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# Performing carbon's materiality: the production of carbon offsets and the framing of exchange

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Received 27 February 2011; in revised form 9 July 2011

**Abstract.** In this paper I provide a first-hand account of a trip designed to verify the existence of a carbon forestry offset in Costa Rica. In so doing, I reflect on how various actors become the stabilized calculative agents of scientists, state bureaucrats, indigenous leaders, GPS devices, trees, signs, and field reports that such trips require. In addition, I show how various articulations of these actors, and their emergent agencies, simultaneously maintains both the carbon offset as a commodity object as well as a field of action and communication that allows for such an object to be exchanged. In short, I consider the verification of an offset as a performance. Doing so, I examine the agency of some actors in this process, and account for the uneven power relations inherent in such a process. Specifically, I advance three arguments. First, the agency of actors is constituted, in part, by various calculative devices, which themselves simultaneously occupy an unstable position of being both a material object and an abstraction. Second, the normative power of the performance I witnessed derives from its relation to the object: spaces and ways of being that are unintelligible to the logics of offsetting that nonetheless serve to further reiterate the need for an offset's calculative frame. Third, performing an offset is a self-reflexive process, and it is through the self-reflexivity of actors involved that the qualities of 'the forest' emerge in ways that confound the stability of an offset commodity. In this way, the biophysical qualities of the forest are not necessarily barriers to its commodification. Instead, it is the reflexive practices inherent in performing 'the economic' that can serve to confound the emergence of the commodified forest.

**Keywords:** performativity, carbon offsets, materiality, commodification, power

## Introduction

In 2004 an indigenous reserve in Costa Rica set aside a block of pasture land as a carbon forestry offset. The reserve's governance council was given an upfront payment by a foreign company that sells voluntary offsets on the Internet.<sup>(1)</sup> In exchange, the council agreed to ensure the land will not be used for a fixed period so that it may begin sequestering carbon. Today, a consumer may offset the climatic impact of his or her greenhouse gas emissions by calculating the level of emissions from a particular action—a plane flight, car ride, or home electricity use—and purchasing a credit. In theory, a purchase from this company goes toward the payment the council received for allowing this land to become a budding, carbon-rich secondary forest, a monetary transaction that ultimately neutralizes the climatic impact of the consumer's greenhouse gas emissions.

In practice, this economic transaction requires considerable work by a diverse group of actors to transform this block of land into a space of commodified carbon storage. Government bureaucrats, members of NGOs, employees of the company, and indigenous political leaders came together to carve physical markers onto the landscape. Some of them cut trails that marked the borders of this space, while others posted signs on the territory's edge that signified that this space is dedicated to conservation and is 'off-limits' to hunting, farming, or fishing (figure 1). In addition

<sup>(1)</sup> I purposefully refrain from identifying the company and NGO involved with this offset. In addition, all personal names are pseudonyms.



**Figure 1.** [In color online.] ‘Carbon territory’ sign. Example of signs that were posted on the borders of the carbon offset territory described in this paper. The sign reads: “Property under private conservation; program of environmental service payments; hunting, logging and plant and animal extraction from the forest is prohibited; help us conserve the natural resources of Talamanca by enjoying them today and leaving them for the next generation.” (Photograph by the author.)

to the physical markers, this group also produced a number of abstract representations of the territory. They carefully measured and calculated the boundaries of the space using GPS devices, and used these data to produce maps that represented the area as a Cartesian space of carbon storage. These maps were then circulated among this broad network of producers, certifiers, regulators, and consumers that brought this space into being as a site of commodified carbon storage.

These efforts, however, are not enough. The spatial extent of the forest and its ephemerality mean that this offset is in constant danger of becoming undone: trees might be illegally removed from the site; farmers might cut and plant a clandestine field of plantains; a fire might break out; consumers might suspect that this offset is a ‘fraud’. Therefore, once a year, this same group gets together in order to reiterate this carbon territory anew. Guided by GPS devices, they inspect the space’s physical boundaries; they repair signs; recut trails; and take photographs of the site (figure 2). GPS devices, maps, signs, trails, and cameras: these artifacts of calculation, measure, and inscription join the human actors of scientists, bureaucrats, politicians, farmers, businessmen, and consumers in the ongoing and iterative process of maintaining this precarious object of exchange—the carbon offset commodity.

How is such a diverse group of actors able to create, and maintain, a stable, tradable commodity? From where does such a sociotechnical assemblage draw its power? In this paper I address these questions of power and agency by considering the practices of calculation that are necessary for such an offset to exist, and the kinds of agencies such practices enable. I do so by situating my observations within the insights offered by writings on economic performativity, an approach developed by



(a)



(b)

**Figure 2.** [In color online.] Scenes from a carbon verification trip. (a): An NGO representative checks her GPS device before crossing a stream. (b): Single file hiking along predetermined trails was the primary formation during the trip. (Photographs by author.)



Michel Callon (1998a; 2007) and colleagues (eg, MacKenzie et al, 2007) that studies how markets are constituted through the performative effects of economic frames. For Callon (1998b; 1998c), “the economic” is a sphere of action and intelligibility where sociotechnical assemblages of calculating actors come together in a way that allows for exchange to occur. Crucial to this view is the idea that acts of calculation are at once abstract representations and practices that are imbued with a materiality. This slipperiness between abstraction and materiality means that such practices are more than descriptions of an aspect of economic life, but also become material interventions into how economic action unfolds.

