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Climate Politics in the Anthropocene and Environmentalism  
Beyond Nature and Culture in Brazilian Amazonia

This article examines the work of a group of scientists who contributed to influential climate policy approaches while taking part in groundbreaking research on climate transformations. The scientists promoted a policy approach known as REDD+, which was designed to slow climate change by paying forest landholders to not cut their forests. These scientists also made important contributions to the science of the Anthropocene, which is premised on the idea that humanity has become a geological force that is transforming the planet in disruptive ways. I argue that their science and policy efforts are at odds with anthropological critiques that view environmentalists as experts who see themselves as bearing exceptional “cultural” capacities and therefore as capable of protecting or improving “Nature.” In a region of Amazonia, the science of the Anthropocene and the associated REDD+ projects moved beyond ontological understandings that divide the world into the opposing spheres of Nature and Culture. The scientists did not see themselves as inhabiting a “cultural” sphere from which they could protect Amazonia as a “natural” object, but rather they used REDD+ projects to immerse themselves in what they felt were irreversible, uncontrollable, and disruptive socioenvironmental transformations.  

“I believe we will be able to address and even try mitigating climate change... but this will only take place after a good deal of suffering.” My interviewee, an environmental scientist I will call Derek, talked about dismal futures as we discussed policy-oriented environmental research projects in which he was involved. This was the first of ninety-six conversations that, since 2010, I have carried out with environmental scientists—from graduate students to Nobel Prize winners—who work at the thresholds of science and policymaking in Amazonia. Some of my interlocutors designed ambitious research projects so others could use their results in the design and implementation of novel climate policies. Others took on the role of policymakers themselves and drafted and advocated for climate policy proposals that were highly influential in environmental forums in Brazil and the United Nations. In this article, I examine the policy-oriented work of scientists who believed that “a good deal of suffering” would be unavoidable and that projects designed to arrest potentially catastrophic socioenvironmental transformations would be ineffectual. I argue that my interlocutors’ characteristically bleak approach to climate politics challenges conventional anthropological critiques of dominant environmental approaches.

The policy approach Derek and his colleagues promoted was known as REDD+ (an acronym for Reducing Emissions from Deforestation and Forest Degradation—the plus sign signifies improved carbon stocks). The REDD+ idea was the following: imagine a company that wants to claim it is “going green” but whose revenue is tied to activities that generate greenhouse gas emissions. REDD+ programs would offer this company
the possibility of offsetting its emissions by supporting forest conservation projects in Amazonia. Scientists would assess greenhouse gas emission reductions achieved by forest landholders as they adopt novel economic practices. REDD+ promoters would then use this information to generate emission reductions credits that could be purchased by wealthy parties around the world. While buyers of REDD+ credits could claim that they limited their environmental footprints by purchasing carbon credits, forest landholders could earn money and invest in capital-intensive agricultural technologies. REDD+ approaches have been highly influential in climate policy forums and have channeled hundreds of millions of dollars to environmental projects in Latin America, Africa, and Asia (Corbera 2012). REDD+ is also an important part of the United Nation’s global climate agreement that was signed in Paris in December 2015.

REDD+ has, however, been the object of much deserved criticism. For example, James Fairhead and colleagues (2012) recently described the market schemes on which these strategies are based as conveying a “mercantile optimism,” the belief that it is possible to create an “economy of repair” wherein monetary flows would fix environmental problems and guarantee ecological sustainability. From this viewpoint, REDD+ is a naïvely optimistic climate policy proposal that would posit experts as custodians of worlds over which they have complete, unrivaled knowledge—and power (Fairhead, Leach, and Scoones 2012; see also Leach, Fairhead, and Fraser 2012). Such criticisms are adequate as long as we see in REDD+ an expression of what one could call “naturalist ontological understandings” (Descola 2013, 172–200). That is to say, REDD+ critics assume that carbon market proposals are grounded on framing the biophysical world as “Nature”: a sum of inert objects linked with one another through chains of causation that respond to invariable laws that humans may unveil. REDD+ proponents are also understood to believe that while experts are part of Nature, they bear exceptional “cultural” capacities. Unlike nonhuman entities that lack “souls” or “minds” and nonexperts from whom Nature’s laws remain hidden, REDD+ proponents would see themselves as uniquely capable of knowing, protecting, and improving regions such as Amazonia. If these assumptions are correct, REDD+ would join a long line of political projects based on systems of expertise that systematically disavow the failure of their techno-managerial designs and the permanent emergence of socionatural entities that cannot be accommodated within the opposing categories of Nature and Culture (Ferguson 1994; Goldman 2005; Latour [1991] 1993; Mitchell 2002; Scott 1998).

