health effects are assigned. In the case of the communities around the Lake Albert oil exploration, the local translation of offsetting logics has to some degree resulted in the idea that not participating in TFGB will increase the risk for negative environmental or health outcomes. In these different examples, the rendering local of TFGB is at the same time also the "rendering blind" (cf. Corbera and Martin 2015) of participants to trade-offs and complexities in how carbon markets operate, the conditions under which tree planting functions as a climate change mitigation strategy, or indeed the specific interests of funders. This flags an important justice dimension to knowledge translation, raising questions regarding the possibility of informed consent in contexts where the opportunities and capacities for translating expert knowledge are so unevenly distributed (cf. Corbera and Martin 2015).

For TFGB itself, meanwhile, the rendering local of the project provides opportunities but also creates a number of tensions and contradictions. The various translations that characterize the project are simultaneously productive to the creation of marketable offsets—where they help farmers overcome initial skepticism, make knowledge locally relevant, and even encourage recruitment—but also potentially disruptive, particularly where motivations for participation conflict with those being articulated

through the market. It is significant, however, that the latter has so far failed to make any significant dents in the success narratives that circulate about TFGB. The fact that participants fail to perform foundational claims about the offset market seems to matter little to how the project itself is unfolding, highlighting how the offset market is anything but a flat sociomateriality and how certain performatives of it ultimately are far less important or influential than others (cf. Lansing 2012). As is common in PES projects (Kolinjivadi et al. 2019), the universal primacy of economic incentives and of rational decision making based on perfect information is simply assumed by Ecotrust and offset buyers. Despite contradicting these claims, the complex and contradictory motivations and knowledges of participants hold little weight within the TFGB assemblage. Their ideas and perceptions about the project matter only in a very selective sense, as a medium for the facilitation of tree planting. Their "localized" knowledge is sufficient to enable participation in the global "economy of repair" (cf. Fairhead, Leach, and Scoones 2012) but has limited reach when it comes to reframing or contesting global narratives about TFGB.

In these different ways, the sociomateriality of the TFGB project maintains its internal coherence not just despite the imperfect, partial, and often contradictory translation of knowledge into the socioecological realities of project participants but in certain ways also because of it. Not only is forestry in this project a "realm in which scientific and local knowledge systems meet on unequal footing" (Ahlborg and Nightingale 2012, 1) but that unequal footing is itself conducive to the objectives of carbon market governance. In certain regions at least, TFGB is able to attract participants because of one-sided, exaggerated, or erroneous claims about the benefits of tree planting. Its additionality claims maintain legitimacy because some knowledge translations de facto remain mute within the uneven sociomaterial ordering of the offset market, preventing specific concerns from "jumping scales" (cf. Holmes and Cavanagh 2016). The apparent unruliness of translating environmental knowledge into the socioecological realities of smallholder farmers in this way becomes an instrument through which TFGB is governed, rather than just an obstacle to that governance. In other words, it is not just that carbon is here "a substance with diverse meanings and consequences" (Leach and

Scoones 2015b, 3). Those different meanings in turn give rise to differentiated capacities and opportunities of actors on the carbon market to access knowledge and create tensions and are thereby constitutive of how the project is managed. This marks knowledge translation as a process through which the uneven and political dimensions of forest governance and carbon offset creation are reproduced.

Conclusion

Critical scholars have long analyzed knowledge translations as key processes in the neoliberalization of nature. Articulating and reframing socioecological realities is central to making socionatures legible to global experts, to producing abstractions, and to enabling institutions such as carbon offset markets. In this article, I have argued for closer attention to a related set of translations, one in which the abstracted knowledge that neoliberal governance builds on is translated back into the context-specific localities where, for example, offsetting projects are implemented. In the case of TFGB, this translation process occurs in part as a conscious effort of Ecotrust to help make the project locally relevant, "smoothen" farmer involvement, and build on the environmental and economic knowledge that participants possess. In part, it emerges from a crowded landscape of extant understandings, framings, and socioecological interactions that construct participants' environmental knowledge in certain ways when encountering new ideas and concepts.

As with processes of abstraction, these translations are characterized by an inherent messiness and partiality, in some cases resulting in erroneous claims that are far removed from how project organizers and carbon buyers are articulating offsetting practices. It might be tempting to dismiss these outcomes as an apparent failure of translation. Yet the "imperfections" of translation that the TFGB example puts the finger on are interesting not because they deviate from ideal-type expert knowledge about carbon and climate change but because they appear constitutive of the tree planting efforts that TFGB is promoting and are therefore in some ways productive of the creation of tradeable offsets. The various opportunities and tensions outlined in this article thus show how the governance of TFGB occurs in part through this imperfect character of knowledge

translation and not just despite it. Moreover, the outcomes of these translations are not random but demonstrate a clear geographical logic. This is unsurprising perhaps, given the direction of translation into local project settings and the uneven socioeconomic relations within carbon forestry projects that these translations are inevitably mapped onto. Yet recognizing the rendering local of TFGB as a distinctive process is important because it puts in focus the uneven geographies of climate knowledge (and the creation of these through translation) as an important and so far underrecognized condition through which such projects operate.

I conclude this article with a call for closer attention to local translations of climate and carbon forestry knowledge, the contingent outcomes in which they result, and their performative role within neoliberal environmental governance. Scrutinizing the uneven dynamics of carbon offsetting demands that we take seriously the unequal "social lives" of expert knowledge as it travels across scales and social contexts. Doing so fruitfully extends discussions on the contradictory mechanisms through which offsetting operates in practice and the environmental justice questions these raise. This ultimately demands a more fully multiscalar and heterogenous conception of knowledge translations, one that highlights not just the pursuit of equivalence but also the creation of difference. It posits the articulation of environmental knowledge as a scalar process whereby the differentiated capacities and opportunities of actors on the carbon market to access knowledge itself serve as a tool of governance. The specific dynamics and outcomes of this will necessarily differ across cultural and geographical settings and from project to project. Further case studies would therefore be useful to substantiate how "rendering local" and the politics of differential knowledge more generally play out beyond the case of TFGB in western Uganda.

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Note

1. REDD+ stands for reducing emissions from deforestation and forest degradation, and foster conservation, sustainable management of forests, and enhancement of forest carbon stocks.
2. Participants often conflate knowledge about the ozone layer with ideas about climate change. Throughout this article, I am interpreting these references to the ozone layer because an observation on the greenhouse gas effect, because it is evident from the context that this is what people are talking about.
3. All names have been changed to guarantee the anonymity of the interviewees.

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