My account is meant to attend to an oversight found in the ‘economic performativity’ literature, and that is the nature of power-relations that both enable and constrain the effects that performative practices can have. Recent engagements over the performativity program between Judith Butler (2010) and Michel Callon (2010; see also du Gay, 2010) suggest a critical need to understand how and why performative practices are able to (or fail to) compel particular ways of acting and being in the world. As Butler describes Callon’s project: “the normative horizon of its aspirations still remain to be explained and understood” (page 150). In this paper I examine this ‘horizon’ by drawing on Butler’s (1993; 1997) accounts of the abject in order to argue that the performance of an offset derives its power from its relation to that which it cannot be. In this case the subaltern, ‘silenced’ enactments of space are the abject spaces from which the performance I witnessed derived its power. By attending to the relation between performativity and the production of space, my account of the abject addresses an issue that is relatively unexplored with regard to performativity (but see Berndt and Boeckler, 2011; Gregson and Rose, 2000). While recent efforts to understand how carbon markets are performed through different forms of economic models and methods of calculation (eg, Callon, 2009; MacKenzie, 2009), there has, to date, been little scholarship on the on-the-ground practices that allow for such offsets to be produced (but see Bumpus, 2011). My attention to how spaces are formed through the performative effects of calculation is intended to address this oversight.

Finally, my engagement with the insights from the economic performativity project is also meant to address longstanding concerns in the geographic literature with the relation between nature and capital. A number of writers have approached this issue by explicitly placing the issue of constructed nature–society dualisms at the center of their analysis, and have focused on how practices of representation that allow for ‘nature’ to emerge as a bounded, separate object for exchange, production, and consumption (eg, Mansfield, 2003; Robertson, 2004; 2006; Swyngedouw, 2004). Under this theoretical purview, nature’s materiality is not pregiven, nor is the agency of the nonhuman an inherent property contained within itself (Bakker and Bridge, 2006). Instead, both the materiality and agency of the nonhuman are emergent properties of a networked articulation of actors (Whatmore, 2002).

I wish to extend these arguments by tracking the hybrid, and unstable, nature of *calculative practices* that constitute the forest as an object of economic exchange. Doing so, however, I wish to avoid assuming the existence of stable concepts and identities prior to the creation of commodified forms of carbon storage. Instead, not only do practices of calculation constitute what a carbon commodity is (Lansing, 2010), but they also bring into being ways in which the carbon commodity can circulate and become useful to others (see Lansing, 2011). And it is through this process of stabilizing both the forest as an object of exchange, and the possibility of exchange itself, that one can find further forms of the commodity’s potential undoing. In other words, I argue in this paper that, in understanding how practices of calculation produce a commodity, pregiven concepts such as ‘the commodity’ and ‘the market’ are insufficient

for understanding the production of objects such as carbon offsets, whose emergence as a semiotic–material object of exchange cannot be separated from the ongoing framing of the field of exchange itself. Instead, such a coeval production of markets and its objects occurs through a process of rendering these very ‘things’ as temporarily stabilized emergences that are constantly poised to be interrupted. In this paper, therefore, I describe how practices of calculation allow for such concepts and objects to achieve stability by defining a temporary subject position for various actors involved in this process. I do so by showing how some devices seemingly oscillate between being abstract representations and material artifacts. In this way, I show how devices of calculation are simultaneously abstractions *and* imbued with a materiality, even as they do not always appear as such. My main concern in studying the instability of these two forms is a question of their emergence, deployment, and effects among the broad group of actors who, through their actions, simultaneously bring this carbon offset into being as an economic object, as well as the frame of economic exchange itself.

My argument proceeds in three parts. First, I point to the complexity of actors and how they contain both qualities of abstraction and materiality during the reiteration of the offset described above. I then develop an account of performativity that situates the practices of calculation and measurement as having particular effects on both the emergence of the object in question and the field of exchange within which such an object becomes intelligible. I do this in order to understand how specific spatial and temporal qualities of the carbon offset emerge as necessary for this commodity to come into being. By considering a brief moment in which the offset temporarily ceased to exist among the actors in question, I show how the power to produce such qualities derives from their relation to spaces that can never become commodified. Finally, I consider a moment where the performance of this offset failed, and the material and the abstract could not be articulated within the frame of exchange. I argue that this failure emanates not from the material qualities of the forest but, rather, through the self-reflexive stance of the actors charged with bringing this object into being as an object of exchange. Empirical details from this paper are culled from a three-day carbon verification trip, where I joined the actors listed above in their efforts to maintain the space of the forest as a commodified space of carbon storage. These observations are further informed by eighteen months of fieldwork, a process that included interviews with, and observations of, various actors charged with producing carbon forestry offsets in Costa Rica.

### **Mapping the materiality of offsets**

“Sitting around a long table in the middle of the open-air dining room were ten people eating rice, chicken, and plantains. White faces, hiking boots, and well-cut, stylish, ‘outdoor’ clothing tell me the group is from Europe—‘The NGO’ I kept hearing so much about. I sat down at one end of the table and introduced myself to two of the diners: one was a graduate student who was in Costa Rica conducting research on carbon credits for her master’s thesis, the other was here as part of an ecological vacation with the NGO that sponsors the trip.