While I draw heavily on such insights, I argue that Derek’s comments on the suffering he anticipated conveys nonnaturalist understandings that are widespread among the policy-oriented scientists with whom I worked. They did not see Amazonia as a system bounded by immutable laws that could be manipulated to avoid severe socioenvironmental disruptions. I explore my interlocutors’ understandings of expertise in relation to their contributions to scientific research in light of the idea of the Anthropocene. Coined by Paul Crutzen and Eugene Stoermer, “the Anthropocene” denotes a new geological epoch in which human impacts on global ecological processes have brought to an end the previous geological epoch of the Holocene (Crutzen and Stoermer 2000; Steffen et al. 2011; Zalasiewicz et al. 2011). Arguably, on the one hand, the Holocene’s relative macroecological stability supported ontological understandings wherein the biophysical world was seen to be a natural machine-like system whose lawful regularities were fundamentally independent of the vicissitudes of human history. The scientists who claim that we live in the Anthropocene, on the other hand, argue that, as we exit the Holocene, we find ourselves in terra incognita, a radically uncertain world wherein geological and macroecological transformations are interwoven with the histories of capitalist operations, imperial projects, and postcolonial developments (Chakrabarty 2009, 2012; Crutzen 2002; Crutzen and Steffen 2003). All my
interlocutors agreed with Crutzen and Stoermer’s thesis, and some of them had published influential articles in which environmental transformations in Amazonia were analyzed as belonging in the Anthropocene. Furthermore, they explicitly agreed that REDD+ could be understood as a response to the Anthropocene’s political challenges.

I study the linkages between the science of the Anthropocene and REDD+ policies in Amazonia by drawing on recent ontological investigations advanced in anthropology and science and technology studies (Holbraad, Pedersen, and Viveiros de Castro 2014; Woolgar and Lezaun 2013). Within these fields, to study “ontological understandings” means to examine practical considerations regarding the kinds of entities that do or can exist in the worlds we inhabit as well as the types of relationships that entities may establish with one another (Blaser 2009; Descola 2013; Kohn 2015). This approach focuses on “world-making” undertakings that emerge from the shifting relations that humans establish with other humans as well as with nonhumans (Law and Lien 2013; Lynch 2013; Viveiros de Castro 2004).

In order to show that this approach is particularly well-suited for a study of climate politics in the Anthropocene, let me first describe two tasks that this article does not undertake: First, this ontological approach is not concerned with a study of unchanging “things in themselves” (Mol 2012). I do not study the Anthropocene as a given “fact” of a world “out there” that could be known once and for all. Second, the approach I follow is not a study of “theories of knowledge” or “worldviews” (Hacking 2002; Mol 2002). As I see it, ontology is not “another word for culture” (Carrithers et al. 2010). Nor do I examine the Anthropocene as a “construction” that, from within the minds of experts, spawns REDD+ policy proposals. Rather, I study the Anthropocene as a challenge brought forward by worlds vibrating with crises that resist complete propositional articulation. For example, in a conversation about which I will have more to say in the pages that follow, a scientist told me that the Anthropocene is not a “word” or “definition” but conveys the unsettling sense that we are facing overwhelming, human-driven climate transformations. From this viewpoint, I examine REDD+ proposals in Amazonia as a political response to the sense of living immersed in animated worlds that are filled with echoes and reverberations of disruptive human impacts.

Scholars who adopt the ontological approach I follow claim that the world-making undertakings they study are not “naturally” (or “culturally”) necessary and that other worlds are possible—the “otherwise” is possible (Hage 2012; Povinelli 2011). I claim that REDD+ represents a sinister turn in the onto-politics of the otherwise, which is to say, a willingness to embrace the emergence of new, unknown worlds even when these carry with them the potential for great destruction (Massumi 2015). REDD+ is not designed to preserve Amazonia “as it is,” or to transform the region according to a predetermined design that is thought capable of preserving or improving Nature. Rather, this environmental approach can work without recourse to rational claims of truth and is open to the emergence of new socionatural worlds in crises shaped by capitalist operations. My research thus substantiates Hage’s (2014) recent remark: “Because of the threat of global warming, capitalism is decoupling itself from scientific mono-naturalism.”

I first show how Derek and his colleagues are aware of the limits and contradictions that characterize their climate policy proposals. I explain how, rather than thinking of themselves as capable of managing Amazonian ecosystems as if these were machines that could be fine-tuned following an instruction manual, they see themselves as scientists working immersed in worlds beyond control. In the second section of this article, I focus on my interlocutors’ experiences while they were conducting scientific research and claim that they lived through characteristically Amazonian Anthropocenes. In line with scholars
who study unprecedented analytical challenges posed by Anthropocene ideas and emerging climate politics (Howe 2014; Whittington 2013; Yusoff 2013), I examine REDD+ initiatives as projects that operate beyond Nature and Culture in the sense that they are carried out by experts who see themselves as inhabiting worlds of “suffering” wherein old environmental orderings collapse.

Part 1. Climate Politics in Amazonia
Machineries of Rural Capitalism

Coming from an expert in large-scale environmental policies that are often characterized as naively optimistic, Derek’s grim assessment of the futures he foresaw surprised me. However, I soon learned that his views were shared by a group of scientists who held singular understandings of what it means to be an expert in the kinds of worlds in which REDD+ proposals are meant to operate. During fieldwork completed between 2010 and 2015, I followed policy-oriented scientists while attending environmental policy and environmental science events (conferences, workshops, seminars, and summits in Brazil and elsewhere). I also worked closely with REDD+ proponents while living for eight months in two villages in Amazonia in which REDD+ projects were being advanced. Finally, I spent three weeks visiting a research station in Amazonia built by Derek’s colleagues.

World-renowned environmental scientist Thomas Lovejoy explained the climate policy approaches I studied at these various settings in 2009. Speaking at a conference panel alongside agro-industrial entrepreneurs and powerful landed interests from Brazilian Amazonia, Lovejoy reminded his audience of one of the key findings made by the environmental scientists of his generation: the transformation of forests into pastures and farmlands was not only contributing to climate change but also disrupting the hydric cycle in ways that could increase droughts that could undermine agriculture’s macroecological conditions (Wright 2009).

These remarks—fairly conventional coming from an environmentalist like Lovejoy—were accompanied by less orthodox lines. Lovejoy suggested that a REDD+ scheme could be used to cover the expenses of establishing a system of private forest reserves in agro-industrial farms—thus taking conservation efforts beyond areas of “natural preservation.” In Lovejoy’s proposal, anthropogenic landscapes such as export-oriented soy plantations could be slightly modified to include patches of native vegetation to provide humidity for an “Amazonian rain machine” (Wright 2009, 9) that would limit disruptions of regional rain regimes. Lovejoy concluded that such a strategy could incorporate agro-industrial operations into an airborne irrigation system composed of private areas and remaining public forests: “The ultimate global arrangement for planetary management” (9).

By the time of Lovejoy’s presentation, a medium-size Brazilian nongovernmental organization (NGO) with which I worked had spent years implementing a similar REDD+ initiative in Brazilian Amazonia. Over a five-year period I examined this institution’s policy proposals working alongside NGO officials (scientists, engineers, and economists) who understood that environmental degradation in the Amazon was driven by the production of rural commodities associated with global population growth (expected to reach at least nine billion people by 2050) and expanding middle classes across the world (which entailed dietary changes that increased meat and dairy consumption). In response to this situation, the NGO’s officials decided to try an approach that moved beyond creating areas of natural protection. They directly engaged the motors of socioecological transformations in Amazonia: farming and ranching activities. They put together a REDD+ initiative to channel carbon payments to fund technical aid programs destined for hundreds of small and
large ranchers and farmers distributed across thousands of square miles. Participants in the program would receive agricultural inputs, tools, and training that would lead to increased yields in areas that were already open—thus undermining economic incentives to cut trees in order to increase production and meet global demand. The project’s ultimate goals were similar in scope to Lovejoy’s proposal: create private forest reserves; promote agricultural development; and limit biodiversity loss, climate change, and disruptions in regional rain regimes.

At first glance, both Lovejoy and the REDD+ project I studied could be seen as advocating for an “economy of repair” wherein market-oriented environmental approaches would fix “the damage inflicted by economic growth” (Fairhead et al. 2012, 242). However, in the specific case I examined, such an analytical tack would obscure the extent to which scientists are aware of the limits and contradictions of their own policy proposals. Take, for example, the case of a natural scientist I will call Fernando—a senior NGO official working in the REDD+ initiative I just described. Fernando’s family migrated to the region when he was a small child—at the height of violent colonization projects that transformed Amazonia in the 1970s and 1980s. Born into extreme poverty, he worked hard as a student and completed postgraduate training with research on how mining operations in Amazonia released chemical elements that entered food chains and severely undermined human health. Fernando helped run a number of small Amazonian NGOs that formed the backbone of an institutional network advancing policies in partnership with local entrepreneurs and politicians. On a number of occasions he attended United Nations-run environmental summits advocating for REDD+ strategies and established transnational alliances with funders and similarly oriented NGOs from across the world. The massive REDD+ initiative to which Fernando contributed was the outcome of decades of work in Amazonia and an effort to consolidate links between scientific research projects, environmental institutions, and regional political players.

At one point in one of our conversations, I asked Fernando to comment on three criticisms his proposals often provoked: first, that they supported emission-intensive global systems of food production; second, that they relied on payments from fossil fuel-intensive economic sectors and companies (Fernando’s project, for example, was partly funded by a global mining corporation that had massive environmental impacts and a controversial social record); and third, that such projects handed green credentials to corporate and political forces that, despite supporting some ecological initiatives, also pushed for scaling down environmental regulations. Like the rest of my interviewees, Fernando broadly agreed with the criticisms I presented. “Now, the problem of global capitalism,” he said, “now that is a complex problem. And until we can break that [capitalist] logic, we don’t know.” He paused briefly and then tried again. “And as long as we can help and contribute to [breaking the capitalist logics], we will do it. This is what we hope for.”