After dinner, Mario, the NGO’s leader, called everyone around the table where they discussed the plan for the next day. A series of color maps with superimposed aerial photographs, and boundaries that marked the border of the blocks of land in conservation, were passed around. The NGO leader began giving a history of this project, and the issues they have encountered in the past” (field notes, March 2008).

When it came time for our group to discuss what we were going to do the next day, the first thing Mario did was pass around maps of the site we would be verifying. Here I pose the question: why did he pass around maps? If we were there to verify a carbon offset project, why were we not examining tables, charts, and graphs that demonstrate the levels of carbon being fixed? After all, that is what was being sold: carbon that is being fixed in the ground. To answer my own question, and invoke the language of Bruno Latour (1987; Latour and Woolgar, 1986), the information that such charts contain has already shed most of its qualifying modalities, and is well on its way to being accepted as an unquestioned fact: ‘this forest sequesters  $X$  amount of carbon’. One ontological modality remains, however, that cannot be shed: ‘this forest sequesters carbon, *so long as the forest remains intact*’. It is this remaining modality that renders this commodity unstable. While the fact that this forest sequesters carbon has been stabilized, the space of the forest itself has not. We were passing around maps because it is the reiteration of the *space* of carbon that our group was there to do.

Here, I wish to suggest that the maps upon which the Cartesian boundaries of this project are inscribed are one of several actors among many in the framings of this space. I argue that it is from this framing of space that not only the socionature of ‘the forest-as-carbon-sink’ is stabilized, but also ‘the economic’ as a sphere of action and intelligibility is simultaneously produced. This argument closely tracks those made by Callon (1998b; 1998c; 2007) and colleagues (MacKenzie, 2006; Miller, 1998), who have argued that the production of markets is a performative process in which actors enter into a calculatory frame, one that allows for both an object of exchange, and the field of exchange itself, to emerge (Callon, 1998b; Fligstein and Dauter, 2007). A field of exchange is made possible through the emergence of calculatory agencies that define a clear, if temporary and unstable, subject position for each actor involved in the frame. Framing is a process where owners, products, and forms of ownership are simple and uncontroversial. In addition, it is a process of knowing what to count, who is accountable, and what not to count (Lohmann, 2005), where these are all emergent properties of networked articulations of actors [Callon (1998b); Mitchell (2002); see Lohmann (2005) for more on this argument applied to carbon trading]. Through this framing, actors become temporarily cleaved from their previous webs of relationships and entanglements, and enter into this frame in their role of simplified calculatory actors.

Consider, for a moment, some of the actors involved in this forestry offset: landowners who have consented to leave this land out of production in exchange for a payment; a designated state authority who certifies and sells the credit to a private company; trees which are measured and weighed by scientists, who themselves use tape measures and scales; third-party verifiers who inspect the landscapes in question; GPS devices that are used to demarcate the precise Cartesian space where the project occurs; and a consumer who has calculated his or her carbon footprint. These actors must become disentangled from their previous relationships in order to enter into a frame of calculation and measurement that allows for the carbon stored in this territory to be exchanged. The landowner is a father of four, the scientists are experts in the world of cacao research, and trees are organisms susceptible to fire and disease. These previous webs of relationships, which define these actors to some degree, must be temporarily cleaved through the practices of measurement and calculation—practices that result in a frame where the agencies of these actors as consumers, certifiers, producers, and sellers are temporarily stabilized, along with the object of exchange itself. Through this process, the indigenous farmer becomes a carbon manager, trees become stocks of carbon, and scientists become carbon evaluators, and the land itself becomes a precisely delineated carbon territory. Finally, through

the emergence of these agencies, 'the carbon market' itself is able to emerge, where this object becomes one offset among many to be bought and sold.

As Callon as argued (1998c), and a number of writers have demonstrated (Beunza and Garud, 2007; Lohmann, 2005; Mitchell, 2005), this disentangling is necessarily an incomplete process where practices of framing are always accompanied by 'overflows'—connections outside the frame that continually reassert themselves. The land-owner remains a father of four, and may use his carbon payment to purchase a forest elsewhere so his son may clear it—a process known as 'negative leakage' in the world of offsets. The scientists who evaluate the carbon content of the landscape may use this knowledge for research papers to advance their careers—a 'positive externality' in the language of neoclassical economics. The trees themselves may become invaded by beetles and die off. In the production and maintenance of this frame, the nonhuman devices of measurement that help perform these calculations also occupy an unstable agency. Callon has argued that the materiality of calculation itself helps to bring this frame into being, where the artifacts of measurement, calculation, and inscription produce abstractions, which themselves can take on a materiality, and in so doing produce particular effects (Beunza and Stark, 2010; Callon, 1998c). In other words, the distinction between the material and the abstract breaks down with regard to these devices and their effects. And it is through the simultaneous qualities of abstraction and materiality that the calculative agencies of these objects, and the frame of exchange itself, become mutually constituted.