While nodding sympathetically I retorted that critics would point out that REDD+ not only failed to break capitalist dynamics but also reinforced the capitalist logics he had just mentioned. “If you stay outside [REDD+ schemes]” he responded, “other sectors are going to organize and are going to use these resources. I think that the most important thing is to have access [to REDD+ resources] and to organize ourselves and to enter the mechanism in its own logics.” Fernando’s description of his REDD+ efforts as going inside a “mechanism” beyond his control sheds light on Lovejoy’s proposal to create an “Amazonian rain machine.” As I show in the following pages, these environmentalists champion large and ambitious environmental projects that are informed by understandings of expertise that diverge from naturalist views of experts as being able to control Amazonian ecologies.
**Within Market Mechanisms**

Mechanistic representations of the world are commonplace in the ecological imagination, and their emergence has been traced to the rise of “industrial machinofacture” (Ingold 2000, 294–310; Worster 1994). Ingold argues that, unlike manufacuring systems, machinofacture is not organized around the embodied skills that particular persons cultivate in specific settings but supposes vertical systems of authority that determine the coming together of human bodies, raw materials, tools, and energy. The material configuration of relations of production—and the experiences associated with it—creates the practical understanding of a managerial domain detached from productive operations on the ground floor. Such a gap between managers (who know how and why the system works) and workers (who are made to obey, often through force) reinforces naturalist ontological understandings whereby the world is divided into a “Cultural” sphere, in which creativity and authority reside, and a “Natural” pole of passive, instrumental implementation (Ingold 2000). More simply put, machine-based modes of production create worlds conducive to the emergence of ontological understandings that Nature and Culture are opposite domains (Descola 2013, 68–72; Kohn 2013, 90). Advancing these insights, I would argue that scientists have experienced the expansion of farming and ranching in Amazonia as a fundamentally different undertaking from machinofacture. They have seen the transformation of the basin at the hands of Brazilian development institutions, land speculators, rogue entrepreneurs, poor peasants, and multinational corporations that do not conform to a predefined plan nor express the linear advance of one single capitalist logic (Cleary 1993; Garfield 2014; Raffles 2002). Amazonia’s transformations have been decentralized and made unruly, and can be seen as belonging in “frontiers” built through the “mobilization of chaos” (Tsing 2005, 42; Campbell 2015). Those who lived through the basin’s recent history experienced dynamics quite unlike those of a machinofacturing system under expert command.

In 2012, I attended a workshop on environmental science and policy held in a small Amazonian village. The workshop gathered NGO officials (Fernando included) in addition to students, scientists, and local government officials. Participants held a broad range of political views, and it was not rare for profound differences of opinion to emerge in lively debates. At one point, someone criticized market-oriented policies for being insufficient to guarantee socioecological sustainability in Amazonia. Fernando intervened. He stated that his interlocutors had a romantic view that was profoundly problematic and offered an alternative image of Amazonia. He reminded the attendees that his family had to endure abject poverty, he had lived through famine at various points in his life, and had lost four people in his immediate family to starvation. His reference to personal experiences of extreme suffering and loss underlined the violence in the region’s socioeconomic dynamics and allowed him to depict the basin as something other than a place where environmental utopias could be realized. “For me, Amazonia is not this beautiful thing,” a visibly irritated Fernando declared.

A few months before the workshop, Fernando told me that his REDD+ project focused on what he called “the agricultural frontier.” Poor landless populations, he explained, moved into Amazonia from southern parts of the country where industrial agriculture took most of the land while offering few jobs. Displaced peasants arriving in Amazonia replaced forests with pastures and then used inputs (seeds, fertilizers, and improved cattle breeds) to establish cattle herds. However, only large landholders had the political and economic means to claim large tracts of land and amass enough wealth to establish economically successful farms and ranches. Poor peasants typically went bankrupt, sold their land, and
migrated into forested areas where they cut the forest and tried their luck in establishing new ranching sites once again.

For Fernando, the agricultural frontier was not a space that could be approached as if it were a machine that could be retooled following an instruction manual. He perceived Amazonia as the morphing sum of nonhuman dynamics and the efforts carried out by peasants, farmers, and ranchers—each engaged in economic and political competition, each advancing particular strategies to link lands, commodity markets, and agricultural inputs. Rather than using REDD+ to command all these projects and processes, Fernando intended to learn from local populations how to make his NGO one additional party to the process of frontier expansion. He elaborated these insights using as an example my own ethnographic project:

The first step [in our REDD+ project] is to understand. Just like you. You went to live with peasants and tried to understand how [things are] working out in their area. You cannot just arrive and act following your logics. It is their logics. Their logics have to be used by those who come from afar. This is our line of work. [We try] to understand landholders so we can know if we can contribute to their demands.