Such a claim can be seen with the maps that our group passed around. These maps represent the abstract spaces of the forest. As they are passed around our group, however, they are also material bearers of this abstraction that we are there to verify. The materiality, and mobility, of these maps allow our group to orient ourselves as verifiers of a carbon territory, and help us to understand that this carbon exists in a contained area, one with borders that separate the carbon-friendly 'inside' of the territory from the unpredictable and unmeasured 'outside' (Grove, 2009). During our actual work, these maps provided the basis for our actions—guiding our transect walk and directing where to take photographs. In this way, these maps do not just describe a territory, but actively shape and intervene in how this territory is understood, and brought into being, as a space of commodified carbon (Pickles, 2004; Wainwright and Bryan, 2009). In short, their circulation around our table and beyond has performative effects on the way in which this carbon offset comes to be. The maps act as signifiers of territory, but also, in their materiality and circulation, they provide a context through which our group becomes interpellated as agents of this space's territorialization. In this context, these maps are one actor among many in a verification process that is itself performative, in which the calculatory frame of the carbon offset is reasserted through the material and abstract reiteration of this space as a territory of commodified carbon. In a moment, I will offer a closer reading of what it means to say that these actors are performing this offset. But, first, let us briefly return to the field.

### Technologies of space

"We drove to the site and stopped at the first GPS waypoint by a large Ceiba tree. Someone explained that everything to our left is the project. One of the volunteers took a photo of the tree. We drove a little more, stopped, and got out. There were some guys waiting there under a tree with their plantains to sell to a passing truck. On the tree above their heads was a red sign that explained that this area is part of the Mesoamerican Biological Corridor and that the land is in conservation. Someone else took a photo of this tree and the landscape behind it.



We started walking along the path. Mario was shouting descriptions of each waypoint to some of the women volunteers, who were dutifully writing them down on a clipboard with paper. Two different men took photos of the landscape at each waypoint. The NGO volunteers would frequently ask the government ecologist the names of particular trees, sometimes wanting both the Spanish and the scientific names. This too was written down.

At one point, I was looking at a field that looked like a pasture that had been abandoned for at least a couple of years, but with some medium-sized trees as well. I asked the government engineer if this growth was regeneration from the project. He said that most of the regeneration was due to the project, but the trees were there from before when the land was owned by a cattle rancher. At that point, Mario came over and told me that this field isn't part of the carbon project, he then held up his GPS device, pointed to the screen, and said: 'See, this is where we are, so this land over there isn't part of the project' (field notes, March 2008).

Mario's use of the GPS device to locate ourselves in relation to this territory foreshadowed a coming conflict that occupied our group for the rest of the morning. The conflict began when we came upon a field of plantains. Upon encountering this field, the government technicians and NGO volunteers closely examined their GPS devices. The government employees then held a brief, private conference and, within a few minutes, everyone with a device concluded that we were standing in an unauthorized plantain field. The indigenous president disputed this consensus. A long, and tense, conversation between him, the head of the NGO, and the government employees began over where the border of the project area really was.

The indigenous president pointed to a nearby tree and made a sweeping motion with his arm, saying: "The border goes from that tree there over to the river over there. These plantains are outside of the area." The NGO leader, however, offered his GPS device as evidence to the contrary. Standing next to the president, hunched over the device, he pointed to the map displayed on its screen, saying: "Look at this, this is where we are, inside the area, and we are standing in a plantain field." At first, the president held his ground, insisting that his border, defined by the imaginary line running between the tree and the river in front of us, rendered the plantain field outside of the territory. Other NGO volunteers soon returned from a reconnaissance with their own GPS devices. Tracing his finger over the GPS screen, one of the volunteers said to a government employee: "The plantains continue until here. All of this is in plantain." Outnumbered, the president gave in and agreed to cut down the plantains at his expense.

Later that evening, one of the government technicians discovered that he downloaded the digital maps onto the GPS devices using the wrong projection, and that many of those plantains were outside the carbon reserve after all. The next day, I asked him how he had discovered his mistake. He responded: "When [the indigenous president] pointed out that tree, I remembered it from years past and something about its placement didn't seem right, so I checked the maps when we got back, and that's when I saw we had the wrong projection."

### **Performing the global**

This story could be read as an example of the superiority of local knowledge, grounded in 'real' things like trees and rivers, over the sophisticated, yet highly contingent technologies of global positioning systems. Advancing this argument, however, is not my goal in relating this story here. Instead, I wish to highlight the porous boundary

between the abstract and the material during this process, where the enmeshment of these two forms is critical for a performative process where both the object of exchange, and the frame of exchange itself, become simultaneously emergent.

I do so by offering three observations. First, specific Cartesian spaces are necessary for this forestry offset to function as a commodity. As a result, we needed to rely on GPS devices to determine where we were, and where we were going. This commodity's ultimate function—its use value—is for consumers to reduce the climatic impact of their carbon footprint. This is done by sequestering an equivalent level of carbon in the biomass of the forest. For this equivalence to hold, however, carbon must be stored in a specific place with a degree of permanence. Otherwise, the consumer's contribution to mitigating global climate change, and the ultimate point of purchasing this commodity, will be in doubt. Thus, the seller of this commodity—the foreign company that offers this offset as a commodity on the Internet—must assure its customers that it is storing carbon within a prescribed, and permanent, absolute space. This was the motivation behind our group's transect walk, to produce a credible report and to make sure that what is represented by the maps of this space coheres with a material reality on the ground.