During my fieldwork I attended meetings in which NGO officials asked peasants, ranchers, politicians, and sawmill operators about the economic challenges they faced, how they responded to such challenges, and what kind of help they could use from the NGO. In agreement with characterizations of REDD+ as “adaptive policymaking” (Agrawal, Nepsstad, and Chhatre 2011), these conversations determined the use of REDD+ resources to satisfy the various, shifting needs of local populations. Although such adaptive dialogues could be taken as politically correct posturing, they actually required NGO officials to behave in politically incorrect ways. Fernando and his colleagues reached out to, sat with, and learned from players that included global corporations, large ranchers, logging enterprises, and powerful politicians known for their environmentally damaging projects and illegal land-appropriation enterprises. Although REDD+ projects would also give poor populations more tools with which to take part in capitalistic dynamics, powerful players had the most to gain from such an approach, and unjust dynamics were expected to remain fundamentally unchanged. As Fernando’s boss explained to me:

I don’t think it is legitimate to criticize REDD+ because it does not solve capitalism’s problems. . . . What we can ask from REDD+ is that it does not deepen injustices. And, if possible, that it may help to fix in some measure some of the injustices [of capitalism]. But we cannot ask from it to be an anticapitalist mechanism. We work within a market economy. This is our vision in this NGO—we work within this logic and we look for ways to be as socially fair as we can.

Despite their massive scale, REDD+ projects were not intended as a blueprint with which to remake sociopolitical relations. They were designed to be compatible with dynamic assemblages of migrant populations, land, forests, machinery, seeds, cattle, and wealth. Their proponents did not hope to “solve capitalism’s problems” or avoid environmental disruptions. They foresaw “suffering” rather than horizons of techno-managerial mastery.
Revisiting REDD+ Critics

Market-oriented climate politics have been found to address the earth as a machine whose problems may be fixed through techno-managerial means and to occlude socioeconomic conflicts and contradictions driving global environmental transformations (Newell 2013; Swyngedouw 2011). Ethnographic studies have substantiated these views and have shown that some REDD+ projects simplify diverse ecologies into “forests,” forests into “carbon,” and carbon into money—thus imposing on climate politics a characteristically Western Nature/Culture dichotomy that transforms expert knowledge into power over livelihoods and territories (Bäckstrand and Lövbrand 2006; Cabello and Gilbertson 2012; Corbera, Estrada, and Brown 2010; Gutierrez 2011; Mentore 2011; Runk 2009).

Although these critiques are based on ample ethnographic evidence that describes practical ideas of expertise at play in some locations, I argue that Derek and Fernando, among others, challenge us to understand the work of scientists for whom to be an expert means to work in uncertain situations beyond human command. It would be fair to see their stance as pragmatic. However, bear in mind that such pragmatism, by self-critically accepting violent and unjust socioenvironmental transformations, is much more serious than crass opportunism and entails an ontological stance. What they have come to accept is that they are immersed in worlds that are bound to change. Here, consider that pragmatism can be seen to entail singular claims about worlds wherein general principles are insufficient and in which those interested in political action need to advance situated, contingent strategies (Massumi 2011, 29–37). As I explain in the next section, REDD+ proposals draw on scientific studies and lived experiences that have undermined ideas of Amazonia as a system bound by unchanging laws. Like Ingold, I argue that REDD+ can be seen as derived not from “a way of believing about the world” but from “a condition of being in it” (Ingold 2011, 67).

Part Two. Amazonian Anthropocenes

“The Amazon is Change”

One of the most frequent misunderstandings concerning the science behind REDD+ is that this policy is intended to preserve forests qua “carbon sinks.” Critics often argue that REDD+ proponents frame Amazonia as a space that is capable of capturing carbon from the atmosphere and transforming it into tree trunks, leaves, and so on. Therefore, their understanding is that REDD+ is designed to manage Amazonia as a pristine space that could heal the global environmental damage inflicted by industrial areas of the world. Such an understanding ignores the groundbreaking contributions that pro-REDD+ scientists have made to earth system science. Although some scientists indeed told me that they thought that Amazonia was, on average, a carbon sink, others thought it was, on average, a carbon source. Furthermore, all my interlocutors understood that the really important questions regarding the region’s carbon cycle concerned its seasonal and historical variations. Moreover, even those who believed in the region’s carbon capture capacities did not think these could in any environmentally significant way offset global industrial emissions.

The claim on which REDD+ is based is that Amazonia, in the sociohistorical juncture of the 1990s and 2000s, was a very large source of carbon emissions due to the expansion of ranching and agriculture operations, the construction of macroinfrastructure projects, and the associated burning of forests. Therefore, reducing emissions from deforestation could have positive impacts on the climate that would be comparable to reducing industrial emissions. This scientific perspective, which made Amazonian socinatural dynamics comparable to industrial processes, conveyed mainstream scientific understandings.
Take, for example, a meeting I attended at which some of the world’s foremost scientists specializing in Amazonia (Derek included) discussed the most important outcomes of recent environmental research on the basin. Meeting participants concluded that the region could no longer be seen as the world’s “lungs” that the media or naïve environmentalists took the basin to be. One of them claimed, “The Amazon is change . . . changes in rainfall and land use patterns, in soils and waterways.” Attendees also argued that their research could not support policies aimed at preserving Amazonia as a well-balanced macroecological entity, as those approaches would be incongruous with the dynamic situations they encountered in the field. Rather, for them the main policy–scientific issue was determining how best to address a system in transformation. With these questions looming in the background, the scientists supportively discussed REDD+ initiatives.

*Amazonia through the Biogeochemical Glass*

Scientists came to see Amazonia as “change” after decades of seeing the worlds in which they worked as composed of planetary-scale chemical flows driven forward by interlinked physical, chemical, and biological processes such as rain, fire, transpiration, photosynthesis, decomposition, and atmospheric circulation. Theirs was a biogeochemical perspective (Garrels and Perry Jr. 1974; Westbroek 1991), a vantage point from which they studied, for example, how some of the nutrients and aerosols that were found in the region came from places as remote as the Sahara, how humidity reached the basin from the Atlantic Ocean, and how fumes derived from deforestation made air pollution in some areas in Amazonia worse than in São Paulo.

Their biogeochemical vantage point offered particularly vivid insights into links between humans and nonhumans. As soil scientist and biogeochemist Henry Janzen explains:

> If we could follow a single carbon atom now in the air, we might find that it enters a pine tree by photosynthesis, returns to the air when the pine needle decays, then is fixed into a grain of rice, before escaping back into the air in a child’s breath. And so the carbon atom flits from place to place, pausing here and there for seconds or millennia, but ever passed along. (Janzen 2004, 400)

From Janzen’s and my interlocutors’ perspective, the Earth System (and Amazonia as a key part of it) is a shifting, ever-changing composition resulting from molecular transmutations and recombinations. Although from this viewpoint it was hard to identify natural entities that could be neatly cut off from social spheres, for many decades scientists working in Amazonia could still address some geochemical cycles in the region as Nature—insofar as such cycles exhibited stability and temporal invariance. This was the approach taken by Brazilian scientist Eneas Salati, whose biogeochemical research in Amazonia influenced a generation of environmentalists. Salati and colleagues conceptualized the region as a volume of matter through which 15 to 20 percent of total freshwater on earth circulated together with a vast array of chemical elements. Writing with Peter Vose in the article “Amazon Basin: A System in Equilibrium,” they explained that forests slowed down global flows of nutrients and water, thereby creating the climatological and soil-nutrient conditions, thanks to which tropical vegetation thrived (Salati and Vose 1984; see also Salati et al. 1979). Were colonization projects to continue clearing forests, Salati and colleagues suggested, soil fertility could plummet and precipitation patterns might be disrupted, thus threatening to degrade the environmental conditions in the absence of which forests would cease to exist in their current form (Salati and Vose 1984).
While they celebrated Salati and colleagues’ groundbreaking biogeochemical research, the scientists with whom I worked strongly disagreed with their interpretation of Amazonia as a balanced, invariant system within which humanity could stand as a distinct, exterior sphere. As Derek explained to me, biogeochemists often depict the planet as a web of arrows that symbolize how chemical elements circulate across organisms, soils, air, and water. For several decades now, Derek added, he and his colleagues included in their models of the Amazonia a “human arrow” to represent the global impacts of human activities such as burning fossil fuels or deploying agro-industrial inputs. Not only were “social” flows indistinguishable from “natural” ones, but the regional flow of chemicals no longer exhibited homeostatic invariance. As one of Derek’s colleagues told me as we sat by massive agro-industrial fields that extended over what a few years back were Amazonian savannas: “I think that the biggest thing that separates the biogeochemist [from other environmental scientists] is that we are living in a different kind of world; what we are studying... is not the natural cycles, it’s how those are being perturbed [by human activities], and without having much idea about the natural cycles themselves.”

Paul Crutzen’s field experiment “Brushfire” was a landmark in a slow but momentous shift whereby environmental scientists working in Amazonia distanced themselves from Salati and others’ studies that, like those of a generation of scientists, focused on the “balance of nature” (Abel and Stepp 2003; Scoones 1999). In 1979 and 1980 Crutzen’s Brushfire deployed planes so that scientists could literally plunge into heavy smoke plumes rising kilometers into the atmosphere from colonization projects that burned hundreds of square miles of forests. Writing with Meinrat Andreae, Crutzen explained that, as trees were transformed into smoke particles that rose high into the atmosphere, they became nuclei around which water molecules aggregated. The aerosol particles thus formed not only blocked sunlight and reduced ground temperatures, but also made it hard for larger rain droplets to form. Crutzen and Andreae concluded that anthropogenic fires effectively transformed the atmosphere’s molecular composition, reduced ground temperatures, and suppressed rains at regional scales (Crutzen and Andreae 1990; see also Crutzen et al. 1985).