Second, the production of this report, and the assurance that it brings, emerge through a series of practices that bring this abstract space into being as a space that is at once circumscribed and local, but also continually defined in relation to a global space. In other words, in order for our observations to be credible, our transect walk needed to be guided by the GPS, a device that uses the geosynchronous orbit of satellites to produce waypoints that help us orient our bodies in relation to this space. This orientation then provided guidance for the placement of the signs and trails, material artifacts that reiterate this territory onto the landscape.

Finally, through the production, use, and circulation of these artifacts of calculation and measure, this space's status as a carbon commodity becomes reiterated both on the ground, and within the network of actors who are producing, buying, and selling this commodity; through this circulation, the network itself is maintained. With the production of this report, the company knows it is selling a 'real' space of carbon sequestration, consumers are assured that their product is legitimate, and local residents can see that this territory is still 'off-limits' to logging and farming. In short, the circulation of this report, along with the on-the-ground practices of its production, served to re-enroll these actors as the simplified agents that are needed for this particular frame to hold together. In other words, this verification trip, and the technologies that allowed it to occur, were part of an ongoing performance that brings into being this space as an object of exchange while simultaneously allowing for this particular market transaction to hold together. Through this performance, and the calculative framing it enables, the actors have become constituted as calculative agents, while simultaneously maintaining the object of exchange.

This analytical approach to performativity has been employed by a number of scholars studying the performance of markets, and the role that economic models play in producing economies, where such models do not just describe markets, but are also interventions that shape markets (Beunza and Stark, 2010; Garcia-Parpet, 2007; MacKenzie, 2006; MacKenzie et al, 2007). Under this purview, measuring instruments and economic models are devices for abstraction that also have material, performative effects that actively shape and intervene in the contours of market exchange.

In this same vein, the work of our group can be seen as a performance that intervenes in not only the constitution of this space as a space of commodified carbon, but also in the maintenance of the frame of exchange itself. It is through our

performance, and later through the performance of the consumers' calculations, that this space can be considered an exchangeable commodity. And it is through these very same practices of producing the object of exchange that the network of exchange itself, and its constitutive calculatory agencies, are formed and maintained. Consumers, through their calculations on the Internet now see their actions in terms of carbon equivalencies, carbon that can be stored elsewhere for a price. The producer, through the on-the-ground spatial demarcation of this offset (as well as the original carbon content calculations), allows for this space to be linked to a consumer's actions. Through these sets of calculations, not only is the offset commodity formed, but so are the agencies of 'consumer', 'producer', and 'seller' of carbon, as well as the linkages between these actors. In this way, one cannot separate the emergence of the field of exchange from the emergence of the object of exchange itself. Instead, the two are coproduced.

### **Object spaces**

In the mutual becomings of the economic and its objects, however, there were moments where the constitution of this frame was in doubt. Our debate over where the boundaries of the carbon offset were located was one of these moments. Here, our framing was hardly harmonious, and ultimately resulted in the 'silencing' of the indigenous president and his depiction of this space. What, then, are we to make of the calculative agency of the indigenous president? Why was the performative effect of his sweeping hand so facile? Why did the space that he was performing not count?

As my retelling of this encounter suggests, the process of framing, and the agencies they enable is a process laden with unequal power relations and silences. This is an aspect of economic performativity rarely addressed by Callon, and has become a point of criticism (eg, Fine, 2003; see also Heatherington and Law, 2000). Here, I wish to draw on the insights of Callon's project while simultaneously accounting for the silences that I witnessed during this performance. For this, I wish to ground Callon's arguments in Butler's (1993) account of the object.

Butler offers a more explicitly normative, and radical, approach to performativity, one centered around a Heideggerian questioning of being that destabilizes our inherited 'modern' notions of a preexisting ontological status of the body. For Butler the materiality of the body has no *a priori* ontology but, rather, is emergent as an effect of power. Thus 'gender' is not a construct that is imposed on the preexisting materiality of 'sex'. Instead, the body's sex is a normative ideal through which the body becomes materialized as legible. This materialization of the body is the result of practices that circumscribe the domain of intelligibility, where the body becomes viable through continual performances. Here, entities like 'the body' or 'nature' are not 'socially constructed'—a term that implies that someone is doing the constructing—but, rather, they become materialized in particular ways through iterative, bodily practices; practices that take on these forms to become legible.

Butler argues that this performative materialization necessarily entails a relation to that which cannot fall within this domain of intelligibility: the object. Here, the object is not merely the 'opposite' of the material norms that a discursive—material performance opens, but is the excluded and unintelligible 'outside' to the regulatory norms that are continually materialized. Here, the object plays a dual role. First, the object is the normative 'other' that serves as a reminder of how precarious bodily norms, and their materializations, are. In this way, the object performs what Butler describes as a 'haunting' of bodily norms that serves a second role: its very 'otherness' allows these norms to have the force that they do. Butler (1993, page 3) argues that the power-effects of bodily norms derive, in part, from the possibility of their destabilization, where

the abject represents such possibilities, ultimately allowing for the normative effects of bodily materializations to emerge.

I argue that, in this context, it is useful to think of the space of the indigenous president as an abject one. The ability of his sweeping hand to conjure an intelligible space among our group was ineffectual, and unviable, so long as it remained unarticulated with the spatial abstractions of the GPS technology.<sup>(2)</sup> Here, the only viable spaces are those in which the bodily movement of the human is articulated with the representations of space found in the GPS system. The joining together of these two forms is what brings this space into being as a site of carbon storage—a permanent, absolute space that is understood in relation to the global space of the climate; a space that allows for a consumer to equate the actions of his or her own body to this patch of land in Costa Rica through the purchase of a commodity. This was the space that needed to be reiterated—a use value for exchange. Seen this way, the concrete directionality of the indigenous president's hand gesture failed to have an effect among our group not because it was imprecise or inaccurate, but, rather, the kind of space that such a gesture conjures was untenable within the context of our group's performance. Without the measuring devices that contextualized his body's actions within a globally defined, abstract, Cartesian space, his actions had no meaning.

The space of the indigenous president—the one suggested by his sweeping hand—nevertheless had effects in other ways. Its very abjectness enabled the technology-mediated space of the group to emerge as the fulfillment of a norm. The president's space—its emergence in relation to trees and rivers, but without a global reference—is just what a carbon offset can never be. It was accurate but not precise; easily understandable, but outside of a globally mediated spatial frame. The president's performance of space, as it occurred alongside those with their GPS devices, served to reinforce the global, absolute space as the norm that was *necessary* for this commodity to come into being: an object that requires a frame of exchange through which it can circulate. This frame, and the commodity object itself, are dependent upon placing 'local' boundaries in relation to the 'global' space of the GPS. While the president knew where the border was, his failure to relate his border to a global context reinforced the need for our group's performance, which served to materialize this particular relation between local and global space. Without such a relation, neither the commodity itself, nor the field of its exchange, can have meaning.

The president's border, the one that ran between the tree and the river, ultimately did find expression, but not until later that evening, when the GIS technician cross-checked the tree in question to the maps on his computer. In this case, the accuracy of the president's space did not undermine the technology-mediated understanding of this commodified space. Instead, it was quite the opposite. His space finally became acceptable once it was articulated with the technologies of the group's GPS maps. In the end, his space did not undermine the performance of our transect walk, but, instead, further reiterated its power.

### Reflexive performances

"Day two... we set out to verify a newly incorporated territory.... We ran into problems when we crossed a river bed and the trail ended in an abandoned banana field. We were trying to make our way to a GPS waypoint, but without a path,

<sup>(2)</sup>I wish to emphasize that the performance of the relational, lived space of the indigenous president includes reiterated, citational practices that extend well beyond this one gesture. I highlight this one specific action because it crystallizes the difference between the space of the offset and that of the president even as the ruptures between these two enactments of space cannot be reduced to this moment alone.

Mario refused to go on. Here, in the middle of an overgrown banana plot, Mario and the government employees began an extended discussion about the ‘lack of coordination’ with the project. Mario had fully expected to already see a trail with signs for the group to follow. The government employees explained, in detail, the bureaucratic process that has to occur before money is put into the hands of local leaders, who can then pay someone to cut a path.<sup>(3)</sup>

Mario was clearly not happy with this state of affairs, although he was very good about keeping his cool. His displeasure was expressed through his very detailed, and repetitive, explanations of why this is not acceptable. Mario’s main concern was that, in his words, he is there as ‘the eyes and ears of [the company]’, which signed a contract with the government. As far as the company is concerned, it bought the rights to a land’s carbon storage, and the long process of what has to happen between the Costa Rican government, the reserve council, and the landowners is not [the company’s] problem. As Mario put it: ‘I have to write a report for the investor but the land here isn’t changing.’

The change he was referring to here wasn’t the conversion of an agricultural plot to a forest. It was clear that this plot really was reverting back to secondary forest. The change Mario wanted to see was the implementation of all of the physical, on-the-ground markers that identify this plot as a space of carbon storage. As he put it, ‘markers with numbers, signs, and trails’” (field notes, March 2008).

When confronted with the lack of trails and signs, our group’s performance fell apart. In theory, we could have used our GPS devices to aid us in ‘carving-out’ the material boundaries of this space by making trails and posting signs. This, however, was not the point of our trip. All of us were there—with our GPS devices, cameras, and clipboards—to reiterate this space as a space of carbon through the performative effects of our transect walk. Without preexisting trails and signs, the maps on the GPS device and the images in the camera were only capable of describing this space. For this space to be performed, for it to be brought into being as a commodity, our practices of abstraction needed to occur in a context where the material boundaries of this territory were already present.

This very issue was expressed by one of the members of our group. During the long conversation between Mario and the government employees, when Mario was trying to explain the importance of having a trail, one of the volunteers interjected

“It is a problem to find money for carbon projects. It is always difficult. Investors want to work on projects that are social projects too, and so they look toward Africa for this. There it is cheaper. Without a credible report that shows this place is in conservation, no one will work with us. To be credible, we need to show evidence that this place is in conservation” (field notes March, 2008).