Unlike Salati, who could still suggest that natural macroecological equilibriums could be preserved by limiting human incursions in the region, Crutzen studied worlds whose innermost forms could not be understood without taking into consideration destructive human impacts. This perspective, which places disruptive socionatural entanglements at the center of scientific research, would characterize Crutzen’s study across decades of working on problems as varied as how chlorofluorocarbon molecules had opened a hole in the ozone layer—sharing a Nobel Prize for his findings—and, more recently, the “Anthropocene.”

**Amazonian Anthropocene**

Crutzen’s research in Amazonia opens important paths along which to explore Anthropocene science from an ethnographic perspective and to elucidate the links between this field of research and REDD+ policies. The understanding of humanity as a geological force that is shaping the earth in disruptive ways is often examined through a study of literature produced in the Global North. Shifting scientific understandings of human–nonhuman relations are thus seen to emerge from intellectual labor and discursive configurations emerging from Anglo-European universities, northern governments, and international organizations associated with the United Nations (Lovbrand, Stripple, and Wiman 2009; Sayre 2012). Although these histories accurately convey intellectual genealogies, I argue that an ethnographic engagement with environmental scientists unveils alternative, lived
histories that provide a new perspective from which to study the Anthropocene. This approach would not be an anthropology of or in the Anthropocene, but an Anthropocene anthropology, as Amelia Moore (2015) has suggested, and would entail exploring how scientific understandings of human–nonhuman entanglements carry traces specific to their locations of emergence.

For example, one afternoon I helped a scientist collect air samples in Amazonian agroindustrial fields. The work was fairly repetitive and gave us much space for talking. At one point I asked my companion if he believed we were living in the Anthropocene. “I gotta say,” he replied, “for me it is almost not a question of belief. It just... look at how huge the impact is. The imprint that we left on earth.” He looked around him and I followed his gaze. A flat monocrop field extended to the horizon, briefly interrupted by a few patches of green—private forest reserves that could soon become part of a REDD+ scheme. “I gotta say,” he went on, “I mean, basically, these things [scientific theories and debates] are always about definitions. It is only words we are using here. But this word [Anthropocene], what it tries to explain for me is nothing else but the fact that we left a mark on the planet and that is something that you cannot really deny. You know we did that.”

For my interlocutors, Crutzen’s understanding of the world as a volume of matter thoroughly shaped by human impacts is not compelling as a truthful proposition or precise representation but as a fitting way to convey the bewildering, undeniable sense of being immersed in worlds in fluxion. One of Derek’s close collaborators, a scientist I will call John, once explained to me that Amazonia’s dazzling socionatural transformations and the problems of the Anthropocene became apparent to him in association with experiences that led to radical shifts in his research. John’s initial work as a scientist concerned studies similar to Salati’s research on ecological equilibriums. “We would go into the forest and find ourselves a nice tree and camp beside it,” John told me:

We measured [the tree] and studied in detail rates of growth. We measured leaves, assessed rain patterns, looked into how leaves fell, how they decomposed and became nutrients [for the tree]... and one day a frog jumped on the tree! And then the frog would poop! And we would study how the poop became nutrients for the tree. [He laughed.]

His work on self-sustaining chains of transmutation came to an end in the 1980s when he lived in the Amazon working as a research assistant whose obligations included collecting air samples in the forest and sending them to North America for chemical analysis. One day he received a strange, scalding letter from his laboratory. The person in charge of sample analysis pointedly asked about his collection protocols, whether he was still at the scientific base to which he was assigned, and even about his drinking habits. “Have you escaped to Rio [de Janeiro] to waste the [grant] money on partying?” Only with time did he fully understand the reasons behind this communication: chlorofluorocarbon molecules derived from industrial processes were found in some of his samples. His laboratory eventually determined that these were not traces of John’s lifestyle (the samples had indeed been taken in forests). During summers in the Northern Hemisphere, he explained to me, the atmosphere expands due to higher temperatures, thus altering atmospheric circulation patterns and taking air laden with industrial chemicals from the Northern Hemisphere to Amazonian forests. For John, the experience of finding himself immersed in streams of interweaving industrial and ecological processes was more shocking than witnessing mass deforestation first hand. He argued that, at that point, he was forced to drop for good his
view of Amazonia as a pristine region threatened from the outside and opposed to the industrial North.