The dense vegetation of secondary forest that we were standing in was not the credible evidence they needed. Here, the evidence that counts are the physical markers that signify the borders of this territory. These markers, however, are not enough by themselves. Only by transforming these material signs into *representations* of signs can the object of the carbon commodity emerge within a frame of exchange. Without the red signs, and a landscape of forest-like trees behind them, the cameras could not

<sup>(3)</sup> This particular offset occurs within an officially designated indigenous territory. This means that, in the eyes of the Costa Rican state, the reserve’s ‘development council’ owns and manages all of the land. In practice, this means that the council tracks and manages property relations between indigenous households. For this offset, payments were given to the development council (headed by the indigenous president in this paper), who then disbursed them to the individuals whose land is part of this offset.

serve their purpose. And without a material trail to follow, the GPS devices were unable to take on the performative effects that they did the day before. Similar to the ineffectual spaces formed by the indigenous president's hand from the day before, the GPS device alone is not enough to perform this space. The performance served to territorialize this space, where the local, material boundaries and the global abstractions of this space become joined, producing an 'inside' and an 'outside' to this space that is meaningful not only to the residents of this area, but also to those faraway investors who are always 'looking toward Africa' for projects. Without the preexisting boundary markers, this joining could not proceed, and our performance on this day had to end prematurely.

I contend that this performance—the transect walk, the production of the report, the arguments and discussions, and the effects they produce—is done self-reflexively, where the actors involved in this verification trip are well aware of the performative effects of their actions, and it is through this reflexive stance that our efforts on this morning failed. The volunteer's concern over how this project fits in with carbon markets more generally, and his argument that this project needs to be credible to a group of investors and consumers, reflects this self-awareness. During these trips, such openness about the purpose of the report was common. It was no great secret that the report they were producing served a purpose beyond being a description, but rather, was an artifact whose circulation among investors, consumers, producers, and 'middle-men' would maintain this network of exchange for at least one more year, thereby assuring this space will remain a viable commodity.

In other words, the process of producing, and maintaining, this carbon offset is an autodocumentary one (Riles, 2000), where the participants in this process are active agents in its documentation (Maurer, 2005). During this transect I was just one of many in the group with a camera, notebook, and pen, because the very point of this trip was to document it. This documentation was done with full knowledge of the participants about the practical effects of their work. As the conversation that occurred in that overgrown banana field demonstrated, these actors were well aware of the limits of this process. They know that their photographs have no meaning if not situated within a material context of trails and signs. They know that they are producing a report that, in its circulation, helps to maintain the credibility of this space among the network of investors, producers, and consumers that are needed for this object to be exchanged. In short, these actors are well aware of the performative effects of this trip, even if they lack the social science jargon to describe it as such.

This self-awareness was most apparent when, during our conversation in that banana field, the report's broader context itself—its conditions of production and circulation—was frequently brought up by members of the group in order to demand a more timely placement of the signs and trails. As the NGO volunteers were quick to point out, the descriptions of this transect walk had a number of critical effects on the future of this space's status as an attractive commodity; therefore, the description needed to look a certain way. The end result was a performance undertaken not by the modest, objective witnesses found in a laboratory (Haraway, 1997; Shapin and Schaffer, 1989), but, rather, reflexive ones who recognize that their understanding of this space is inseparable from their framing of what this space is supposed to be (Choy, 2005).

This result is a performance that reflexively joins the particular and the general as well as the abstract and the concrete in ways that render their potential divorce as a source of the offset's unraveling. Much in the same way that the maps that we passed around the table on our first night moved from 'abstract representation' to 'material artifact' and back again, our volunteer, with his interjection, was one of many actors on



this trip that made the discursive move between ‘this project’ and ‘carbon markets’ and ‘this evidence’ versus ‘types of evidence’ (Maurer, 2005; cf Choy, 2005). Mario himself indicated that the change he needs to document is not the change in the landscape itself, but the change in how this landscape is presented on-the-ground—otherwise the report about this offset, his abstraction, cannot circulate as a credible, material artifact. As we can see in the above example, the actors involved in this transect walk rhetorically marshaled this very marriage of abstraction and materiality as grounds for the changes they want to see, where the volunteer reminded us that the forest-itself is not good enough, but rather, a *credible report about* the forest is what keeps this offset as an attractive commodity. Through the actions of our group, both the space of carbon and the frame of exchange through which this object circulates, emerge as effects of this reflexive performance. In this case, however, the self-awareness of the actors on this day served to undermine this space as a commodified space of carbon storage.

### Conclusions

In this paper I have described a brief moment in the life of a carbon offset commodity, a process of stabilization that is being repeated with offsets the world over. Doing so, I have argued that technologies such as maps and GPS devices occupy neither a pure state as a material artifact or as an abstraction, but, instead, are able to become both. And it is through this protean quality that calculative agencies are formed. Further, I have argued that it is through the formation of these calculative agencies that the economic frame of ‘carbon trading’ and the carbon offset commodity are coemergent. This is an emergence that, like the map itself, occurs by positioning the offset’s space, and the actors performing this space, as part of an ongoing articulation between the abstract and the material. The result is that the space of the offset itself is simultaneously understood as an abstraction and material thing. Such a liminal epistemic framing of the offset extends to its ontology, where the offset commodity becomes an abstraction that is simultaneously imbued with a specific materiality—a materiality that is not limited to the biomass of the forest, but extends to the circulation of reports, maps, photographs and computer servers that hold such information. In other words, for a carbon offset to come into being, both of these forms are necessary. Once brought into being, however, such forms are necessarily unstable.

My description of the sociotechnical assemblages that produce, and maintain, the carbon offset commodity is intended to account for how various calculative agencies of the actors involved are formed and mobilized. Specifically, I considered the ‘silenced’ agency of the indigenous president. His performance of space, while ineffectual, served to further reiterate the normative power of the technologically mediated space that defines the forestry offset. In this way, the space of the offset can never exist on its own, but emerges, and is maintained, through specific articulations that emerge as effects of the group’s performance. The ‘global’ space of the GPS is joined with ‘local’ spaces our group witnessed, and the ‘material’ markers of the carbon territory are linked with spatial abstractions found in the report’s maps. Such an understanding of what an offset is, however, is not limited to my analysis alone. This is because a similar analytic is also employed by the actors themselves, many of whom referenced the production of these articulations as key to the ‘success’ of their work. In this way, the calculative agency of many of the offset’s actors was a reflexive one, where the situated nature of their knowledge was itself brought to the forefront in ways that shaped the kinds of practices that were acceptable. In the specific case I witnessed, this kind of reflexivity had its limits, and resulted in the temporary breakdown of our group’s performance.

I wish to conclude this paper by highlighting how these examples, and my interpretation of them, can point to a slightly different way to understand the materiality of nature as it relates to its commodification. It has become almost axiomatic in the geographic literature that nature is not separate from society, and that parts of nature are more properly thought of as mutually entangled, socionatural entities (eg, Braun and Castree, 1998). In a similar vein, a number of writers have shown how both markets for nature and ‘nature itself’ exist as mutually constitutive constructions (eg, McAfee 2003; Robertson, 2004), with a number of writers exploring specific instantiations of the contradictions that arise from a nature–capital dialectic (eg, Prudham 2007; Swyngedouw, 2004). Many such writings, however, posit the materiality of socionatural entities as pregiven, where it is particular qualities of nature—the heaviness of water (Bakker, 2003) or the slow growth rate of trees (Prudham, 2003)—that serve as a physical quality of nature with which the production process must confront and incorporate. A similar analytic can be found in more recent writings on carbon markets, where such markets are understood as incorporating the preexisting materiality of the world into the logics of capitalism (eg, Bumpus, 2011; Knox-Hayes, 2010), resulting in an outcome where, as Knox-Hayes (2010) puts it: “[Carbon] markets restructure the human–nature relationship, such that all environmental impacts and attributes can ultimately be controlled by capitalism” (page 960). I disagree with what such an assertion implies. Instead, I argue that neither markets for carbon, nor the materiality of nature that such markets seek to commodify, can be said to meaningfully preexist their mutual entanglements.

This is not to say that I necessarily disagree with an analysis that frame nature’s commodification as part of a dialectical ‘metabolism’ between ‘socionatures’ and capital. Instead, I propose that by understanding how both ‘nature’ and ‘markets for nature’ come to be through specific practices, the materiality of nature can be thought of in a slightly different light. In the case of the offset I described above, it was not the *a priori* biophysical qualities of the forest that threatened to disrupt the process of commodification. Instead, practices of performing ‘the economic’ created particular subject positions, and it was these temporarily stabilized subjectivities that led to various interruptions of the emergence of the-forest-as-carbon-sink. Understanding carbon’s commodification as an ongoing performance shows that both the forest, and the circuits of exchange through which it circulates as a commodity, are coemergent as temporarily stabilized, mutually imbricated, moments of being. In this way, the ruptures and barriers that efforts at commodifying the forest encounter are not a result of an exogenous materiality, but rather, the incompatibility of the forest’s materiality is integral to the commodity’s own moments of becoming. The forest exists, yes, but the material qualities that are of concern to us here—the ephemerality of its carbon-accumulating biomass, its spatial extent, and its rich alluvial soils that are so attractive to farmers—in short, its entanglements that continually threaten to interrupt the frame of exchange, emerge as such through the process of framing itself.

Such entanglements, however, have contradictory effects. They are disruptive, but they also enable the emergence of the commodity as well. As my account of the abject spaces of the indigenous president shows, the calculative agencies that help ‘materialize’ the forest are able to do so because of its relation with ‘the other’: the ambiguousness and complexities of the forest and the bodily gestures of the indigenous president. These features emerge as potential disruptions of the carbon offset commodity through the process of framing and its overflows. This was a process that not only allowed for these abject spaces to serve as potential sources of disruption for the offset commodity’s being, but also served to reiterate the normative power of the process of framing itself.

**Acknowledgements.** This research was made possible due to a dissertation fieldwork grant from the Social Science Research Council and the American Council of Learned Societies. I wish to thank the human actors described above who were gracious in allowing me to join them during their work. I also thank Kendra McSweeney, Becky Mansfield, Joel Wainwright, and Kevin Cox, and three reviewers for their comments on earlier drafts of this paper. The usual disclaimers apply.

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