When John described the experience of studying worlds in fluxion, he let go of his characteristic wit. While a previous generation of biogeochemists (such as Salati) worked with data gathered at a handful of accessible cities and ports, John and his colleagues, he told me, studied Amazonia by drawing on data collected in evermore numerous urban centers hurriedly built across the basin since the 1970s. The more colonization undertakings advanced, the more data-gathering sites were established, the more data became available, and the clearer it became to scientists that Amazonia was far from being a monolithic “green carpet.” What scientists knew about Amazonia changed along with what scientists sensed while living in Amazonia. John witnessed firsthand how small settlements emerged in forests and progressively became farms and ranches. Some of these places grew into villages and then cities. Areas that were opened during the years in which Fernando’s family arrived in Amazonia and over which Crutzen’s team flew became a global agro-industrial powerhouse exporting rural commodities to European and Asian markets. These economic and environmental transformations forced scientists to modify their research projects in order to take into account the macroecological impacts of industrial agriculture. Salati could still overlook millennia of human interventions in Amazonia and focus on invariant biogeochemical flows (see Baleé 1989; Heckenberger 2005), but scientists such as John, Derek, and Fernando studied the region riding human waves that drove irreversible changes.

The sense that macroecosystem dynamics could be studied only thanks to waves of change that could collapse current ecological forms underlines characteristically Amazonian takes on the Anthropocene. When Crutzen left the basin to study the ozone layer, the environmental impacts of a possible nuclear confrontation, and, more recently, the new geological epoch of the Anthropocene, he left behind students, collaborators, methodological guidelines, and questions that were profoundly influential in environmental science in Amazonia. Nonetheless, if Crutzen’s “Anthropocene approach” has influenced recent environmental research in Amazonia, it is also true that Amazonia research influenced Crutzen. Amazon-based scientists like John and Derek contributed to the science of the Anthropocene by clarifying human impacts on biodiversity, biogeochemical fluxes, regional rain regimes, regional fire regimes, and emissions derived from deforestation, among other topics.

My point here is that it is useful, when addressing the science of the Anthropocene, to consider, as anthropologists of science and technology encourage us to do, the contributions made by scientists from the Global South; situated engagements with locations, instruments, and atmospheres; and the unique vantage points offered by scientific fields that specialize in issues that destabilize naturalist ontological understandings (Helmreich 2016; Lahsen 2004; Mathews 2011; Traweek [1988] 1992). This approach makes it possible to understand how REDD+ initiatives were shaped by research on themes of the Anthropocene and lived experiences of irreversible, violent, and purportedly unavoidable ecological transformations.

Conclusions

“There is a difference,” Ingold argues, “between being surprised by things, and being astonished by them. Surprise is the currency of experts who trade in plans and predictions” (Ingold 2011, 63–64). In those terms, there was “surprise” in Salati’s conclusions regarding colonization’s impacts on Amazonia’s hydric balance or in John’s findings about how frog and tree metabolisms formed large ecological webs. The feeling of surprise can also be found in climate policy proposals that respond to socioenvironmental crises in Amazonia
by advocating for strategies designed to protect Nature. In all of these cases, there were experts who saw themselves as capable of knowing and protecting self-sustained systems whose properties are understood to be invariant, like those of a well-tuned machine. These science/policy approaches can be seen as conveying what Descola describes as “the certainties of naturalism” (Descola 2013, 172–200).

Meanwhile, I claim that John’s experience of finding industrial molecules in his air samples was marked by what Ingold calls “astonishment,” the sense experience of finding oneself immersed in the fluidity of worlds-in-formation (Ingold 2011, 74–75). Analogous feelings of astonishment can be found in REDD+ proposals advanced by Derek, Lovejoy, and Fernando. Like other scientists who worked in Amazonia, they came to know the region as new roads were opened, cities grew, forests were felled and burned, and agriculture and ranching operations blossomed. They did not experience Nature but shifting situations that were always unsettling, often unjust, sometimes violent, and occasionally deadly. In response, they rejected plans that would require placing environmentalists as managers who could know, improve, and command Amazonia. REDD+ proponents engaged Amazonia as a dynamic configuration of political, economic, and ecological forces that undermined ideas of the region as a mechanism bounded by invariable, elegant laws and chains of causation. For them, to know Amazonia was synonymous with suffering environmental loss, and to respond politically to climate transformations in the region was synonymous with taking part in environmentally disruptive and unjust socioenvironmental processes. Their science/policy undertakings thus moved beyond (or perhaps below) Nature and Culture.

My interpretation of the linkages between REDD+ and research on themes of the Anthropocene places life histories, situated experiences, and the unique vantage point offered by biogeochemistry research at the forefront. By focusing on these issues, I offer an interpretation of novel, mainstream climate politics that differ from projects that strive to preserve conventional forms of authority which are premised on Nature/Culture dichotomies. I claim that REDD+ exemplifies an emerging type of climate politics whose problems are not derived from striving to preserve the world as it is or to improve it as it should be (Evans and Reid 2014; Oels 2013; Walker and Cooper 2011; Whittington 2012). Derek and his colleagues allow us to see an increasingly important type of environmental politics that operates within emerging, ever-shifting worlds shaped by “a good deal of suffering.”

Notes

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1. For an insightful study of these debates, see Lahsen 2009.
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